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Preface to the Imaging Guidelines

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Preface-1: Guideline Development

- The eviCore healthcare (eviCore) evidence-based, proprietary clinical guidelines evaluate a range of advanced imaging and procedures, including NM, US, CT, MRI, PET, and Radiation Oncology, Sleep Studies and Cardiac and Spine interventions.

- eviCore reserves the right to change and update the guidelines. The guidelines undergo a formal review annually. eviCore’s guidelines are based upon major national and international association and society guidelines and criteria, peer-reviewed literature, major treatises as well as, input from health plans, practicing academic and community-based physicians.

- These Guidelines are not intended to supersede or replace sound medical judgment, but instead, should facilitate the identification of the most appropriate imaging procedure given the patient’s clinical condition. These guidelines are written to cover medical conditions as experienced by the majority of patients. However, these guidelines may not be applicable in certain clinical circumstances, and physician judgment can override the guidelines.

- Clinical decisions, including treatment decisions, are the responsibility of the patient and his/her provider. Clinicians are expected to use independent medical judgment, which takes into account the clinical circumstances to determine patient management decisions.

- eviCore supports the Choosing Wisely initiative (www.choosingwisely.org) by the American Board of Internal Medicine (ABIM) Foundation and many national physician organizations, to reduce the overuse of diagnostic tests that are low value, no value, or whose risks are greater than the benefits.
Preface-2: Benefits, Coverage Policies, and Eligibility Issues

**Medicare Coverage Policies**

- For Medicare and Medicare Advantage enrollees, the coverage policies of CMS (Centers for Medicare and Medicaid Services) take precedence over eviCore’s guidelines.

**Investigational and Experimental Studies**

- Certain advanced imaging studies, or other procedures, may be considered investigational and experimental if there is a paucity of supporting evidence; if the evidence has not matured to exhibit improved health parameters or; the advanced imaging study/procedure lacks a collective opinion of support.

**Clinical and Research Trials**

- Similar to investigational and experimental studies, clinical trial imaging requests will be considered to determine whether they meet Health Plan coverage and eviCore’s evidence-based guidelines.

**Legislative Mandate**

- State and federal legislations may need to be considered in the review of advanced imaging requests. For example:
  - Various State and Federal Breast Density Laws
  - Texas HB 1290 Coronary Calcium CT Law

**Reference**

Preface-3: Clinical Information

- eviCore guidelines use an evidence-based approach to determine the most appropriate imaging procedure for each patient, at the most appropriate time in the diagnostic and treatment cycle. eviCore guidelines direct by:
  - Clinical presentation of the patient, not by the studies requested
  - Current evaluation (within 60 days), to include the following: a recent detailed history, physical examination, and/or appropriate laboratory studies. The Spine and Musculoskeletal guidelines require x-ray studies from when the current episode of symptoms has started or changed; x-ray imaging does not have to be within the past 60 days.
  - Advanced imaging should not be ordered prior to clinical evaluation of a patient by the physician treating the individual. This may include referral to Consultant Specialist who will make further treatment decisions.
  - Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.
  - An exception can be made if the patient is undergoing a guideline-supported, scheduled follow-up imaging evaluation. These routine surveillance indications are addressed in the applicable guideline sections.

- The terms “male” and “female” used in these guidelines refer to anatomic-specific diseases and disease predispositions associated with individuals’ sex assigned at birth rather than their gender identity. It should be noted that gender identity and anatomic-specific diseases as well as disease predispositions are not always linked. As such, these guidelines should be applied to the individual's corresponding known or suspected anatomic-specific disease or disease predisposition. At eviCore, we believe that it is important to understand how all individuals, including those who are gender-diverse, choose to identify themselves. To ensure that gender-diverse individuals are treated with respect and that decisions impacting their healthcare are made correctly and with sensitivity, eviCore recognizes all individuals with the following gender marker options: Male, Female, Transgender male, Transgender female, “X”, and “Not specified”.

Imaging – General Process

- “Standard” or “conventional” imaging is most often performed in the initial and subsequent evaluations of malignancy. Standard or conventional imaging includes plain film, CT, MRI, or US.

- Often, further advanced imaging is needed when initial imaging, such as ultrasound or CT does not answer the clinical question. Uncertain, indeterminate, inconclusive, or equivocal may describe these situations.

- Requests for many Healthcare Common Procedure Coding System (HCPCS) codes, including nonspecific codes such as S8042 [Magnetic resonance imaging (MRI), low-field], should be redirected to a more appropriate and specific CPT® code. Exceptions are noted in the applicable guidelines.
Imaging – Contrast Media

- Contrast is the second important component, along with the advanced imaging modality (refer to specific guideline contrast section)
  - If, during the performance of a non-contrast imaging study, there is the need to use contrast in order to evaluate a possible abnormality, then that is appropriate.¹

Imaging – Metal devices or implants

- Most orthopedic and dental implants are not magnetic. These include hip and knee replacements; plates, screws, and rods used to treat fractures; and cavity fillings. Yet, all of these metal implants can distort the MRI image if near the part of the body being scanned.
  - Other implants, however, may have contraindications to MRI. These include:
    - Pacemakers
    - ICD or heart valves
    - Metal implants in the brain
    - Metal implants in the eyes or ears
    - Infusion catheters and bullets or shrapnel.
  - CT can therefore be an alternative study to MRI in these scenarios.

Computed Tomography (CT):

- CT can be performed without contrast, with contrast, or without and with contrast depending on the clinical indication and body part.
- CT without contrast maybe appropriate if clinical criteria are met AND:
  - Patient has elevated BUN and/or creatinine
  - Renal insufficiency
  - Allergies to iodinated CT contrast
  - Thyroid disease which could be treated with I-131
  - Diabetics
  - Very elderly

- There are significant potential adverse effects associated with the use of iodinated contrast media. These include hypersensitivity reactions, thyroid dysfunction, and contrast-induced nephropathy (CIN). Patients with impaired renal function are at increased risk for CIN.²
- Both contrast CT and MRI may be considered to have the same risk profile with renal failure (GFR <30 mL/min).
- The use of CT contrast should proceed with caution in pregnant and breast feeding patients. There is a theoretical risk of contrast to the fetal and infant thyroid. The procedure can be performed if the specific need for that procedure outweighs risk to the fetus. Breast feeding patients may pump and discard breast milk for 12-24 hours after the contrast injection.
Magnetic Resonance Imaging (MRI):

- MR imaging may be utilized through these guidelines either as the primary advanced imaging modality, or when further definition is needed based on CT imaging.
- MRI imaging may be preferred in patients with renal failure, and in patients allergic to intravenous CT contrast.
  - Both contrast CT and MRI may be considered to have the same risk profile with renal failure (GFR <30 mL/min).
  - Gadolinium can cause Nephrogenic Systemic Fibrosis (NSF). The greater the number exposure of gadolinium in patients with a low GFR (especially if on dialysis), the greater the chance of NSF.
  - Multiple studies have demonstrated potential for gadolinium deposition following the use of gadolinium-based contrast agents (GBCAs) for MRI studies. The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.

- A CT (contrast mirrors what is appropriate for MRI) may be approved in place of an MRI when:
  - Clinical criteria are met for MRI AND there is a contraindication to having an MRI (pacemaker, ICD, insulin pump, neurostimulator, etc.)
  - Caution should be taken in the use of gadolinium in patients with renal failure
  - The use of gadolinium contrast agents is contraindicated during pregnancy unless the specific need for that procedure outweighs risk to the fetus.
  - MRI can be performed for non ferromagnetic body metals, although some imaging facilities will consider it contraindicated if recent surgery, regardless of the metal type

- MRI should not be used as a replacement for CT, for the reason of lack of ionizing radiation, especially when the indication does not meet these Guidelines, since it does not solve the problem of over-utilization.

Overutilization of Advanced Imaging:

- A number of recent reports describe over-utilization in all areas of advanced imaging, which may include:
  - High level testing without consideration of lesser invasive, lesser cost and low technology options
  - Excessive radiation and costs with unnecessary testing
  - Defensive medical practice
  - CT without and with contrast (so called “double contrast studies) requests, which have few current indications.
  - MRI requested in place of CT to avoid radiation without considering the primary indication for imaging
Adult CT settings and protocols used for smaller people and children

Unnecessarily imaging procedures when the same or similar studies have already been conducted.

A review of the imaging histories of all patients presenting for studies has been recognized as one of the more important processes that can be implemented. By recognizing that a duplicate or questionably indicated examination has been ordered for patients, it may be possible to avoid exposing them to unnecessary risks. To avoid these unnecessary risks, the precautions below should be considered.

The results of initial diagnostic tests or radiologic studies to narrow the differential diagnosis should be obtained prior to performing further tests or radiologic studies.

The clinical history should include a potential indication such as a known or suspected abnormality involving the body part for which the imaging study is being requested. These potential indications are addressed in greater detail within the applicable guidelines.

The results of the requested imaging procedures should be expected to have an impact on patient management or treatment decisions.

Repeat imaging studies are not generally necessary unless there is evidence of disease progression, recurrence of disease, and/or the repeat imaging will affect a patient’s clinical management.

References
## Preface-4: Coding Issues

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Preface-4.1: 3D Rendering

CPT® 76376 and CPT® 76377:

- Both codes require concurrent supervision of the image post-processing 3D manipulation of the volumetric data set and image rendering.
  - Concurrent supervision is defined as active physician participation in and monitoring of the reconstruction process including design of the anatomic region that is to be reconstructed; determination of the tissue types and actual structures to be displayed (eg, bone, organs, and vessels); determination of the images or cine loops that are to be archived; and monitoring and adjustment of the 3D work product. The American College of Radiology (ACR) recommends that it is best to document the physician's supervision or participation in the 3D reconstruction of images.

- These two codes differ in the need for and use of an independent workstation for post-processing.
  - CPT® 76376 reports procedures not requiring image post-processing on an independent workstation.
  - CPT® 76377 reports procedures that require image post-processing on an independent workstation.

- These 3D rendering codes should not be used for 2D reformatting.

- Two-dimensional reconstruction (e.g. reformatting an axial scan into the coronal plane) is now included in all cross-sectional imaging base codes and is not separately reimbursable.

- The codes used to report 3D rendering for ultrasound and echocardiography are also used to report the 3D post processing work on CT, MRI, and other tomographic modalities.

- Providers may be required to obtain prior authorization on these 3D codes even if prior authorization is not required for the echocardiography and/or ultrasound procedure codes. It may appear that eviCore pre-authorizes echocardiography and/or ultrasound when, in fact, it may only be the 3D code that needs the prior authorization.

- CPT® codes for 3D rendering should not be billed in conjunction with computer-aided detection (CAD), MRA, CTA, nuclear medicine SPECT studies, PET, PET/CT, Mammogram, MRI Breast, CT Colonography (virtual colonoscopy), Cardiac MRI, Cardiac CT, or Coronary CTA studies.

- CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) can be considered in the following clinical scenarios:
  - Bony conditions:
    - Evaluation of congenital skull abnormalities in newborns, infants, and toddlers (usually for preoperative planning)
    - Complex joint fractures or pelvis fractures
    - Spine fractures (usually for preoperative planning)
- Complex facial fractures
- Preoperative planning for other complex surgical cases
- Pelvis conditions:
  - Uterine intra-cavitary lesion when initial US is equivocal (See PV-2.1: Abnormal Uterine Bleeding (AUB) and PV-12.1: Leiomyomata in the Pelvis Imaging Guidelines)
  - Hydrosalpinx or peritoneal cysts when initial US is indeterminate (See PV-5.3: Complex Adnexal Masses in the Pelvis Imaging Guidelines)
  - Lost IUD (inability to feel or see IUD string) with initial US (See PV-10.1: Intrauterine Device in the Pelvis Imaging Guidelines)
  - Uterine anomalies with initial US (See PV-14.1: Uterine Anomalies in the Pelvis Imaging Guidelines)
  - Infertility (See PV-9.1: Infertility Evaluation, Female in the Pelvis Imaging Guidelines)
- Abdomen conditions:
  - CT Urogram (See AB-39: Hemaeturia and Hydronephrosis in the Abdomen Imaging Guidelines)
  - MRCP (See AB-27: MR Cholangiopancreatography (MRCP) in the Abdomen Imaging Guidelines)

Preface-4.2: CT-, MR-, or Ultrasound-Guided Procedures

- CT, MR, and Ultrasound guidance procedure codes contain all the imaging necessary to guide a needle or catheter. It is inappropriate to routinely bill a diagnostic procedure code in conjunction with a guidance procedure code.
- Imaging studies performed as part of a CT-, MR-, or Ultrasound-guided procedure should be reported using the CPT® codes in the following table.

**TABLE: Imaging Guidance Procedure Codes**

<table>
<thead>
<tr>
<th>CPT®</th>
<th>Description</th>
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<tr>
<td>19085</td>
<td>Biopsy, breast, with placement of breast localization device(s), when performed, and imaging of the biopsy specimen, when performed, percutaneous; first lesion, including MR guidance</td>
</tr>
<tr>
<td>19086</td>
<td>Biopsy, breast, with placement of breast localization device(s), when performed, and imaging of the biopsy specimen, when performed, percutaneous; first lesion, including MR guidance; each additional lesion, including MR guidance</td>
</tr>
<tr>
<td>75989</td>
<td>Imaging guidance for percutaneous drainage with placement of catheter (all modalities)</td>
</tr>
<tr>
<td>77011</td>
<td>CT guidance for stereotactic localization</td>
</tr>
<tr>
<td>77012</td>
<td>CT guidance for needle placement</td>
</tr>
<tr>
<td>77013</td>
<td>CT guidance for, and monitoring of parenchymal tissue ablation</td>
</tr>
<tr>
<td>77021</td>
<td>MR guidance for needle placement</td>
</tr>
<tr>
<td>77022</td>
<td>MR guidance for, and monitoring of parenchymal tissue ablation</td>
</tr>
<tr>
<td>76942</td>
<td>Ultrasonic guidance for needle placement</td>
</tr>
</tbody>
</table>
**CPT® 19085 and CPT® 19086:**

- The proper way to bill an MRI guided breast biopsy is CPT® 19085 (Biopsy, breast, with placement of breast localization device(s), when performed, and imaging of the biopsy specimen, when performed, percutaneous; first lesion, including MR guidance). Additional lesions should be billed using CPT® 19086.

**CPT® 75989:**

- This code is used to report imaging guidance for a percutaneous drainage procedure in which a catheter is left in place.
- This code can be used to report whether the drainage catheter is placed under fluoroscopy, ultrasound, CT, or MR guidance modality.

**CPT® 77011:**

- A stereotactic CT localization scan is frequently obtained prior to sinus surgery. The dataset is then loaded into the navigational workstation in the operating room for use during the surgical procedure. The information provides exact positioning of surgical instruments with regard to the patient’s 3D CT images.
- In most cases, the preoperative CT is a technical-only service that does not require interpretation by a radiologist.
  - The imaging facility should report CPT® 77011 when performing a scan not requiring interpretation by a radiologist.
  - If a diagnostic scan is performed and interpreted by a radiologist, the appropriate diagnostic CT code (e.g., CPT® 70486) should be used.
  - It is not appropriate to report both CPT® 70486 and CPT® 77011 for the same CT stereotactic localization imaging session.
  - 3D Rendering (CPT® 76376 or CPT® 76377) should not be reported in conjunction with CPT® 77011 (or CPT® 70486 if used). The procedure inherently generates a 3D dataset.

**CPT® 77012 (CT) and CPT® 77021 (MR):**

- These codes are used to report imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.
- They represent the radiological supervision and interpretation of the procedure and are often billed in conjunction with surgical procedure codes.
  - For example, CPT® 77012 is reported when CT guidance is used to place the needle for a conventional arthrogram.
  - Only codes representing percutaneous surgical procedures should be billed with CPT® 77012 and CPT® 77021. It is inappropriate to use with surgical codes for open, excisional, or incisional procedures.
CPT® 77013 (CT) and CPT® 77022 (MR):

These codes include the initial guidance to direct a needle electrode to the tumor(s), monitoring for needle electrode repositioning within the lesion, and as necessary for multiple ablations to coagulate the lesion and confirmation of satisfactory coagulative necrosis of the lesion(s) and comparison to pre-ablation images.

- **NOTE:** CPT® 77013 should only be used for non-bone ablation procedures.
- CPT® 20982 includes CT guidance for bone tumor ablations.
- Only codes representing percutaneous surgical procedures should be billed with CPT® 77013 and CPT® 77022. It is inappropriate to use with surgical codes for open, excisional, or incisional procedures.

CPT® 77012 and CPT® 77021 (as well as guidance codes CPT® 76942 [US], and CPT® 77002 - CPT® 77003 [fluoroscopy]) describe radiologic guidance by different modalities.

- Only one unit of any of these codes should be reported per patient encounter (date of service). The unit of service is considered to be the patient encounter, not the number of lesions, aspirations, biopsies, injections, or localizations.

### Preface-4.3: Unlisted Procedures/Therapy Treatment Planning

<table>
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<tr>
<th>CPT®</th>
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<tr>
<td>76497</td>
<td>Unlisted CT procedure (e.g., diagnostic or interventional)</td>
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<tr>
<td>76498</td>
<td>Unlisted MR procedure (e.g., diagnostic or interventional)</td>
</tr>
<tr>
<td>78999</td>
<td>Unlisted procedure, diagnostic nuclear medicine</td>
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</table>

These unlisted codes should be reported whenever a diagnostic or interventional CT or MR study is performed in which an appropriate anatomic site-specific code is not available.

- A Category III code that describes the procedure performed must be reported rather than an unlisted code if one is available.

CPT® 76497 or CPT® 76498 (Unlisted CT or MRI procedure) can be considered in the following clinical scenarios:

- Studies done for navigation and planning for neurosurgical procedures (i.e. Stealth or Brain Lab Imaging)¹,²
- Custom joint Arthroplasty planning (not as Alternative Recommendation) (See **MS-12.1: Osteoarthritis** in the Musculoskeletal Imaging Guidelines)
- Any procedure/surgical planning if thinner cuts or different positional acquisition (than those on the completed diagnostic study) are needed. These could include sinus surgery or navigational bronchoscopy.

### Therapy Treatment Planning

- Radiation Therapy Treatment Planning: See **ONC-1.5: Unlisted Procedure Codes in Oncology** in the Oncology Imaging Guidelines

### References

1. [https://neurosurgery.mgh.harvard.edu/iGSImages.htm](https://neurosurgery.mgh.harvard.edu/iGSImages.htm).
Preface-4.4: Unilateral versus Bilateral Breast MRI

Diagnostic MRI of both breasts should be coded as CPT® 77049 regardless of whether both breasts are imaged simultaneously or whether unilateral breast MRI is performed in two separate imaging sessions.

Preface-4.5: CPT® 76380 Limited or Follow-up CT

CPT® 76380 describes a limited or follow-up CT scan. The code is used to report any CT scan, for any given area of the body, in which the work of a full diagnostic code is not performed.

- Common examples include (but are not limited to):
  - Limited sinus CT imaging protocol
  - Limited or follow-up slices through a known pulmonary nodule
  - Limited slices to assess a non-healing fracture (such as the clavicle)

- It is inappropriate to report CPT® 76380, in conjunction with other diagnostic CT codes, to cover 'extra slices' in certain imaging protocols.
  - There is no specific number of sequences or slices defined in any CT CPT® code definition.
  - The AMA, in CPT® 2019, does not describe nor assign any minimum or maximum number of sequences or slices for any CT study.
    - A few additional slices or sequences are not uncommon.
    - CT imaging protocols are often influenced by the individual clinical situation of the patient. Sometimes the protocols require more time and sometimes less.

Preface-4.6: SPECT/CT Imaging

SPECT/CT involves SPECT (Single Photon Emission Computed Tomography) nuclear medicine imaging and CT for optimizing location, accuracy, and attenuation correction and combines functional and anatomic information.

- Common studies using this modality include $^{123}$I- or $^{131}$I-Metaiodobenzylguanidine (MIBG) and octreotide scintigraphy for neuroendocrine tumors.

- Hybrid Nuclear/CT scan can be CPT® 78830 - single area and single day, CPT® 78831 - 2 or more days, or CPT® 78832 - 2 areas with one day and 2 day study.

- A procedure code for SPECT/CT parathyroid nuclear imaging, (CPT® 78072), became effective January 1, 2013.

Reference
1. Society of Nuclear Medicine and Molecular Imaging Coding Corner
http://www.snmmi.org/ClinicalPractice/CodingCornerPT.aspx?ItemNumber=1786
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<td>Preface-5.3: PET-MRI</td>
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Preface-5.1: Whole Body CT Imaging

Whole body CT or LifeScan (CT Brain, Chest, Abdomen, and Pelvis) for screening of asymptomatic patients is not a covered benefit. The performance of whole body screening CT examinations in healthy patients does not meet any of the current validity criteria for screening studies and there is no clear documentation of benefit versus radiation risk.

Preface-5.2: Whole Body MR Imaging

Whole body MRI (WBMRI) is, with the exception of Li-Fraumeni syndrome discussed below, generally not supported by eviCore at this time due to lack of standardization in imaging technique and lack of evidence that WBMRI improves patient outcome for any individual disease state.

- While WBMRI has the benefit of whole body imaging and lack of radiation exposure, substantial variation still exists in the number of images, type of sequences (STIR vs. diffusion weighting, for example), and contrast agent(s) used.

Coding considerations:

- There are no established CPT® or HCPCS codes for reporting WBMRI.
- WBMRI is at present only reportable using CPT® 76498. All other methods of reporting whole body MRI are inappropriate, including:
  - Separate diagnostic MRI codes for multiple individual body parts
  - MRI Bone Marrow Supply (CPT® 77084)

Disease-specific considerations:

- Cancer screening:
  - Annual WBMRI is recommended for cancer screening in patients with Li-Fraumeni Syndrome. Otherwise, WBMRI has not been shown to improve outcomes for cancer screening. See PEDONC-2.2: Li-Fraumeni Syndrome (LFS) in the Pediatric Oncology Imaging Guidelines for additional information

- Cancer staging and restaging
  - While the feasibility of WBMRI has been established, data remain conflicting on whether WBMRI is of equivalent diagnostic accuracy compared with standard imaging modalities such as CT, scintigraphy, and PET imaging. Evidence has not been published establishing WBMRI as a standard evaluation for any type of cancer.

- Autoimmune disease
  - WBMRI has been shown to increase the number of detected lesions in chronic multifocal osteomyelitis and other inflammatory arthritides, but no improvement in outcomes from the use of WBMRI has yet been shown. See PEDMS-10.2: Chronic Recurrent Multifocal Osteomyelitis in the Pediatric Musculoskeletal Imaging Guidelines for additional information.
Preface-5.3: PET-MRI

PET-MRI is, generally, not supported by eviCore at this time due to lack of standardization in imaging technique and lack of evidence that PET-MRI improves patient outcome for any individual disease state.

References
Preface-6: References

- Complete reference citations for the journal articles are embedded within the body of the guidelines and/or may be found on the Reference pages at the end of some guideline sections.

- The website addresses for certain references are included in the body of the guidelines but are not hyperlinked to the actual website.

- The website address for the American College of Radiology (ACR) Appropriateness Criteria® is [http://www.acr.org](http://www.acr.org).
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### Abdomen Imaging Guidelines

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### Abbreviations for Abdomen Imaging Guidelines

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<th>Description</th>
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<tr>
<td>AAA</td>
<td>abdominal aortic aneurysm</td>
</tr>
<tr>
<td>AASLD</td>
<td>American Association for the Study of Liver Diseases</td>
</tr>
<tr>
<td>ACE</td>
<td>angiotensin-converting enzyme</td>
</tr>
<tr>
<td>ACG</td>
<td>American College of Gastroenterology</td>
</tr>
<tr>
<td>ACR</td>
<td>American College of Radiology</td>
</tr>
<tr>
<td>ACTH</td>
<td>adrenocorticotropic hormone</td>
</tr>
<tr>
<td>AFP</td>
<td>alpha-fetoprotein</td>
</tr>
<tr>
<td>AGA</td>
<td>American Gastroenterological Association</td>
</tr>
<tr>
<td>ALT</td>
<td>alanine aminotransferase</td>
</tr>
<tr>
<td>ASGE</td>
<td>American Society for Gastrointestinal Endoscopy</td>
</tr>
<tr>
<td>AST</td>
<td>aspartate aminotransferase</td>
</tr>
<tr>
<td>AUA</td>
<td>American Urological Association</td>
</tr>
<tr>
<td>BEIR</td>
<td>Biological Effects of Ionizing Radiation</td>
</tr>
<tr>
<td>BUN</td>
<td>blood urea nitrogen</td>
</tr>
<tr>
<td>CAG</td>
<td>Canadian Association of Gastroenterology</td>
</tr>
<tr>
<td>CNS</td>
<td>central nervous system</td>
</tr>
<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>CTC</td>
<td>computed tomography colonography (aka: virtual colonoscopy)</td>
</tr>
<tr>
<td>DVT</td>
<td>deep vein thrombosis</td>
</tr>
<tr>
<td>ERCP</td>
<td>endoscopic retrograde cholangiopancreatography</td>
</tr>
<tr>
<td>EUS</td>
<td>endoscopic ultrasound</td>
</tr>
<tr>
<td>FNH</td>
<td>focal nodular hyperplasia</td>
</tr>
<tr>
<td>GFR</td>
<td>glomerular filtration rate</td>
</tr>
<tr>
<td>GGT</td>
<td>gamma glutamyltransferase</td>
</tr>
<tr>
<td>GI</td>
<td>gastrointestinal</td>
</tr>
<tr>
<td>HCC</td>
<td>hepatocellular carcinoma</td>
</tr>
<tr>
<td>HCPCS</td>
<td>Healthcare Common Procedural Coding System (commonly pronounced: “hix pix”)</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
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</tr>
<tr>
<td>HU</td>
<td>Hounsfield units</td>
</tr>
<tr>
<td>IAA</td>
<td>iliac artery aneurysm</td>
</tr>
<tr>
<td>IV</td>
<td>intravenous</td>
</tr>
<tr>
<td>KUB</td>
<td>kidneys, ureters, bladder (plain frontal supine abdominal radiograph)</td>
</tr>
<tr>
<td>LFT</td>
<td>liver function tests</td>
</tr>
<tr>
<td>MRCP</td>
<td>magnetic resonance cholangiopancreatography</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
<tr>
<td>mSv</td>
<td>millisievert</td>
</tr>
<tr>
<td>NAFLD</td>
<td>nonalcoholic fatty liver disease</td>
</tr>
<tr>
<td>PA</td>
<td>posteroanterior projection</td>
</tr>
<tr>
<td>PET</td>
<td>positron emission tomography</td>
</tr>
<tr>
<td>RAS</td>
<td>renal artery stenosis</td>
</tr>
<tr>
<td>RBC</td>
<td>red blood cell</td>
</tr>
<tr>
<td>SBFT</td>
<td>small bowel follow through</td>
</tr>
<tr>
<td>SPECT</td>
<td>single photon emission computed tomography</td>
</tr>
<tr>
<td>VC</td>
<td>virtual colonoscopy (CT colonography)</td>
</tr>
<tr>
<td>PFT</td>
<td>pulmonary function tests</td>
</tr>
<tr>
<td>WBC</td>
<td>white blood cell</td>
</tr>
<tr>
<td>ZES</td>
<td>Zollinger-Ellison Syndrome</td>
</tr>
<tr>
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<td></td>
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<td>--------------------------</td>
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<td>AB-1.11: RADCAT Grading System</td>
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**AB-1.1: Overview**

- A current clinical evaluation (within 60 days) is required before advanced imaging can be considered. The clinical evaluation may include a relevant history and physical examination, appropriate laboratory studies, and non-advanced imaging modalities such as plain X-ray or ultrasound. Other meaningful contact (telephone call, electronic mail or messaging) by an established individual can substitute for a face-to-face clinical evaluation.

- GI Specialist evaluations can be helpful, particularly in determining mesenteric/colic ischemia, diarrhea/constipation, irritable bowel syndrome (IBS), or need for MRCP.

- Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crest.

- Pelvic imaging begins at the iliac crest and extends to the pubis.

- Clinical concerns at the dividing line can be providers’ choice (abdomen and pelvis; abdomen or pelvis).

**AB-1.2: CT Imaging**

- CT imaging is a more generalized modality. CT Abdomen is usually performed with contrast (CPT® 74160):
  - Oral contrast has no relation to the IV contrast administered. Coding for contrast only refers to IV contrast. There is no coding for oral contrast.
  - Exceptions are noted in these guidelines, and include:
    - CT Abdomen with contrast (CPT® 74160) or without and with contrast (CPT® 74170) with suspicion of a solid organ lesion (liver, kidney, pancreas, spleen).
    - CT Abdomen without contrast (CPT® 74150) or CT Abdomen and Pelvis without contrast (CPT® 74176) if there is renal insufficiency/failure, or a documented allergy to contrast. It can also be considered for diabetics or the very elderly.
  - Shellfish allergy:
    - It is commonly assumed that an allergy to shellfish infers iodine allergy, and that this implies an allergy to CT iodinated contrast media. However, this is NOT true. Shellfish allergy is due to tropomyosins. Iodine plays no role in these allergic reactions. Allergies to shellfish do not increase the risk of reaction to IV contrast any more than that of other allergens.
  - CT Abdomen and Pelvis, usually with contrast (CPT® 74177), should be considered when signs or symptoms are generalized, or involve a lower quadrant of the abdomen.
  - CT Enterography (CPT® 74177) combines CT imaging with large volumes of ingested neutral bowel contrast material to allow visualization of the small bowel.
  - CT Enteroclysis
    - A tube is placed through the nose or mouth and advanced into the duodenum or jejunum. Bowel contrast material is infused through the tube and CT imaging is performed either with or without intravenous contrast.
CT Enteroclysis is used to allow visualization of the small bowel wall and lumen. CT Enteroclysis may allow better or more consistent distention of the small bowel than CT Enterography.

Report by assigning: CPT® 74176 or CPT® 74177

- **Triple-phase CT**
  - 3 phases of a triple-phase CT are:
    1. Hepatic arterial phase,
    2. Portal venous phase, and
    3. Washout or delayed acquisitions phase.

  It should be noted that, in general, a precontrast or noncontrast CT is usually not needed in a standard triple-phase CT, except in those individuals previously treated with locoregional embolic or ablative therapies. Thus, for the evaluation of liver lesions EITHER a CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170) can be approved. This is in contradistinction to MRI, in which precontrast imaging is needed.

**AB-1.3: MR Imaging**

- MRI may be preferred as a more targeted study in cases of renal failure in individuals allergic to intravenous CT contrast, and as noted in these guidelines.
  - MRI Abdomen with contrast only is essentially never performed. If contrast is indicated, MRI Abdomen without and with contrast (CPT® 74183) should be performed.
  - For pregnant women ultrasound or MRI without contrast should be used to avoid radiation exposure. The use of gadolinium contrast agents is contraindicated during pregnancy, as gadolinium contrast agents cross the placenta and enter the amniotic fluid with unknown long term effects on the fetus.

- MR Elastography (CPT® 76391) replaces MRI Abdomen (CPT® 74183 or CPT® 74181) for requests for MR Elastography liver (See [AB-45: Liver Elastography](#)).

**AB-1.4: MR Enterography and Enteroclysis Coding Notes**

- MR Enterography or Enteroclysis is reported in one of two ways:
  - MRI Abdomen without and with contrast (CPT® 74183), or
  - MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis with and without contrast (CPT® 72197)
**AB-1.5: Ultrasound**

- Ultrasound, also called sonography, uses high frequency sound waves to image body structures.
  - The routine use of 3D and 4D rendering, (post-processing), in conjunction with ultrasound is considered investigational.
  - All ultrasound studies require permanently recorded images either stored on film or in a Picture Archiving and Communication System (PACS).
  - The use of a hand-held or any Doppler device that does not create a hard-copy output is considered part of the physical examination and is not separately billable. This exclusion includes devices that produce a record that does not permit analysis of bi-directional vascular flow.

- Duplex scan describes an ultrasonic scanning procedure for characterizing the pattern and direction of blood flow in arteries and veins with the production of real-time images integrating B-mode 2D vascular structures, Doppler spectral analysis, and color flow Doppler imaging.
  - The minimal use of color Doppler alone, when performed for anatomical structure identification during a standard ultrasound procedure, is not separately reimbursable.

**AB-1.6: Abdominal Ultrasound**

- Complete abdominal ultrasound (CPT® 76700) includes all of the following required elements:
  - Liver, gallbladder, common bile duct, pancreas, spleen, kidneys, upper abdominal aorta, and inferior vena cava.
  - If a particular structure or organ cannot be visualized, the report should document the reason.

- Limited abdominal ultrasound (CPT® 76705) is without all of these required elements and can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
  - Further, CPT® 76705 should:
    - Be assigned to report follow-up studies once a complete abdominal ultrasound (CPT® 76700) has been performed; and
    - Be assigned to report ultrasonic evaluation of diaphragmatic motion; and
    - Be reported only once per individual imaging session; and
      - Not be reported with CPT® 76700 for the same individual for the same imaging session.
AB-1.7: Retroperitoneal Ultrasound

- Complete retroperitoneal ultrasound (CPT® 76770) includes all of the following required elements:
  - Kidneys, lymph nodes, abdominal aorta, common iliac artery origins, inferior vena cava.
  - For urinary tract indications, a complete study can consist of kidneys and bladder.

- Limited retroperitoneal ultrasound (CPT® 76775) studies are without all of these required elements and can refer to a specific study of a single organ, a limited area of the abdomen, or a follow-up study.
  - Further, CPT® 76775 should:
    - Be assigned to report follow-up studies once a complete retroperitoneal ultrasound (CPT® 76770) has been performed; and
    - Be reported only once per individual imaging session; and
    - Not be reported with CPT® 76770 for the same individual for the same imaging session.

AB-1.8: CT-, MR-, Ultrasound-guided Procedures

See Preface-4.2: CT-, MR-, or Ultrasound-Guided Procedures in the Preface Imaging Guidelines

AB-1.9: Contrast-Enhanced Ultrasound

Ultrasound with contrast (CEUS, CPT® 76978, CPT® 76979) is only considered when MRI or CT cannot be performed, and the clinical situation requires ultrasound contrast to further delineate the nature of the lesion. CEUS of the liver is otherwise considered investigational or experimental at this time.

AB-1.10: This section intentionally left blank

AB-1.11: RADCAT Grading System

- The RADCAT (Radiology Report Categorization) Grading System was developed in order to communicate to ordering physicians (most commonly in the ER setting), the relative urgency of a radiologic finding. It is not related to the LIRADs reporting system, nor does it necessarily imply the need for follow-up imaging, as opposed to clinical follow-up. The rating system is as follows:
  - RADCAT 1: Normal Result
  - RADCAT 2: Routine Result
  - RADCAT 3: Result with recommendation for non-urgent routine follow-up
  - RADCAT 4: Priority Result
  - RADCAT 5: Critical Result
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<td>AB-2.5: Epigastric Pain and Dyspepsia</td>
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<td>AB-2.7: Non-operative Treatment of Acute Appendicitis</td>
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<tr>
<td>AB-2.8: Non-chronic Nonspecific Abdominal Pain With No Localizing Findings</td>
<td>19</td>
</tr>
</tbody>
</table>
AB-2.1: General Information
The tables in **AB-2.2: Abdominal Pain** provide imaging guidance for generalized and quadrant specific abdominal pain. The column headers are defined as the following:

<table>
<thead>
<tr>
<th>Pain Location/Type of Abdominal Pain</th>
<th>Initial Ultrasound?</th>
<th>Conservative Treatment?</th>
<th>Advanced Imaging Indicated?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location/type of abdominal pain</td>
<td>Is an initial US required before advanced imaging?</td>
<td>Is conservative treatment required before advanced imaging?</td>
<td>Advanced imaging indicated for the specific abdominal pain</td>
<td>Additional comments related to indication</td>
</tr>
</tbody>
</table>

**Red Flag Signs and Symptoms**
- In “red flag” situations, the imaging indications may vary from the usual imaging pathway. A red flag situation is described as the following:
  - Persistent abdominal pain and at least ONE of the following:
    - History of malignancy with a likelihood or propensity to metastasize to abdomen
    - Fever (≥101 degrees)
    - Mass
    - GI bleeding
    - Moderate to severe abdominal tenderness
    - Guarding, rebound tenderness, or other peritoneal signs
    - Elevated WBC as per the testing laboratory’s range
    - History of bariatric surgery

- Please note, that when any one red flag is present with abdominal pain, the initial ultrasound is not required. Please proceed to the imaging indications under the “Advanced Imaging” column.

**Pregnant Women**
- Abdominal ultrasound (CPT® 76700), and/or Pelvic ultrasound (if below the umbilicus) (CPT® 76856) and/or TV ultrasound (CPT® 76830) should be performed first. If ultrasound is equivocal or red flags are present, proceed to:
  - MRI Abdomen without contrast (CPT® 74181) and/or MRI Pelvis without contrast (CPT® 72195) (if below the umbilicus).
### AB-2.2: Abdominal Pain

<table>
<thead>
<tr>
<th>Pain Location</th>
<th>Initial Ultrasound?</th>
<th>Conservative Treatment?</th>
<th>Advanced Imaging Indicated?</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Generalized, men and also women not of childbearing age</td>
<td>See AB-2.8: Non-chronic Nonspecific Abdominal Pain With No Localizing Findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalized, women of childbearing age, not pregnant,</td>
<td>See AB-2.8: Non-chronic Nonspecific Abdominal Pain With No Localizing Findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Generalized, pregnant</td>
<td>See AB-2.8: Non-chronic Nonspecific Abdominal Pain With No Localizing Findings</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Left Lower Quadrant, rule out diverticulitis – ALL men and non-pregnant women</td>
<td>No</td>
<td>No</td>
<td></td>
<td>CT Abdomen and Pelvis with contrast</td>
</tr>
<tr>
<td>Left Lower Quadrant, suspected or known intraabdominal abscess – ALL men and non-pregnant women</td>
<td>No</td>
<td>No</td>
<td></td>
<td>CT Abdomen and/or Pelvis with contrast.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See AB-3: Abdominal Sepsis (Suspected Abdominal Abscess)</td>
</tr>
<tr>
<td>Left Lower Quadrant, follow-up known intraabdominal abscess – ALL men and non-pregnant women</td>
<td>No</td>
<td>No</td>
<td></td>
<td>Serial abdominal and/or pelvic ultrasound (CPT® 76700 and/or CPT® 76856) or CT Abdomen and/or Pelvis with contrast. The interval can be days, weeks, or months.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See AB-3: Abdominal Sepsis (Suspected Abdominal Abscess)</td>
</tr>
<tr>
<td>Left Upper Quadrant – ALL men and non-pregnant women</td>
<td>See AB-2.4: Left Upper Quadrant (LUQ) Pain</td>
<td>See AB-2.4: Left Upper Quadrant (LUQ) Pain</td>
<td>See AB-2.4: Left Upper Quadrant (LUQ) Pain</td>
<td></td>
</tr>
<tr>
<td>Pain Location</td>
<td>Initial Ultrasound?</td>
<td>Conservative Treatment?</td>
<td>Advanced Imaging Indicated?</td>
<td>Comments</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------</td>
<td>--------------------------</td>
<td>-----------------------------</td>
<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Right Lower Quad, rule out appendicitis in – ALL men and non-pregnant women</td>
<td>Ultrasound complete or limited may be performed but is not required prior to performing a CT Abdomen and Pelvis with contrast or without contrast.</td>
<td>No</td>
<td>CT Abdomen and Pelvis either with contrast or without contrast.</td>
<td></td>
</tr>
<tr>
<td>Right Upper Quadrant, rule out cholecystitis - ALL men and non-pregnant women</td>
<td>See AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease</td>
<td>See AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease</td>
<td>See AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease</td>
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<td>Epigastric pain, dyspepsia, gastritis, and postprandial fullness – ALL men and non-pregnant women</td>
<td>See AB-2.5: Epigastric Pain and Dyspepsia</td>
<td>See AB-2.5: Epigastric Pain and Dyspepsia</td>
<td>See AB-2.5: Epigastric Pain and Dyspepsia</td>
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<tr>
<td>Acute epigastric pain with any red flag symptoms – ALL men and non-pregnant women</td>
<td>See AB-2.5: Epigastric Pain and Dyspepsia</td>
<td>See AB-2.5: Epigastric Pain and Dyspepsia</td>
<td>See AB-2.5: Epigastric Pain and Dyspepsia</td>
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**CPT® Codes for AB 2.2**

<table>
<thead>
<tr>
<th>CPT® Code</th>
<th>Description</th>
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<tbody>
<tr>
<td>74150</td>
<td>CT Abdomen without contrast</td>
</tr>
<tr>
<td>74160</td>
<td>CT Abdomen with contrast</td>
</tr>
<tr>
<td>74176</td>
<td>CT Abdomen and Pelvis without contrast</td>
</tr>
<tr>
<td>74177</td>
<td>CT Abdomen and Pelvis with contrast</td>
</tr>
<tr>
<td>74181</td>
<td>MRI Abdomen without contrast</td>
</tr>
<tr>
<td>74183</td>
<td>MRI Abdomen without and with contrast</td>
</tr>
<tr>
<td>76700</td>
<td>Ultrasound, complete Abdomen</td>
</tr>
<tr>
<td>76705</td>
<td>Ultrasound, limited Abdomen</td>
</tr>
<tr>
<td>76830</td>
<td>Ultrasound, Transvaginal</td>
</tr>
<tr>
<td>76856</td>
<td>Ultrasound, complete Pelvis</td>
</tr>
<tr>
<td>72195</td>
<td>MRI Pelvis without contrast</td>
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<tr>
<td>72197</td>
<td>MRI Pelvis without and with contrast</td>
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**AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease**

- For Pregnant Women, See **AB-2.1: General Information**
- For all others:
  - Abdominal ultrasound (complete or limited) is the initial diagnostic test in the absence of red flags.
  - CT Abdomen with contrast, or MRI Abdomen without or without and with contrast if ultrasound is equivocal, nondiagnostic, or red flags present

- Hepatobiliary System Imaging (HIDA) with OR without pharmacologic intervention (CPT® 78226 or CPT® 78227) can be considered:
  - If there is right upper quadrant pain or epigastric pain and there is a suspicion of gallbladder disease, with a normal, or equivocal or non-diagnostic recent ultrasound
  - **NOTE:** If findings on US suggest acute cholecystitis in a symptomatic individual (presence of gallstones with gallbladder wall thickening, Murphy’s sign, and peri-cholecystic fluid) then a HIDA scan is generally not needed.
  - If the HIDA without pharmacologic intervention (CPT® 78226) is initially performed and is normal or inconclusive, the site can convert the study to HIDA with pharmacologic intervention (CPT® 78227). The member will not need to return for a second study with injection of a pharmaceutical.
  - Suspected bile leak after trauma or surgery.
  - Monitoring of liver regeneration
  - Assessment of liver transplant
  - Assessment of choledochal cyst
  - Pre-operative assessment prior to partial hepatectomy.
  - Chronic acalculous cholecystitis, biliary dyskinesia, functional gallbladder disease, or sphincter of Oddi dysfunction can be imaged with a HIDA with or without pharmacologic intervention (CPT® 78226 or CPT® 78227)

**AB-2.4: Left Upper Quadrant (LUQ) Pain**

- LUQ pain is more difficult to categorize with regard to imaging as there are many potential etiologies, which might be better evaluated with different imaging procedures.
- Most common causes which may be more specifically evaluated:
  - Splenic etiologies:
    - Suspected trauma, or splenomegaly
      - See **AB-34: Spleen**
    - Suspected infarct or abscess (severe pain and tenderness, fever, history of atrial fibrillation)
      - CT Abdomen without and with contrast or with contrast (CPT® 74170 or CPT® 74160)
  - Pancreatic etiologies:
    - Suspected pancreatitis
      - See **AB-33.1: Acute Pancreatitis**
Renal etiologies
- Suspected nephrolithiasis
  - See **AB-4.1: Suspected Renal Stone**
- Suspected pyelonephritis or abscess
  - See **AB-40.1: Upper (Pyelonephritis)**
- Suspected small or large bowel etiologies (e.g., ischemia, obstruction, volvulus, diverticulitis)
  - CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177)

Gastric etiologies
- If there is concern for peptic ulcer disease, or if the complaint is dyspepsia, without any red flags suggesting possible perforation or penetration, endoscopy would be the best study for assessing these potential conditions.
- If there is concern for a more urgent gastric problem, such as perforation, or any red flag is present, then a CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177) can be approved.

Suspected aortic dissection
- See **PVD-6.7: Aortic Dissection and Other Aortic Conditions** in the Peripheral Vascular Disease Imaging Guidelines

Unknown etiology, simply reported as LUQ pain
- LUQ pain with any red flag: CT Abdomen or CT Abdomen and Pelvis (CPT® 74160 or CPT® 74177) can be approved.
- LUQ pain without any red flags
  - Prior to advanced imaging, an adequate history and physical examination, with lab work to include: CBC, chemistry profile including electrolytes, BUN, creatinine, LFTs (ALT, AST, alkaline phosphatase and bilirubin) lipase, amylase, and urinalysis, should be performed with the intention of trying to establish a potential etiology.
  - If these evaluations and lab studies are negative or inconclusive for establishing a potential etiology which can be more specifically evaluated as described above, a CT Abdomen or CT Abdomen and Pelvis (CPT® 74160 or CPT® 74177) can be approved

**AB-2.5: Epigastric Pain and Dyspepsia**
- Epigastric pain with red flags: (non-pregnant individuals)
  - ANY of the following:
    - Ultrasound Abdomen (CPT® 76700 or CPT® 76705)
    - CT Abdomen with contrast (CPT® 74160)
    - MRI Abdomen with and without contrast (CPT® 74183)

- Epigastric pain without red flags or dyspepsia (defined by the ACG and CAG as predominant epigastric pain lasting at least one month and can be associated with any upper gastrointestinal symptoms such as epigastric fullness, nausea, vomiting, or heartburn):
  
  (Note: Those individuals with abnormal laboratory tests or physical findings should also be assessed under the appropriate guidelines for those findings, e.g. LFTs, jaundice, etc.)
- Ultrasound Abdomen (CPT® 76700 or CPT® 76705) to assess for biliary/pancreatic disease
- CT Abdomen (CPT® 74160) or MRI Abdomen (CPT® 74183), or MRCP (CPT® 74181 or CPT® 74183), may be appropriate to evaluate positive findings on ultrasound. The use of these advanced imaging procedures to evaluate the ultrasound findings may be specifically addressed in the dedicated guideline. For example, the use of MRCP to evaluate potential pathology in the biliary tree or pancreatic duct is addressed in AB-27: MR Cholangiopancreatography (MRCP).
- CT Abdomen (CPT® 74160), or MRI Abdomen (CPT® 74183) for persistent symptoms after a negative or inconclusive upper gastrointestinal endoscopy and ultrasound as well as ONE of the following:
  - Test and treat for Helicobacter pylori (H. pylori) and a trial of acid suppression with a proton pump inhibitor (PPI) for 4–8 weeks if eradication is successful, but symptoms do not resolve OR
  - An empiric trial of acid suppression with a PPI for 4–8 weeks.

NOTE: See imaging for pregnant women AB-2.1: General Information

**AB-2.6: Chronic Abdominal Pain**

- Evaluation of Chronic Abdominal Pain (continuous or intermittent symptoms >6 months)
- If red flag symptoms are present:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177)
- In the absence of red flag symptoms:
  - Epigastric Pain and Dyspepsia
    - See AB-2.5: Epigastric Pain and Dyspepsia
  - Right Upper Quadrant Pain
    - See AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease
  - Left Upper Quadrant Pain
    - See AB-2.4: Left Upper Quadrant (LUQ) Pain
  - Nonspecific, generalized or lower abdominal pain
    - Initial laboratory assessment including
      - CBC with differential, chemistry profile including electrolytes, glucose, creatinine, BUN and liver chemistries, ESR, urinalysis amylase and lipase (for generalized or upper abdominal complaints), thyroid function tests.
      - Serology testing for celiac if suspected celiac disease
    - All patients >50 years of age should have GI endoscopy
      - Colonoscopy if pain is in the lower abdomen and/or is associated with changes in bowel habits.
- EGD (upper endoscopy) if pain is localized in the upper abdomen particularly if other upper GI symptoms are present (including early satiety, nausea), or if celiac disease is suspected. (See AB-2.5: Epigastric Pain and Dyspepsia)
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177) as requested (include pelvis for lower abdominal complaints or findings): if the above work-up is negative or does not provide specific causes for more directed work-up (for example, hematuria on urinalysis, or elevated transaminases, etc.)

**AB-2.7: Non-operative Treatment of Acute Appendicitis**
- Recurrent symptoms or routine post-treatment follow-up, if requested:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  (Note: Non-operative treatment of acute appendicitis is increasingly utilized. There is an approximately 2% chance of a pathologic finding not initially identified prior to treatment (e.g. Crohn’s Disease or an appendiceal neoplasm such as a carcinoid). In view of this, some authors suggest a follow-up imaging study in asymptomatic patients, post-antibiotic treatment.)

**AB-2.8: Non-chronic Nonspecific Abdominal Pain With No Localizing Findings**
- Nonspecific abdominal pain can have multiple etiologies and be a diagnostic dilemma. Often, the history, physical examination, and laboratory data can guide subsequent workup in individuals presenting with abdominal pain (e.g. RUQ pain would lead to US for the evaluation of cholecystitis). If, despite an initial history and physical examination the clinical suspicion cannot be localized, and there is no specific indication of a significant concern for serious pathology (e.g., no red flags) then further workup and appropriate imaging may be directed by the results of initial lab studies or the results of non-advanced imaging relevant to and ordered for the evaluation of the current complaint being investigated.
- When possible, please use the more specific guideline, depending on clinical presentation and the differential diagnosis offered by the provider:
  - **AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease**
  - **AB-2.4: Left Upper Quadrant (LUQ) Pain**
  - **AB-2.5: Epigastric Pain and Dyspepsia**
  - **AB-2.6: Chronic Abdominal Pain**
  - **AB-4: Flank Pain, Rule Out or Known Renal/Ureteral Stone**
  - **AB-5.1: Gastroenteritis**
  - **AB-6: Mesenteric/Colonic Ischemia**
  - **AB-7: Post-Operative Pain Within 60 Days Following Abdominal Surgery – Abdominal Procedure**
  - **AB-20: Bowel Obstruction and Gastroparesis**
  - **AB-21: Diarrhea, Constipation, and Irritable Bowel**
**AB-23: Inflammatory Bowel Disease Rule Out Crohn’s Disease or Ulcerative Colitis**

**AB-33: Pancreatitis**

Evaluation of Nonspecific Abdominal Pain:
- US Abdomen and/or Pelvis
- CT Abdomen and Pelvis with contrast:
  - Age ≥65
  - Any Red Flag
  - If a prior US Abdomen and/or Pelvis performed for the current complaint is unrevealing or does not explain the pain
  - Preliminary labs such as CBC, electrolytes, lipase or amylase, urinalysis, ESR or CRP, or LFT’s are unrevealing or do not point to a specific etiology that would otherwise direct more appropriate imaging (such as findings suggestive of pancreatitis or biliary tract disease). Note: All the specific laboratory studies listed are not required, but there should be some studies performed relating to the current episode in order to help direct imaging appropriately. (Note: Pregnancy test should be performed prior to CT in all appropriate reproductive age females)

Special Populations:
- Pregnant women:
  - US Abdomen and/or Transvaginal and/or complete Pelvis as the initial study
  - If US is equivocal OR ANY Red Flag:
  - MRI Abdomen and/or Pelvis without contrast

References
<table>
<thead>
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<th>AB-3: Abdominal Sepsis (Suspected Abdominal Abscess)</th>
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<td>AB-3.1: Abdominal Sepsis</td>
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AB-3.1: Abdominal Sepsis

- CT Abdomen and/or Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177) for abdominal symptoms associated with fever and/or elevated white blood cell count.¹

- CT Abdomen and Pelvis with contrast (CPT® 74177) interval imaging as requested for intraperitoneal abscess.

- Serial Ultrasound (CPT® 76705) or CT Abdomen and/or Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177) studies may be performed for follow-up of known abnormal fluid collections, especially following catheter drainage. The interval can be days, weeks, or months, based on the clinical course of the individual.

Reference
<table>
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<th>AB-4: Flank Pain, Rule Out or Known Renal/Ureteral Stone</th>
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AB-4.0: Ultrasound

- Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) can be used in place of CT Abdomen and Pelvis at any of the initial or follow-up indications, if requested by Provider.

AB-4.1: Suspected Renal Stone

- Suspected renal stone with symptoms in non-pregnant adults (flank pain/renal colic)¹ ²
  - CT Abdomen and Pelvis without contrast (CPT® 74176)
- Suspected renal stone in pregnant women (flank pain/renal colic)³ ⁴
  - Ultrasound (CPT® 76770 or CPT® 76775) or MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - The use of gadolinium contrast agents is contraindicated during pregnancy unless the specific need for that procedure outweighs risk to the fetus.
- Suspected renal stone in children (flank pain/renal colic)
  - See PEDAB-4: Flank Pain, Renal Stone in the Pediatric Abdomen Imaging Guidelines
- Suspicion renal stones (flank pain/renal colic) with hematuria
  - CT Abdomen and Pelvis without contrast (CPT® 74176) or CT Urogram (CPT® 74178)

AB-4.2: Observation of Known Ureteral Stone

- Radiopaque Stones
  - Initial follow-up imaging:
    - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) and KUB X-ray
  - Subsequent follow-up imaging:
    - If initial follow-up ultrasound and KUB are negative, and there is no hematuria and individual is asymptomatic:
      - See AB-4.4: Annual Surveillance
    - If initial follow-up ultrasound and KUB demonstrates hydronephrosis, retained stone, or if the individual has persistent hematuria, or is symptomatic:
      - CT Abdomen and Pelvis without contrast (CPT® 74176)

- Non-radiopaque Stones
  - Initial follow-up imaging:
    - CT Abdomen and Pelvis without contrast (CPT® 74176)
  - Subsequent follow-up imaging:
    - If CT is negative:
      - See AB-4.4: Annual Surveillance
    - If CT demonstrates a retained stone, hydronephrosis, or if the individual is being evaluated for surgery:
      - Further imaging can be considered on an individual basis
**AB-4.3: Follow-Up of Treated Ureteral Stone**

- **Post-shock wave lithotripsy (SWL):**
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is the appropriate initial follow-up imaging.
  - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) and/or CT Abdomen and Pelvis (contrast as requested) may be indicated for:
    - Individuals who are symptomatic
    - Individuals with hydronephrosis
    - Individuals who have residual fragments
  - Individuals treated by SWL who have passed fragments, are asymptomatic and without hydronephrosis can be followed according to **AB-4.4: Annual Surveillance**.

- **Post-medical expulsive therapy (MET):**
  - Individuals treated by MET who have passed a stone and are symptomatic should undergo retroperitoneal ultrasound.
  - If hydronephrosis is demonstrated with ultrasound, a CT Abdomen and Pelvis (contrast as requested).
  - Individuals treated by MET who have passed a stone and are asymptomatic can be followed according to **AB-4.4: Annual Surveillance**.

- **Post-ureteroscopic extraction with an intact stone:**
  - Individuals without symptoms should have a retroperitoneal ultrasound.
  - Individuals with symptoms or hydronephrosis demonstrated on ultrasound should have a CT Abdomen and Pelvis with contrast (CPT® 74177).
  - Individuals without symptoms or without hydronephrosis demonstrated on ultrasound can be followed according to **AB-4.4: Annual Surveillance**.

- **Post-ureteroscopic extraction requiring fragmentation of the stone(s):**
  - Individuals without symptoms should have a retroperitoneal ultrasound.
  - Individuals without symptoms, but hydronephrosis demonstrated on ultrasound, should have a CT Abdomen and Pelvis without contrast (CPT® 74176).
  - Individuals without symptoms or without hydronephrosis demonstrated on ultrasound can be followed according to **AB-4.4: Annual Surveillance**.
  - Individuals with symptoms and a radiopaque stone should have a retroperitoneal ultrasound and KUB
  - Individuals with symptoms and a non-radiopaque stone should have a CT Abdomen and Pelvis without contrast (CPT® 74176).

- Individuals with persistent symptoms and/or hydronephrosis: Retroperitoneal ultrasound and/or CT Abdomen and Pelvis (contrast as requested) may be indicated.
**AB-4.4: Annual Surveillance**

- Annual surveillance for stable individuals who have a history of stones may be indicated to assess for stone growth or formation of new stones:
  - Plain X-ray (KUB) should be performed for individuals with radiopaque stones
  - Retropertioneal ultrasound (CPT® 76770 or CPT® 76775) is the preferred modality for individuals with non-radiopaque stones

**AB-4.5: Nuclear Kidney Imaging**

- Nuclear kidney imaging (CPT® 78707, CPT® 78708, or CPT® 78709) can be considered for evaluation of any of the following:\(^5,^6\)
  - Recurrent flank pain when CT and ultrasound are non-diagnostic.
  - Prior imaging (CT or ultrasound) shows hydronephrosis and to determine if this truly obstructive in nature.

**References**

<table>
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<td>AB-5.1: Gastroenteritis</td>
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AB-5.1: Gastroenteritis

CT Abdomen and Pelvis with contrast (CPT® 74177) if:
- Acute abdomen suggesting bowel obstruction, toxic megacolon (abdominal swelling, fever, tachycardia, elevated white blood cell count), or perforation
- Bloody stools
- Immunocompromised
- Previous gastric bypass
- Any “Red Flag” (See AB-2.1: General Information)

Practice Note
Gastroenteritis is a nonspecific term which denotes a constellation of symptoms including, to a varying degree, nausea, vomiting, diarrhea, and abdominal pain. It is usually caused by infectious agents such as norovirus. The broad differential of such symptoms evades establishing a guideline to evaluate gastroenteritis, as a specific entity, from an imaging standpoint.

References
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<td>AB-6.2: Colonic ischemia (including ischemic colitis)</td>
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AB-6.1: Mesenteric Ischemia

- Suspicion of acute mesenteric ischemia – typical presentation based on severe abdominal pain out of proportion to findings on physical exam, usually in individuals with underlying risk factors including cardiovascular disease, atrial fibrillation, hypertension, etc.:
  - CTA Abdominal and/or Pelvic (Mesenteric) (CPT® 74174, or CPT® 74175, or CPT® 72191) (preferable), or
  - MRA Abdominal and/or Pelvic (CPT® 72198 and/or CPT® 74185), or
  - CT Abdomen and Pelvis with contrast (CPT® 74177).

- Post-procedure surveillance imaging following invasive treatment for mesenteric ischemia (celiac, superior mesenteric, and inferior mesenteric angioplasty with or without stenting, or mesenteric artery bypass grafting):
  - Baseline Duplex ultrasound (CPT® 93975 or CPT® 93976) within 1 month of the procedure
  - Duplex ultrasound (CPT® 93975 or CPT® 93976) at 6 months, 12 months, 18 months, and then annually thereafter
  - CT Abdomen or Abdomen and Pelvis with contrast (CPT® 74160 and CPT® 74177) or CTA Abdomen or Abdomen and Pelvis (CPT® 74174 or CPT® 74175) or MRA Abdomen (CPT® 74185) and if requested, MRA Pelvis (CPT® 72198):  
    - For symptoms suggesting recurrent ischemia OR
    - In the absence of symptoms, following a Duplex Ultrasound if, on the Duplex study:
      - Celiac axis:
        - PSV >370 cm/s or a substantial increase from the post-treatment baseline PSV (substantial increase has not been defined) or demonstration of restenosis ≥70%
      - Superior mesenteric artery:
        - PSV >420 cm/s, or a substantial increase from the post-treatment baseline PSV (substantial increase has not been defined) or demonstration of restenosis of ≥70%
      - Inferior mesenteric artery:
        - Substantial increase from the post treatment baseline PSV (substantial increase has not been defined).

AB-6.2: Colonic ischemia (including ischemic colitis)

- CT Abdomen and Pelvis with contrast (CPT® 74177) is considered the first imaging modality in order to assess the distribution and phase of the colitis, and it can be performed if abdominal pain and:
  - Rectal bleeding; or
  - Moderate or severe tenderness; or
  - Fever (≥101 degrees); or
  - Guarding, rebound tenderness, or other peritoneal signs; or
  - Elevated WBC as per the testing laboratory’s range

- Repeat imaging for asymptomatic or improving patients is generally not needed.
CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) or MRA Abdomen (CPT® 74185) and if requested, MRA Pelvis (CPT® 72198) can be performed for suspicion of right sided or pancolonic ischemia (as suggested on the initial CT Abdomen and Pelvis or by history/physical examination)

Practice Note

Suspicion of colonic ischemia based on sudden cramping abdominal pain accompanied by urgency to defecate and passage of bright red blood, maroon blood, or bloody diarrhea, with risk factors including cardiovascular disease, diabetes mellitus, kidney disease, previous abdominal surgery, use of constipating medications, COPD, and atrial fibrillation.

As noted in the ACG Clinical Guideline:

“ In contrast to AMI (acute mesenteric ischemia) in which conventional mesenteric angiography or CTA plays an essential role, vascular imaging studies are not indicated in most patients with suspected CI (colonic ischemia) because by the time of presentation, colon blood flow has usually returned to normal and the observed changes are not from ongoing ischemia but rather reflect the ischemic insult with or without reperfusion injury”

References

AB-7: Post-Operative Pain Within 60 Days Following Abdominal Surgery – Abdominal Procedure

AB-7.1: Post-Op Pain within 60 Days
AB-7.1: Post-Op Pain within 60 Days

- CT Abdomen and/or Pelvis with contrast (CPT® 74177, or CPT® 74160, or CPT® 72193) can be performed for suspected postoperative/post procedure complications (For example: bowel obstruction, abscess or anastomotic leak).¹²

- Beyond 60 days postoperatively, See AB-2: Abdominal Pain

- See AB-42.3: Post-Transplant Imaging for post-transplant indications and imaging

References


### AB-8: Abdominal Lymphadenopathy

- **AB-8.1: Abdominal Lymphadenopathy** 36
- **AB-8.2: Inguinal Lymphadenopathy** 36
- **AB-8.3: Sclerosing Mesenteritis and Mesenteric Panniculitis** 37
AB-8.1: Abdominal Lymphadenopathy

- History of malignancy
  - Refer to oncology guidelines specific for that known malignancy
  - Biopsy may be considered

- Clinical or lab findings suggesting a lymphoproliferative disorder:
  - Biopsy
  - PET/CT (CPT® 78815) may be considered prior to biopsy in order to determine a more favorable site for biopsy, when a prior biopsy was nondiagnostic, or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.
  - Clinical note: Due to its relative lack of specificity as well as higher cost, PET is a less efficient alternative to biopsy.

- Clinical or laboratory findings suggesting benign etiology, and no history of malignancy:
  - CT Abdomen and Pelvis (CPT® 74177) for 3-month follow-up.
  - If no changes at 3 months, 2 additional follow-up scans (at 6 months and one year) can be approved.
  - If no changes by one year, the finding can be considered benign. No further imaging.

- If a follow-up CT demonstrates a concerning change, biopsy should be performed. If biopsy is inconclusive, PET/CT (CPT® 78815) can be approved.

AB-8.2: Inguinal Lymphadenopathy

There is no evidence-based support for advanced imaging of clinically evidenced inguinal lymph adenopathy without biopsy.

- Localized inguinal lymphadenopathy should prompt:
  - Search for adjacent extremity injury or infection
  - 3 to 4 weeks of observation if clinical picture is benign
  - Excisional or image guided core needle biopsy under ultrasound or CT guidance of most abnormal lymph node if condition persists or malignancy suspected

- Generalized inguinal lymphadenopathy should prompt:
  - Diagnostic work-up, including serological tests, for systemic diseases and
  - Excisional or image guided core needle biopsy under ultrasound or CT guidance of most abnormal lymph node if condition persists or malignancy suspected.


- Prior history of malignancy: See ONC-31: Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer in the Oncology Imaging Guidelines
AB-8.3: Sclerosing Mesenteritis and Mesenteric Panniculitis

- For new or worsening clinical symptoms, or if not previously performed:
  - CT Abdomen and Pelvis without and with contrast (CPT® 74178)

- Requests for follow-up imaging in asymptomatic individuals or for sequential imaging to monitor for the development of malignancy:
  - Further imaging in these scenarios is not supported in the absence of worsening or new clinical symptoms.

- PET imaging is not indicated for the evaluation of Sclerosing Mesenteritis or Mesenteric Panniculitis

Practice Notes

- Sclerosing mesenteritis and mesenteric panniculitis are rare, incompletely understood entities that are characterized by an idiopathic inflammatory condition of the mesentery, with radiologic findings including:
  - Fatty mass lesion in the small intestinal mesentery
  - “Halo” (fat ring) surrounding lymph nodes or vessels
  - Lymph nodes in the fatty mass
  - A “pseudocapsule”
  - “Misty” mesentery
  - Calcifications from fat necrosis

- Sclerosing mesenteritis may represent a spectrum of diseases (retractile mesenteritis, mesenteric panniculitis, and mesenteric lipodystrophy), or may be stages of one disease with progression.

- The chronic inflammation may result in fibrosis with a mass effect and can involve the gut (causing obstruction), the mesenteric vessels, and other intra-abdominal or retroperitoneal organs. The etiology is uncertain, but may be secondary to trauma (previous abdominal surgery), an autoimmune process, ischemia, infection, and possibly may represent a paraneoplastic syndrome secondary to a malignancy, though this is controversial.

- There is an increased prevalence of malignancy in individuals with sclerosing mesenteritis, and this has resulted in requested for sequential imaging in stable or asymptomatic individuals. In addition, requests may be made to assess the clinical response in those undergoing active treatment.

- However, studies have reported that the data on potentially developing a subsequent malignancy is inconclusive and thus “it does not seem justified to subject patients with MP, especially those in whom other associations such as abdomino-pelvic surgery may explain the MP findings, to multiple follow-up CT scans with the aim of detecting a future malignancy”¹. This is supported by other authors.²,³,⁴,⁵

- In addition, there is no correlation between radiologic and clinical findings, and management decisions are guided by the severity and type of symptoms. Thus, sequential radiologic imaging to assess treatment response is not recommended.²
References
<table>
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<tr>
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<tbody>
<tr>
<td><strong>AB-9.1: Bariatric Surgery</strong></td>
</tr>
</tbody>
</table>
AB-9.1: Bariatric Surgery

- **Pre-operative Assessment:**
  - Abdominal ultrasound (CPT® 76700 or CPT® 76705) to assess the liver and gallbladder

- **Post-operative complications:**
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) may be used for individuals who have had weight loss surgery and present with suspected complications including:
    - Weight loss failure
    - Heartburn
    - Nausea or vomiting
    - Abdominal pain
    - Fever
    - Abdominal distension
    - Suspected hernia

- Note: Internal hernias in patients who have had Roux-en-Y gastric bypasses may have intermittent and relatively mild abdominal symptoms which require immediate evaluation with CT imaging.

- See [AB-7: Post-Operative Pain With-in 60 Days Following Abdominal Surgery – Abdominal Procedure](#)

**Practice Notes**

- Bariatric procedures include gastric banding, gastric bypass, sleeve gastrectomy, and biliopancreatic diversion procedures.

- Though abdominal pain in post-operative bariatric patients may be gallbladder-induced and an ultrasound would be helpful for this diagnosis, the complications of bariatric surgery can become quickly life-threatening, and so any request for CT imaging in the post-operative bariatric individual should not be delayed with recommendations for ultrasound, even if the examination does not indicate any “red flags”.

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</table>
AB-10.1: Blunt Abdominal Trauma

- Abdominal and/or Pelvic ultrasound (CPT® 76700 and/or CPT® 76856) can be approved for the evaluation of blunt abdominal trauma when requested.

- CT Abdomen and/or Pelvis with contrast (CPT® 74160, or CPT® 72193, or CPT® 74177):
  - High probability intra-abdominal injury
    - Abdominal pain or tenderness
    - Pelvic or femur fracture
    - Lower rib fracture
    - Costal margin tenderness or evidence of thoracic wall trauma
    - Diminished breath sounds
    - Vomiting
    - Pneumothorax
    - Hematocrit <30%
    - Hematuria
    - Elevated AST
  - Non-examinable individual (intoxicated, less than fully conscious, Glasgow Coma Scale Score >13, etc.)
  - Evidence of abdominal wall trauma or seat-belt sign

- If ultrasound demonstrates any positive finding(s)

References
### AB-11: Gaucher Disease and Hemochromatosis

| AB-11.1: Gaucher Disease | 44 |
| AB-11.2: Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases | 44 |
AB-11.1: Gaucher Disease

- MRI Abdomen without contrast (CPT® 74181) and MRI Lower Extremity without contrast (CPT® 73718) should be used as follows:
  - Individuals not on enzyme therapy every 12 to 24 months
  - Individuals on enzyme therapy every 12 months:
    - For change in dose of medication, complication from medication specific for treatment of Gaucher disease or clinical complication, individuals with active bone disease may require more frequent monitoring than once a year.

- See PEDPN-4: Gaucher Disease in the Pediatric Peripheral Nerve Disorders (PND) Imaging Guidelines

Practice Note

- Gaucher disease is a lysosomal storage disease characterized by glucosylceramide accumulation in the spleen, liver, kidneys, lung, brain, and bone marrow

AB-11.2: Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases

- Transferrin iron saturation (TS) ≥45% OR Elevated serum ferritin (males >300 ng/mL, females >200 ng/mL)
  - HFE genetic testing required:
    - For C282Y/C282Y homozygote:
      - Serum ferritin >1000 ug/L or elevated liver enzymes:
        - Liver biopsy for fibrosis staging and rule out concurrent liver disease
      - Serum ferritin <1000 ug/L and normal liver enzymes:
        - Therapeutic phlebotomy
    - For C282Y/H63D compound heterozygote, C282Y heterozygote, or non-C282Y homozygote (or negative studies):
      - MRI Abdomen without contrast (CPT® 74181) for iron quantification

      (Note: Studies indicate that measurements of hepatic iron concentration by MRI may be more useful in ruling out than diagnosing clinically significant iron overload. MRI can distinguish between primary and secondary iron overload based on iron uptake in the reticuloendothelial system.)

- For the evaluation of suspected hepatic iron overload in chronic transfusional states (e.g., sickle cell disease, thalassemia, oncology patients, bone marrow failure, and stem cell transplant patients):
  - MRI Abdomen without contrast (CPT® 74181) for iron quantification can be performed annually

- See PEDAB-18.2: Transfusion-Associated (Secondary) Hemochromatosis in the Pediatric Abdomen Imaging Guidelines regarding transfusion-associated hepatic iron deposition.
If clinical, biopsy, or radiological findings suggest advanced fibrosis or cirrhosis and HCC surveillance is requested, then follow HCC Screening Guidelines - See AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC.

Practice Note

- An elevated serum ferritin >1000 mcg/l is associated with an increased risk of cirrhosis and mortality in C282 homozygotes, while a serum ferritin <1000 mcg/l is associated with a very low likelihood of cirrhosis.
- The role of serial MRI for monitoring hepatic iron concentration in hemochromatosis has not been defined. Treatment is phlebotomy and results are monitored by serum ferritin.
- The most recent ACG guideline (2019) noted that transient elastography has not been validated to assess fibrosis stage in hereditary hemochromatosis. The guideline further instructs that "if there is a concomitant need to stage hepatic fibrosis or evaluate for alternate liver diseases, then liver biopsy is the preferred method".14

References


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<td>AB-12.4: Indeterminate Groin Pain</td>
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</table>
AB-12.1: Inguinal or Femoral Hernia

- Clinical examination alone is usually sufficient for confirming the diagnosis of an evident groin hernia.
- Ultrasound, pelvic limited (CPT® 76857) or pelvic complete (CPT® 76856) is the initial imaging study if:
  - Vague groin swelling with diagnostic uncertainty
  - Poor localization of swelling (as might be seen with a small hernia and prominent overlying fat)
  - Intermittent swelling not present on examination
  - Other groin complaints without swelling
- CT Pelvis with contrast (CPT® 72193) or without contrast (CPT® 72192)
  - If ultrasound is indeterminate or non-diagnostic
  - For suspected incarceration or strangulation
- MRI Pelvis without contrast (CPT® 72195) or with and without contrast (CPT® 72197)
  - If ultrasound is indeterminate or non-diagnostic, and musculoskeletal ailments such as osteitis pubis, or athletic pubalgia are in the differential, See MS-23: Pelvis in the Musculoskeletal Imaging Guidelines for applicability of MRI.
- For chronic post-surgical groin pain (after hernia repair):
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) or US-guided nerve block
  - CT Pelvis with contrast (CPT® 72193) or without contrast (CPT® 72192) or MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) can be approved if either ultrasound or ultrasound-guided nerve block is indeterminate or non-diagnostic, to assess for other, non-neuropathic causes.

AB-12.2: Spigelian, Ventral, Umbilical, or Incisional Hernia

- Known or suspected primary or recurrent Spigelian hernia (anterior abdominal wall hernia through the semilunar line), ventral hernia, umbilical, or incisional hernia:
  - CT Abdomen without or with contrast (if above the umbilicus) (CPT® 74150 or CPT® 74160) or
  - CT Pelvis without or with contrast (if below the umbilicus) (CPT® 72192 or CPT® 72193) or
  - CT Abdomen and Pelvis without or with contrast (if above and below the umbilicus) (CPT® 74176 or CPT® 74177)

AB-12.3: Hiatal Hernia

- CT Chest and/or Abdomen with contrast (CPT® 71260 and/or CPT® 74160) to evaluate ANY of the following:
  - GI specialist or surgeon request for treatment/pre-operative planning.
  - Suspected complication of primary disease or surgery.

Practice Note

- Some complications might include suspicion of a gastric volvulus (torsion) within the chest cavity, vomiting, chest pain, and difficulty in swallowing.
**AB-12.4: Indeterminate Groin Pain**

See **MS-23: Pelvis** in the Musculoskeletal Imaging Guidelines

**References**

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</table>
**AB-13.1: Abdominal Wall Mass**

- Abdominal ultrasound and/or Pelvic ultrasound (CPT® 76700 or CPT® 76705 and/or CPT® 76856) is the initial imaging study to assess an abdominal wall or subcutaneous mass.
- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen with contrast (CPT® 74160) can be approved to assess a suspected malignant or indeterminate mass detected on ultrasound (Pelvic imaging can be included depending on the location of the mass).

**AB-13.2: Intra-Abdominal Mass**

- Palpable abdominal mass on physical examination:
  - CT Abdomen with contrast (CPT® 74160) or if extending below the umbilicus or involving the pelvis, CT Abdomen and Pelvis with contrast (CPT® 74177)
  - Abdominal ultrasound (CPT® 76700) may be approved if requested
  - MRI Abdomen without and with contrast (CPT® 74183) may be approved to evaluate indeterminate findings on a prior CT or ultrasound. (Pelvic imaging may be included if the mass extends below the umbilicus or involves the pelvis.)
  - For a pulsatile abdominal mass, suspected aortic aneurysm: See **PVD-6.3: Abdominal Aortic Aneurysm (AAA)** in the Peripheral Vascular Disease (PVD) Imaging Guidelines
  - For females with a suspected adnexal mass or fibroid: See **PV-5: Adnexal Mass/Ovarian Cysts** or **PV-12: Leiomyomata/Uterine Fibroids** in the Pelvis Imaging Guidelines.

- Pregnant individual:
  - Abdominal and/or Pelvic and/or Transvaginal ultrasound (CPT® 76700 and/or CPT® 76856 and/or CPT® 76830) is appropriate for initial imaging.
  - Follow-up Imaging if ultrasound findings are indeterminate: See **AB-2.1: General Information**

**AB-13.3: Abnormal Findings on Endoscopy/Colonoscopy**

- Submucosal colonic lesions above the rectum or unexplained colonic extrinsic compression above the rectum, or for the pre-operative planning of anticipated surgical or endoscopic resection of a previously identified polypoid mass above the rectum (not for routine colonoscopic polypectomy):
  - CT Abdomen and Pelvis with contrast (CPT® 74177)

- Submucosal gastric lesions:
  - CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177)
    - If endoscopic ultrasound with or without fine-needle aspiration (which is the preferred initial imaging modality to further characterize a gastric submucosal lesion detected on endoscopy) cannot be performed, is indeterminate, or if the findings of the endoscopic ultrasound indicate a need for further imaging.
Gastric extrinsic compression:
- CT Abdomen with contrast (CPT® 74160) or CT Abdomen and Pelvis with contrast (CPT® 74177)

Submucosal rectal lesions or unexplained extrinsic compression in the rectum:
- MRI Pelvis without and with contrast (CPT® 72197), or, if requested, MRI Pelvis without contrast (CPT® 72195)
  - If rectal endoscopic ultrasound, which is the preferred initial imaging study, cannot be performed (e.g. anal stricture, or severe inflammatory process prohibiting passage of probe etc.), is indeterminate, or, if based on endoscopic ultrasound findings, additional imaging is needed for further characterization
  - For the pre-operative planning of anticipated surgical or endoscopic resection of a polypoid mass (not for routine colonoscopic polypectomy). CT Abdomen and Pelvis with contrast (CPT® 74177) may also be approved, if requested for pre-operative planning.

For further imaging of a documented colonic or rectal malignancy: See **ONC-16.2: Initial Work-Up/Staging** in the Oncology Imaging Guidelines

For further imaging of a suspected Gastrointestinal Stromal Tumor (GIST): See **ONC-12.5: Gastrointestinal Stromal Tumor (GIST)** in the Oncology Imaging Guidelines

For further imaging of gastric cancer: See **ONC-14.9: Gastric Cancer - Initial Work-up/Staging** in the Oncology Imaging Guidelines

**References**

6. NCCN Guidelines Colon Cancer Version 4.2018. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Colon cancer V 4.2018. ©2018 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
AB-14: Lower Extremity Edema

See the *Peripheral Vascular Disease Imaging Guidelines*. 
AB-15.1: Zollinger-Ellison Syndrome (ZES-Gastrinoma)

See ONC-15: Neuroendocrine Cancers and Adrenal Tumors in the Oncology Imaging Guidelines
## AB-16: Adrenal Cortical Lesions

| AB-16.1: Adrenal Cortical Lesions | 57 |
| AB-16.2: Adrenal Insufficiency     | 61 |
| AB-16.3: Additional Adrenal Imaging| 62 |

| CPT® 74150 | CT Abdomen without contrast |
| CPT® 74160 | CT Abdomen with contrast    |
| CPT® 74170 | CT Abdomen without and with contrast |
| CPT® 74181 | MRI Abdomen without contrast |
| CPT® 74183 | MRI Abdomen without and with contrast |
| CPT® 78812 | PET, Skull Base to Mid-Thigh |
| CPT® 78815 | PET/CT, Skull Base to Mid-Thigh |
# AB-16.1: Adrenal Cortical Lesions

<table>
<thead>
<tr>
<th>Mass Details</th>
<th>Primary Study</th>
<th>Additional Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Incidental adrenal lesion discovered on US</td>
<td></td>
<td>▶ CT Abdomen without contrast (CPT® 74150)</td>
</tr>
<tr>
<td>Note: US is not a prerequisite study for advanced imaging in the evaluation of any adrenal abnormality</td>
<td></td>
<td></td>
</tr>
<tr>
<td>▶ Incidental adrenal mass &lt;1cm in short axis, on any CT or MRI Abdomen or Abdomen and Pelvis</td>
<td></td>
<td>▶ Need not be pursued with further imaging, as it is uncertain as to whether subcentimeter nodularity or adrenal thickening qualifies as an adrenal mass on radiology reports</td>
</tr>
</tbody>
</table>
| ▶ Asymptomatic adrenal mass ≥1 cm                                            | Incidentally detected on any CT or MRI Abdomen or Abdomen and Pelvis with definitive benign findings | ▶ No further imaging, regardless of size, if imaging is diagnostic for benign findings, including ANY of the following:  
  - Myelolipoma (macroscopic fat) or  
  - Calcified mass or  
  - ≤10 HU on CT or decreased signal on Chemical Shift MRI (CS-MRI, CPT® 74181) consistent with benign adenoma, or  
  - If imaging was completed with and without contrast and no enhancement (defined as <10 HU change between unenhanced and enhanced/contrasted CT e.g. cyst, hemorrhage)* |
<table>
<thead>
<tr>
<th>Mass Details</th>
<th>Primary Study</th>
<th>Additional Studies</th>
</tr>
</thead>
</table>
| 1 cm to <4 cm                                                              | Incidentally detected and Indeterminate on any initial CT or MRI Abdomen or Abdomen and Pelvis | 1 cm to 2 cm: Very next study is 12 months from the initial indeterminate study, as follows:  
  - CT Abdomen without and with contrast (adrenal protocol), or may consider CS-MRI (chemical shift MRI, CPT® 74181), especially if CT contraindicated  
    - If stable ≥1 year, no further imaging-likely benign  
    - If enlarging (or new lesion present):  
      - biochemical evaluation;  
      - consider resection for possible primary adrenocortical carcinoma;  
      - exclude pheochromocytoma prior to resection. |
| No history of cancer                                                       |                                                                               | >2 cm to <4 cm: Very next study after initial indeterminate finding is done immediately, as follows:  
  - CT Abdomen without and with contrast (adrenal protocol); may consider CS-MRI (chemical shift MRI, CPT® 74181), especially if CT contraindicated  
    - No further follow up imaging if:  
      - Absolute Percentage Washout/Relative Percentage Washout (APW/RPW) ≥60/40%: Benign adenoma;  
      - No enhancement (defined as change in pre- and post-contrast imaging of <10 HU Cyst or hemorrhage)  
    - If APR/RPW <60/40%:  
      - Consider 6-12 month follow up imaging, or  
      - Resection for possible primary adrenocortical carcinoma, with biochemical evaluation to determine functional status and to exclude pheochromocytoma prior to resection  
    - If not resected, follow-up CT Abdomen with and without contrast in 6 – 12 months. May consider CS-MRI (chemical shift MRI, CPT® 74181), especially if CT contraindicated.  
    - If enlarging on follow up imaging: Consider resection for possible primary adrenocortical carcinoma; biochemical evaluation to determine functional status and to exclude pheochromocytoma prior to resection. |
| Asymptomatic                                                               |                                                                               |                                                                                                                                                  |
| No prior imaging for comparison                                            |                                                                               |                                                                                                                                                  |

Incidentally discovered and Indeterminate adrenal mass details.
### Imaging Decision Tree: Incidentally Discovered Adrenal Mass

<table>
<thead>
<tr>
<th>Mass Details</th>
<th>Primary Study</th>
<th>Additional Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥4 cm, No history of cancer</td>
<td>Incidentally detected and Indeterminate on any initial CT or MRI Abdomen or Abdomen and Pelvis</td>
<td>Biochemical assays to determine functional status to exclude pheochromocytoma prior to resection</td>
</tr>
<tr>
<td>History of cancer with a likelihood or propensity to metastasize to the adrenal gland or abdomen</td>
<td>Incidentally detected and Indeterminate on any initial CT or MRI Abdomen or Abdomen and Pelvis</td>
<td>See <a href="#">ONC-31.4: Adrenal Gland Metastases</a> in the Oncology Imaging Guidelines</td>
</tr>
</tbody>
</table>

1, 2, 3, 4

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1. Biochemical assays to determine functional status to exclude pheochromocytoma prior to resection
2. Consider resection for possible primary adrenocortical carcinoma
3. See [ONC-31.4: Adrenal Gland Metastases](#) in the Oncology Imaging Guidelines
<table>
<thead>
<tr>
<th>Suspected Condition</th>
<th>Initial Imaging</th>
<th>Additional Information</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected Cushing’s Syndrome, or virilizing adrenal tumors</td>
<td>CT Abdomen without contrast*</td>
<td><strong>Laboratory:</strong> dexamethasone suppression, serum ACTH level, virilizing hormone levels, and/or 24 hour urine for adrenal hormones confirm adrenal cortical endocrine syndrome</td>
</tr>
<tr>
<td>Suspected Pheochromocytoma or Paraganglioma (PPGL)</td>
<td>CT Abdomen and Pelvis without and with contrast (preferred study) (CPT® 74178); or CT Abdomen and Pelvis with contrast (CPT® 74177); or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast (if CT is contraindicated***)</td>
<td><strong>CECT</strong> (contrast enhanced CT) is preferred over MRI due to superior spatial resolution in evaluation of PPGL. Imaging to locate PPGL is indicated once biochemical evidence of PPGL is supported by plasma free metanephrine or urinary fractionated metanephrine testing.</td>
</tr>
</tbody>
</table>
| Conn’s Syndrome (hyperaldosteronism)      | CT Abdomen without contrast                                                      | If PAC (plasma aldosterone concentration) >20ng/dl plus undetectable PRA (plasma renin activity), plus spontaneously low potassium level (e.g. not diuretic-induced): proceed with advanced imaging.  
If PAC 15-19ng/dl plus low PRA plus PAC/PRA ratio >20: Confirmatory testing demonstrating lack of aldosterone suppression needed prior to advanced imaging (See Practice Note**).  
If initial CT Abdomen without contrast is indeterminate, CT Abdomen with and without contrast (CPT® 74170) with adrenal protocol is indicated or MRI Abdomen (contrast as requested), if CT contrast is contraindicated.  
If adrenal vein sampling (AVS) is planned once primary aldosteronism is confirmed on biochemical and/or suppression testing; CT Abdomen with contrast is indicated after initial CT Abdomen without has been performed. |
Practice Note

- Above imaging can be applied to patients with bilateral adrenal masses, with each lesion addressed separately.
- Benign calcified mass, such as an old hematoma or calcification from prior granulomatous infection needs no further imaging.
- Both benign and malignant adrenal masses may enlarge over time; there is not a known growth-rate threshold to differentiate benign from malignant adrenal masses.
- *If an adrenal mass does not demonstrate enhancement (defined as <10 HU change between unenhanced and enhanced/contrasted CT scan), mass represents a cyst or hemorrhage and no further imaging is needed. Conversely, when an adrenal mass shows avid enhancement (>110 – 120 HU), a pheochromocytoma should be considered and biochemical evaluation with serum catecholamines is recommended.

- **The most commonly used Confirmatory Aldosterone Suppression tests include: Sodium loading testing (oral or IV), Fludrocortisone Suppression Test (FST) and Captopril Challenge Test.
- ***MRI is recommended in patients with clips that cause artifacts when using CT, in patients with an allergy to CT contrast, and in patients in whom radiation exposure should be limited (children, pregnant women, patients with known germline mutations, and those with recent excessive radiation exposure), and for detection of skull base and neck paragangliomas, as skull base and neck paragangliomas are often biochemically silent and imaging represents the principal means for diagnosis.
- For additional imaging regarding continued suspicion with negative/inconclusive CT scan or MRI and for metastatic tumors, See ONC-15.10: Adrenal Tumors - Initial Work-up/Staging in the Oncology Imaging Guidelines
- The laboratory’s reference range performing renin (PRA) and serum potassium levels should be used for determining abnormalities of these levels.

**AB-16.2: Adrenal Insufficiency**

- CT Abdomen without contrast (CPT® 74150) or MRI Abdomen without contrast (CPT® 74181) is supported to determine the cause of primary adrenal insufficiency. Imaging is necessary if testing has confirmed adrenal insufficiency or adrenomyeloneuropathy.6,7
AB-16.3: Additional Adrenal Imaging

Note: The study for the evaluation of the adrenal gland is either with CT or MRI. Nuclear medicine imaging can assist in the evaluation of adrenal masses not adequately characterized by CT or MRI.

- Additional adrenal imaging considerations include the following:
  - Adrenal Nuclear Imaging of the cortex and/or medulla (CPT® 78075) is indicated for the following:
    - Distinguishing functional adrenal adenoma from adrenal hyperplasia with appropriate abnormal lab values.
    - Evaluation of suspected pheochromocytoma or paraganglioma.
      - MIBG preferred (ONE of the following codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804, or hybrid SPECT/CT CPT® 78830, CPT® 78831, or CPT® 78832).
      - For known pheochromocytoma or paraganglioma: See ONC-15: Neuroendocrine Cancers and Adrenal Tumors in the Oncology Imaging Guidelines.
    - Evaluation of suspected neuroblastoma, ganglioneuroblastoma, or ganglioneuroma.
      - MIBG preferred (One of the following codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804, or hybrid SPECT/CT CPT® 78830, CPT® 78831, or CPT® 78832) See PEDONC-6: Neuroblastoma in the Pediatric Oncology Imaging Guidelines.
  - History of multiple endocrine neoplasia syndromes: See PEDONC-2.8: Multiple Endocrine Neoplasias (MEN) in the Pediatric Oncology Imaging Guidelines.
  - History of neurofibromatosis: See PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2) in the Pediatric Oncology Imaging Guidelines.

Practice Notes

- The majority of “incidentalomas” are benign adenomas. Primary Adrenal Carcinoma is a very rare disease and usually seen with adrenal masses greater than 5 cm in diameter. Metastases with history of malignancy are 25-75%. Routine screening for endocrine function is recommended since 5%-23% will be hormone secreting.
- Resection or biopsy is often considered for mass lesions larger than 4 cm or hormone-secreting tumors.*
- Biopsy is often considered if pheochromocytoma is excluded.
- Signs and symptoms of pheochromocytoma:
  - Flushing spells and/or poorly controlled hypertension.
  - Elevated plasma or urine metanephrines support the diagnosis of pheochromocytoma with sensitivity for diagnosis at 99.7%
  - If plasma metanephrines are not elevated, a 24-hour urine for catecholamine and metanephrine levels should be obtained prior to considering advanced imaging.
If catecholamine and metanephrine levels are not elevated in a 24-hour urine test, then no advanced imaging is indicated unless unexplained symptoms suggestive of pheochromocytoma persist. Endocrine guidelines recommend biochemical evaluation in all incidental adrenal lesions with the exception of myelolipomas and cysts.

Adenoma imaging characteristics:

<table>
<thead>
<tr>
<th>CT Abdomen without contrast</th>
<th>Findings consistent with Adenoma</th>
<th>Indeterminate for Adenoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤10 Hounsfield Units</td>
<td>&gt;10 Hounsfield Units</td>
<td></td>
</tr>
<tr>
<td>CT with contrast with washout (calculated)</td>
<td>≥60% absolute washout or ≥40% relative washout</td>
<td>&lt;60% absolute washout or &lt;40% relative washout</td>
</tr>
<tr>
<td>Chemical Shift MRI</td>
<td>Signal drop out</td>
<td>Lack of signal drop out</td>
</tr>
</tbody>
</table>

*Size >4 cm or growth of a lesion are concerning for malignancy (though occasionally adenomas can demonstrate very slight growth on 6 to 12 month follow up imaging).

References


### AB-17: Abdominal Aortic Aneurysm (AAA), Iliac Artery Aneurysm (IAA), and Visceral Artery Aneurysms Follow-Up of Known Aneurysms and Pre-Op Evaluation

| AB-17.1: Abdominal Aortic Aneurysm (AAA) | 66 |
| AB-17.2: Iliac Artery Aneurysm (IAA)     | 66 |
| AB-17.3: Visceral Artery Aneurysm        | 66 |
AB-17.1: Abdominal Aortic Aneurysm (AAA)
See PVD-6: Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease Imaging Guidelines.

AB-17.2: Iliac Artery Aneurysm (IAA)
See PVD-6: Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease Imaging Guidelines.

AB-17.3: Visceral Artery Aneurysm
See PVD-6: Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease Imaging Guidelines.
AB-18.1: AAA, IAA, Post Endovascular or Open Aortic Repair

See PVD-6: Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease Imaging Guidelines.
AB-19: Aortic Dissection and Imaging for Other Aortic Conditions

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AB-19.1: Aortic Dissection and Other Aortic Conditions

➤ See PVD-6: Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease Imaging Guidelines

AB-19.2: Imaging for Other Aortic Conditions

➤ See PVD-6: Aortic Disorders, Renal Vascular Disorders, and Visceral Artery Aneurysms in the Peripheral Vascular Disease Imaging Guidelines
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AB-20.1: Bowel Obstruction

➤ Suspected high-grade bowel obstruction:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - Pediatric patients:
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved if requested
  - Pregnant patients:
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)

➤ Suspected intermittent or low-grade small bowel obstruction
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - Pediatric patients:
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved if requested
  - Pregnant patients:
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
  - If the etiology or level of suspected intermittent or low-grade small bowel obstruction remains undetermined and additional imaging is needed after CT Abdomen and Pelvis:
    - CT Enteroclysis (CPT® 74176 or CPT® 74177) or
    - CT Enterography (CPT® 74177) or
    - MR Enteroclysis (CPT® 74183 and CPT® 72197) or
    - MR Enterography (CPT® 74183 and CPT® 72197)

➤ If there is a suspected small bowel tumor as a cause of the small bowel obstruction (including a history of no prior abdominal or pelvic surgery, no known hernia and/or concomitant obscure GI bleeding):
  - CT Enterography (CPT® 74177)

➤ Small bowel obstruction suspected to be secondary to Crohn’s Disease:
  - See AB-23.1: IBD Rule out Crohn’s Disease or Ulcerative Colitis and AB-23.2: Known IBD

➤ Bariatric surgery patients: See AB-9.1: Bariatric Surgery

Practice Note

Complete or high-grade obstruction can be defined as no fluid or gas passing beyond the site of obstruction. In incomplete or partial obstruction (low-grade), some fluid or gas passes beyond the point of obstruction. However, a plain film is not required prior to advanced imaging for suspicion of either high- or low-grade obstruction.
**AB-20.2: Gastroparesis**

- Gastric Emptying Study (CPT® 78264) for suspicion of delayed gastric emptying and ONE of the following:
  - Nausea, or vomiting of old food ingested several hours earlier
  - Bloating
  - Early satiety, or Postprandial fullness
  - Nausea, vomiting or recurrent aspiration
  - Unexplained poor glucose control in diabetes
  - Gastroesophageal reflux refractory to medical management
  - Non-ulcer dyspepsia
  - Retained gastric contents on endoscopy

- Gastric emptying study with small bowel transit (CPT® 78265) can be used in the evaluation of suspected abnormalities in both total and regional times for gastrointestinal transit in small bowel.

- Gastric emptying study with small bowel and colon transit (CPT® 78266) can be used in the evaluation of suspected abnormalities in both total and regional time for gastrointestinal transit to the colon.

**AB-20.3: Nausea and Vomiting as the Primary Symptom**

- Nausea and vomiting as the Primary Symptom
  - An initial assessment should be performed prior to imaging requests. The initial assessment should include a history with a delineation of the duration, frequency, and severity of symptoms, including a description of their characteristics and any associated symptoms. The purpose of the initial assessment is to define whether the symptom complex suggests a central (neurologic), endocrine (e.g. pregnancy, thyroid disorder), iatrogenic (chemotherapy/medication-induced), obstructive (e.g., low-grade small bowel obstruction), or a mucosal (gastritis, peptic ulcer disease) etiology. Diagnostic testing for nausea and vomiting should be targeted at finding the etiology suggested by a thorough history and physical examination. In the absence of “red flags”, if the cause is not obvious or suggestive from the history and physical, laboratory data including a CBC, chemistry profile, and, in a reproductive-age female, pregnancy testing, should be performed prior to advanced radiographic imaging. Imaging is based on the findings of the initial evaluation as follows:
  - Symptoms suggesting an intracranial etiology (vertigo/nystagmus, associated headache, or neurogenic vomiting suggested by a positional nature and/or associated with other neurologic signs and symptoms):
    - See **HD-11: Headache, HD-23: Dizziness, Vertigo and Syncope**, or other Head Imaging Guidelines depending on the predominant neurologic presentation.
  - Nausea and vomiting associated with RUQ pain and suspicion of gallbladder disease See **AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease**
  - Nausea and vomiting associated with dyspeptic symptoms, or epigastric pain, See **AB-2.5: Epigastric Pain and Dyspepsia**
Symptoms suggesting an obstructive etiology (e.g. abdominal pain preceding vomiting, distension, feculent vomiting), for abdominal red flags, if the initial assessment does not suggest a specific cause, or if the evaluation proves unproductive:
- CT Abdomen and Pelvis with contrast (CPT® 74177)
- Symptoms suggesting mucosal disease (e.g. GERD, suspicion of ulcer disease):
  - EGD prior to advanced imaging
- If nausea and vomiting remains unexplained despite workup and CT Abdomen and Pelvis is negative:
  - Gastric emptying study (CPT® 78264)

**AB-20.4: Superior Mesenteric Artery (SMA) Syndrome**

- SMA syndrome is a rare cause of duodenal obstruction in which there is a decrease in the aortomesenteric angle with resulting compression of the duodenum by the SMA.
- Risk factors:
  - Recent significant weight loss which leads to a loss of retroperitoneal fat
  - Presence of a severe debilitating illness such as malignancy, malabsorption syndromes, AIDS, trauma, and burns.
  - History of corrective spine surgery for scoliosis
  - Anorexia Nervosa
  - Abdominal surgery
  - Congenital short ligament of Treitz
- The typical clinical scenario includes an episode of weight loss followed by chronic food intolerance with nausea and vomiting, further weight loss, and epigastric pain, and can be relieved by lying prone or in the left lateral decubitus position.
- The diagnosis can be suspected with barium studies demonstrating delayed passage of contrast beyond the duodenum, dilatation of the first and second portions of the duodenum, anti-persistaltic flow of barium proximal to the obstruction, and relief of obstruction when placed in the prone, knee-chest, or left lateral position, or with an upper endoscopy revealing pulsatile extrinsic compression of the duodenum, or plain films suggesting duodenal obstruction.
- In individuals with the clinical suspicion of SMA syndrome with risk factors or radiographic/EGD findings as noted above, or other radiologic findings or history suggestive of duodenal obstruction:
  - CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185)
- Note: CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) may also be appropriate if there is a failure to diagnose either persistent nausea and vomiting despite the workup as outlined in **AB-20.3: Nausea and Vomiting as the Primary Symptom**, or epigastric pain as indicated in **AB-2.5: Epigastric Pain and Dyspepsia**, and there is a clinical suspicion of SMA syndrome.
References

1. Expert Panel on Gastrointestinal Imaging. ACR Appropriateness Criteria® suspected small-bowel obstruction. American College of Radiology (ACR); 2013


AB-21: Diarrhea, Constipation, and Irritable Bowel

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| AB-21.3: Constipation | 77 |
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AB-21.1: Acute and Persistent Diarrhea (up to 30 days)

- Routine advanced imaging is not supported for acute, or persistent (up to 30 days) uncomplicated, including infectious diarrhea.
- Travel and dysenteric (including bloody) diarrhea should undergo biological assessment and antimicrobial treatment.9,10,11 (See AB-2.1: General Information)
- CT Abdomen and Pelvis with contrast (CPT® 74177) can be used if:
  - Red Flags (See AB-2.1: General Information)
  - Suspected ischemia (See AB-6: Mesenteric/Colonic Ischemia)
  - Older (>50) individuals with significant abdominal pain
  - Previous gastric bypass
  - Immunocompromised
  - Obstruction, toxic megacolon, or perforation suspected

AB-21.2: Chronic Diarrhea (more than 30 days)

- Basic lab work including routine CBC, chemistries, as well as stool tests for pathogens should be done prior to advanced imaging.
  - If diarrhea is watery – a secretory or osmotic etiology should be identified.
  - If diarrhea is bloody, it is inflammatory – requiring colonoscopy.
- CT Abdomen with contrast (CPT® 74160), CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 72197), can be considered if both basic lab work and colonoscopy are negative.
- See AB-23.1: IBD Rule out Crohn’s Disease or Ulcerative Colitis for concerns regarding inflammatory bowel disease.

AB-21.3: Constipation

- The work-up and treatment of constipation usually proceeds with a history and physical followed by empiric medication or dietary trials.
  - In general, a colonoscopy is performed prior to advanced imaging in an individual presenting with chronic constipation if the alarm symptoms of blood in the stool, anemia, or weight loss are present.
- Advanced imaging in the evaluation of constipation is appropriate as follows:
  - CT Abdomen and Pelvis with contrast (CPT® 74177) if:
    - Red flags (See AB-2.1: General Information)
    - Concern for obstruction
  - MRI (MRI Pelvis without contrast CPT® 72195) for Defecography is considered investigational/experimental by UHC.
AB-21.4: Bloating and/or Irritable Bowel Syndrome

Irritable bowel syndrome is characterized by abdominal pain associated with altered bowel habits, abdominal distention, and bloating. Subtypes include IBS-C (constipation-predominant), IBS-D (diarrhea-predominant) and IBS-M (mixed). Rome IV Criteria for the diagnosis of irritable bowel syndrome are:

- Recurrent abdominal pain, on average ≥1 d/wk in the past 3 months, related to ≥2 of the following:
  - Defecation
  - Change in stool frequency
  - Change in stool appearance (form)

Colonoscopy should be performed prior to advanced imaging to rule out microscopic colitis or inflammatory bowel disease in patients with IBS-D.

Advanced imaging in the absence of alarm symptoms has a very low yield, but can be considered in the following circumstances (The ACG Task Force recommends against the routine use of abdominal imaging in patients with IBS symptoms and no alarm features):

- CT Abdomen (CPT® 74160) or CT Abdomen and Pelvis (CPT® 74177) can be considered in the following circumstances:
  - Presence of alarm symptoms
    - Weight loss
    - Frequent nocturnal awakenings due to gastrointestinal symptoms
    - Fever
    - Blood in the stool (See AB-22: GI Bleeding)
    - New onset and progressive symptoms
    - Onset of symptoms after age 50
    - Recent antibiotic use
    - Family history of colon cancer or inflammatory bowel disease
    - Findings of an abdominal mass
    - Presence of lymphadenopathy
  - See AB-2.1: General Information for Red flag signs and symptoms
  - Positive findings on blood work including CBC (elevated WBC count), elevated CRP (CRP ≤0.5 essentially excludes inflammatory bowel disease in patients with IBS symptoms), and celiac testing
  - Positive fecal calprotectin (Note: a fecal calprotectin level <40mcg/g virtually excludes inflammatory bowel disease in patients with IBS) (See Practice Note in AB-23.1: IBD Rule out Crohn’s Disease or Ulcerative Colitis)
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**AB-22.1: GI Bleeding**

- Endoscopy for upper GI bleeding as initial evaluation
- Colonoscopy for lower GI bleeding as initial evaluation
- CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) or CT Abdomen and Pelvis with contrast (CPT® 74177):
  - Active bleeding and if endoscopy is negative
  - If conventional angiography is being considered
  - If surgery is being considered
  - If colonoscopy cannot be performed in an individual with GI bleeding
  - GI bleeding and severe abdominal pain
  - GI bleeding and hemodynamic instability (shock)
  - If there is concern for an aorto-enteric fistula (known or suspected aortic aneurysm, history of any type of aortic aneurysm repair).

- Meckel's scan (CPT® 78290) can be approved if bleeding is suspected from a Meckel's diverticulum.

- Gastrointestinal Bleeding Scintigraphy (CPT® 78278) can be considered if there is brisk active bleeding with negative endoscopy

- For TIPS placement, See **AB-26.3: Portal Hypertension**

**AB-22.2: Small Bowel Bleeding Suspected**

- If small bowel bleeding is suspected as the source of bleeding, and if upper and lower endoscopies are negative:
  - Video capsule endoscopy (VCE) is performed prior to advanced imaging.
    - VCE is not required prior to advanced imaging if small bowel obstruction or stricture of the gastrointestinal tract is suspected, or if there is dysphagia. In addition there are theoretical concerns in individuals with implantable devices such as pacemakers or defibrillators.
  - CT Enterography (CPT® 74177) if upper and lower endoscopy are negative and if VCE is negative. If there is a contraindication to CT Enterography, MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) may be performed.
  - Note: Providers occasionally request a CT or MR Enterography prior to the administration of a VCE, in order to assess whether there is pathology that might impede passage of the capsule and cause retention. This is not supported as a routine procedure prior to VCE. It should be noted that a patency capsule is available, and that this may identify patients at higher risk of retention. However, guidance from the consensus group of the American College of Gastroenterology recommends that in patients with obstructive symptomatology, imaging (MR Enterography or CT Enterography) should be performed prior to VCE. This group would also include high risk patients with a known history of Crohn’s Disease, known history of strictures or other obstruction, history of previous pelvic or abdominal radiation, or suspected tumor.

- Iron Deficiency Anemia
If the bleeding is determined to be non-gastrointestinal (e.g. hematuria or vaginal bleeding), refer to the appropriate guideline for these conditions.

If the source is determined to be gastrointestinal:
- Upper endoscopy and colonoscopy should be performed, unless contraindicated.
- Small bowel video capsule endoscopy is next, if endoscopies are negative (unless contraindicated).
- CT Abdomen and Pelvis with contrast (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) (if CT Enterography is contraindicated) can be performed, if small bowel video capsule endoscopy is negative, or for further evaluation of abnormal video capsule findings. CT Enterography should be considered the test of choice given the lack of motion artifact and its superior spatial resolution.

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AB-23.1: IBD Rule out Crohn’s Disease or Ulcerative Colitis

Suspected Crohn’s Disease or Ulcerative Colitis

- Chronic diarrhea without “Red Flags” (See AB-2.1: General Information and AB-21: Diarrhea, Constipation, and Irritable Bowel)

- Any “Red Flag” (See AB-2.1: General Information) can undergo:
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Enterography (CPT® 74177) or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197).

- CT Enterography (CPT® 74177) or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197) can be approved if no red flag is present and request is for the evaluation of chronic abdominal pain associated with diarrhea due to a concern for inflammatory bowel disease if:
  - There is a positive family history of inflammatory bowel disease, or
  - There are endoscopy or colonoscopy findings suggestive of inflammatory bowel disease, or
  - Elevated inflammatory markers (CRP or fecal calprotectin).

- Note: If the CRP is ≤0.5 mg/dl, OR fecal calprotectin is <40 mcg/g, then IBD is effectively excluded and enterography would not be indicated to exclude IBD.

NOTE: Serologic markers

Serologic and genetic markers are currently under investigation with regards to their value in diagnosing inflammatory bowel disease, and are sometimes used as a screening test for IBD in which other examinations are negative. At the current time they are not considered suitable as a screening test for inflammatory bowel disease in patients with GI symptoms, and the routine use of serologic or genetic markers for the diagnosis of IBD is not indicated, Thus, an isolated positive marker result in a patient without any other findings to suggest IBD, especially in the presence of negative inflammatory markers and endoscopic examinations, is not, in and of itself, an indication for advanced imaging.

Note: Serologic markers include anti-glycan antibodies, such as ASCA, ACCA, ALCA, AMCA, Anti-L, Anti-C), Anti-OmpC, Anti-Is, Anti-Cbir, pANCA, PAB, GAB

Practice Notes

Studies have demonstrated the negative predictive value of a low fecal calprotectin and CRP with regards to inflammatory bowel disease. Chey, et al. in a meta-analysis demonstrated that a fecal calprotectin <40mcg/g or a CRP ≤0.5 mg/dl effectively excludes inflammatory bowel disease in patients with IBS. Katsinelos, et al. reviewed wireless capsule endoscopy results in patients with abdominal pain and diarrhea. The diagnostic yield of capsule endoscopy in patients with abdominal pain and diarrhea with positive inflammatory markers was 90.1%, and 0% in patients with abdominal pain and diarrhea with negative inflammatory markers. This led the Canadian Association of Gastroenterology to recommend against the use of capsule endoscopy in persons with chronic abdominal pain or diarrhea as their only symptoms and no evidence of biomarkers associated with Crohn’s Disease, stating “CE (capsule endoscopy) is not warranted in most patients who present with chronic abdominal pain in the absence of positive tests for inflammatory markers or abnormal findings on endoscopy or imaging”.

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**AB-23.2: Known IBD**

- Known Crohn’s Disease or Ulcerative Colitis with suspected complications including abscess, perforation, fistula or obstruction, or monitoring response to therapy:
  - CT Abdomen and Pelvis (CPT® 74177), CT Enterography (CPT® 74177), or MR Enterography (CPT® 74183 or CPT® 74183 and CPT® 72197)
  - MR Enterography is the test of choice for the follow up of young patients with IBD given the lack of ionizing radiation and the need for lifetime follow up in many patients.

**AB-23.3: Perirectal/Perianal Disease**

- Perirectal/Perianal Fistula:
  - MRI Pelvis without and with contrast (CPT® 72197)
  - Endoscopic ultrasound is preferential to CT in this setting
  - CT Pelvis with contrast (CPT® 72193) is an inferior study in this setting, and should be used when MRI or Endoscopic ultrasound cannot be performed.

- Perirectal/Perianal Abscess:
  - MRI Pelvis without and with contrast (CPT® 72197)
  - CT Pelvis with contrast (CPT® 72193) is inferior but can be approved as an alternative if desired.

**AB-23.4: Primary Sclerosing Cholangitis (PSC)**

- Primary Sclerosing Cholangitis:
  - MRCP can be considered to assess for PSC in those:
    - With IBD and any elevated liver study (including alkaline phosphatase, GGTP, bilirubin, AST, or ALT).
    - Without IBD, but with persistent cholestatic liver tests. (See **AB-30: Abnormal Liver Chemistries**)
  - Ultrasound or MRI/MRCP can be done as surveillance for cholangiocarcinoma in individuals with PSC every 6 months.

**Practice Notes**

Primary sclerosing cholangitis (PSC) is a chronic liver and biliary tract disease that can result in stricturing and fibrosis of the intra- and extra- hepatic biliary ducts, as well as end-stage liver disease. It is most often associated with inflammatory bowel disease. Biliary obstruction can occur anywhere along the biliary tree, resulting in cholangitis, and there is a high risk of the development of cholangiocarcinoma, which must be strongly considered in individuals with PSC and a dominant stricture, as well as an increased risk of gallbladder polyps and other malignancies. As such, imaging plays an important role in the diagnosis and follow-up of PSC. See **AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC** Practice Notes PSC (Primary Sclerosing Cholangitis) vs PBC (Primary Biliary Cholangitis)
AB-23.5: Special Considerations

CT Abdomen and Pelvis with or without contrast (CPT® 74177 or CPT® 74176) can be performed prior to endoscopy if requested by the physician who will be performing the endoscopy, especially if there is suspected inflammatory bowel disease.

References

AB-24.1: Celiac Disease

Diagnosis is made by blood testing\(^1\):
- Anti-tissue transglutaminase antibody (anti-tTG), anti-endomysium antibody (EMA), total IgA count, CBC to detect anemia, ESR, C-reactive protein, complete metabolic panel, vitamin D, E, B12 levels.

Endoscopy and biopsy of the small bowel is performed to confirm the diagnosis if the anti-tTG and EMA tests are positive.

CT Abdomen and Pelvis with contrast (CPT\(^\text{®} 74177\)) or CT Enteroclysis (CPT\(^\text{®} 74176\) or CPT\(^\text{®} 74177\)), or CT Enterography (CPT\(^\text{®} 74177\)) is appropriate for:
- One time study after initial, confirmed diagnosis of Celiac Disease.
- Confirmed Celiac disease and despite adherence to a gluten free diet the individual is experiencing new or continued weight loss, diarrhea, abdominal distention, anemia, or other symptoms suggesting complications of celiac disease.

Practice Notes

- Celiac is an autoimmune disease in which the villi of the small intestine are damaged from eating gluten (found in wheat, barley, and rye).
- Complications of celiac disease include ulcerative jejunitis, lymphoma, and small intestinal adenocarcinoma.

References

**AB-25.1: CTC**

- Screening CTC (CPT® 74263) can be performed as indicated below unless ONE of the following has been completed:
  - FIT-DNA (multi-targeted stool DNA test) within the last 3 years. See Lab Management Guidelines: Cologuard Screening for Colorectal Cancer.
  - Colonoscopy within the last 10 years.
- Screening CTC (CPT® 74263) can be approved every 5 years for colorectal cancer for:
  - Average-risk non-African American individuals ages 50 to 75 (average risk is defined as no previously diagnosed colorectal cancer, colonic adenomas, or inflammatory bowel disease involving the colon)
  - Individuals between 76 to 85 if there is no history of a previously negative colonoscopy or CTC
  - African-Americans beginning at age 45
  - Individuals with a SINGLE first-degree relative diagnosed at age >60 years with colorectal cancer or an advanced adenoma can be screened with CTC beginning at age 40. (If there are 2 or more first degree relatives at any age with CRC or an advanced adenoma, or a first degree relative <60, the individual should be screened via colonoscopy, not CTC).

- Diagnostic CTC without contrast (CPT® 74261) can be approved for:
  - Failed conventional colonoscopy (e.g. due to a known colonic lesion, structural abnormality, or technical difficulty), and/or
  - Conventional colonoscopy is medically contraindicated. Contraindications may include:
    - Coagulopathy
    - Intolerance to sedation
    - Elderly ≥80 years of age
    - Recent (within the last 60 days) myocardial infarction (MI)

- Diagnostic CTC with contrast (CPT® 74262) can be approved if:
  - There is a known obstructing colorectal malignancy so that staging prior to surgery can be performed, if desired.
  - There is a clearly stated indication for IV contrast to evaluate extra-colonic organs.

**Practice Notes**

CT Colonography is routinely performed without contrast, and IV contrast is not needed in most cases.
References
AB-26: Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC); Ascites and Portal Hypertension

| AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC | 93 |
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| AB-26.4: Monitoring After Fontan Procedure | 96 |
AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC

Screening for HCC in individuals with chronic liver disease or cirrhosis:
- Ultrasound (CPT® 76700 or CPT® 76705) every 6 months in the presence of chronic liver disease, regardless of etiology. (See exception for AB-26.4: Monitoring After Fontan Procedure).
  - If liver nodule is identified:
    - Less than 1cm
      - Repeat US in 3 months, then every 3 to 6 months.
      - If stable for 2 years, then return to US every 6 months
    - Greater than or equal to 1cm
      - Multiphase CT Liver (either CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183) should be performed.
        - If negative, return to routine surveillance via US in 6 months.
        - If Li-RADS NC (non-categorizable): repeat the same study or an alternative diagnostic imaging ≤3 months. (Note: non-categorizable refers to a technical problem with the study, such as image omission or severe degradation)
        - If Li-RADS 1 (definitely benign): Return to routine surveillance via US in 6 months.
        - If Li-RADS 2 (probably benign): CT or MRI in 6 months can be approved (US requests are approvable if desired). If unchanged, return to routine surveillance via US.
        - If Li-RADS 3 (intermediate): CT or MRI in 6 months, and can be repeated every 6 months 2 more times, for a total of 18 months from the initial finding. If no change by 18 months, return to US surveillance every 6 months.
        - If Li-RADS 4 (probable HCC): Repeat or alternative imaging in ≤3 months. If HCC confirmed: See ONC-14: Upper GI Cancers in the Oncology Imaging Guidelines.
        - If Li-RADS 5 (HCC confirmed): See ONC-14: Upper GI Cancers in the Oncology Imaging Guidelines.
        - If Li-RADS M (Malignant, not definitely HCC): Repeat or alternative imaging in ≤3 months, and follow appropriate Oncology guidelines upon diagnosis.
  - Exceptions to the above algorithms:
    - Advanced imaging for surveillance may be substituted for US in the following circumstances:
      - Obesity (BMI >35)
      - Marked parenchymal heterogeneity noted on US.
      - Other specifically noted technical limitations of US such as obscuration by intestinal gas, chest wall deformity, etc.
    - For individuals on the Liver Transplant list: See AB-42.1: Liver Transplant, Pre-Transplant.
  - Alpha-fetoprotein ≥20 ng/mL: Multiphasic CT or MRI Abdomen:
Further imaging should follow the above algorithm, depending on the findings of the CT or MRI.

- If the initial CT or MRI do not reveal a lesion, but the AFP increases on subsequent testing, additional advanced imaging by CT or MRI may be approved if laboratory results demonstrate an increase in AFP by ≥7 ng/mL/month on at least 3 determinations.

- Contrast-Enhanced Ultrasound (CEUS)
  - Further studies are needed to assess the value of CEUS in this setting, and it should be considered investigational and experimental at this time.

**Practice Note**

When performed for liver lesion evaluation, a multiphase CT protocol may include non-contrast imaging as well as arterial, portal venous, and delayed-phase post-contrast imaging. However, these protocols do not always require non-contrast imaging which may not provide additional information in many scenarios. Therefore, a multiphase CT for liver lesion evaluation can be requested as CPT® 74160 (CT Abdomen with contrast) or CPT® 74170 (CT Abdomen without and with contrast).

The American Association for the Study of Liver Diseases (AASLD) revised its guidelines with respect to surveillance for HCC in patients with cirrhosis in 2018. The recommended algorithm now includes either US alone or US with serum AFP every 6 months. It should be noted that "modification of this surveillance strategy based on the etiology of liver diseases or risk stratification models cannot be recommended at this time."1

In addition, the AASLD also issued a subsequent Practice Guidance in 2018 and this document forms the basis of eviCore’s guidelines. The AASLD has adopted the Li-RADS classification of liver lesions with respect to HCC surveillance imaging for patients with advanced liver disease, and follow-up imaging protocols are based on this system. In view of this, the Li-RADS classification now informs imaging protocols used by eviCore.

Note: PSC (Primary Sclerosing Cholangitis) vs. PBC (Primary Biliary Cholangitis)

These 2 entities sound similar, and both are cholestatic, but they are different diseases, and as such have different monitoring requirements.

PSC is an idiopathic cholestatic disease characterized by chronic inflammation, progressive fibrosis, and stricturing of the *medium and large-sized* extra-hepatic or intra-hepatic bile ducts. Segmental bile duct dilation proximal to areas of stricturing creates the characteristic beaded appearance on a cholangiogram, such as MRCP. This may progress and eventually lead to cirrhosis as well. It is most commonly associated with inflammatory bowel disease. From a surveillance standpoint, PSC may be complicated by disease-associated malignancies, including cholangiocarcinoma, hepatocellular carcinoma, and pancreatic cancer. Thus, follow-up imaging in this setting is generally via MRCP +/- MRI Abdomen (CPT® 74181 or CPT® 74183) - See **AB-23.4: Primary Sclerosing Cholangitis**.

PBC is a complex, chronic, and slowly progressive autoimmune liver disease that predominately affects women, and is characterized by cholestatic liver biochemistries as
well as the presence of AMA (Anti-Mitochondrial Antibodies), and results in T-lymphocyte-mediated destruction of small intrahepatic bile ducts. This may ultimately lead to cirrhosis, and thus an increased risk of hepatocellular carcinoma. Because of this, surveillance via US screening protocols for HCC are followed in PBC. It may be necessary, when the diagnosis of PBC is uncertain, for an MRCP to be performed in order to distinguish between PBC and PSC. However, MRI or MRCP is not used for serial monitoring for PBC, once the diagnosis is established. This is in contradistinction to PSC, in which MRCP is used to surveil for cholangiocarcinoma, as discussed above.

**AB-26.2: Ascites**
- Abdominal ultrasound (CPT® 76700 or CPT® 76705) with diagnostic paracentesis required for all initial evaluations to determine the need for advanced imaging.
- Peritoneal-venous shunt patency study (CPT® 78291) is considered for evaluation of shunt patency and function in an individual with ascites.

**AB-26.3: Portal Hypertension**
- Most cases of portal hypertension are caused by cirrhosis, and the most feared complication is that of esophageal variceal hemorrhage. Causes of portal hypertension can be divided into prehepatic (e.g. portal vein thrombosis, extrinsic compression from a tumor), intrahepatic (e.g. cirrhosis) and post-hepatic (e.g. hepatic vein thrombosis) causes. The differentiation of some of these causes may require work-up which includes measurement of the hepatic venous pressure gradient (HVPG) which is considered the gold standard for the evaluation of portal hypertension.
- The gold standard for the assessment for portal hypertension is the Hepatic Venous Pressure Gradient (HPVG [pressure gradient between portal vein and the inferior vena cava]), which is an invasive test.
- For noninvasive abdominal imaging:
  - Abdominal US (CPT® 76700 or CPT® 76705) (including Duplex Doppler US [CPT® 93975] of the liver and upper abdomen) is required for all initial evaluations to assist in determining the cause (pre-hepatic [e.g. portal vein thrombosis, extrinsic compression from a tumor], intrahepatic [e.g. cirrhosis], and post-hepatic [e.g. hepatic vein thrombosis]). US is very accurate for detecting portal vein or hepatic vein thrombosis.
- For inconclusive US or further evaluation of US findings:
  - Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)
- TIPS (transjugular intrahepatic portosystemic shunt)
  - Pre-procedure evaluation:
Abdominal US, including Doppler (CPT® 76700 and/or CPT® 93975), Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183) See AB-43.1: Hepatic Arteries and Veins

For routine follow-up to monitor stent patency:
- US with Doppler (CPT® 93975) 7-14 days after shunt creation, and then at 3 months, 6 months, and then every 6 months thereafter.
  - (Note: If requested earlier than the above intervals because of a clinical deterioration or suspicion of stent occlusion, the Doppler can be approved).
- If Doppler imaging is indeterminate or if there is a negative Doppler with clinical signs of worsening portal hypertension:
  - Multiphase CT Abdomen (CPT® 74160 or CPT® 74170), Multiphase CTA Abdomen (CPT® 74175), Multiphase MRA Abdomen (CPT® 74185), or MRI Abdomen liver protocol (CPT® 74183)

Certain requests are made for advanced imaging to evaluate an individual with cirrhosis for the presence of esophageal varices. In general, and in the absence of a contraindication, endoscopy should be performed in individuals to assess for the presence of varices.

AB-26.4: Monitoring After Fontan Procedure

- Abdominal ultrasound and Doppler yearly
- Transient Elastography yearly (CPT® 91200) (Note: eviCore does not currently review for this procedure code and providers should contact the insurer directly for any pre-authorization requirements.)
- If any sized lesions are detected on ultrasound:
  - MRI Abdomen without or without and with contrast (CPT® 74181 or CPT® 74183) and then follow AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC timeframes for follow-up based on Li-RADS classification, with the exception that all future follow-up imaging can be with MRI Abdomen without or without and with contrast (CPT® 74181 or CPT® 74183) if requested
- If advanced fibrosis or cirrhosis is detected:
  - HCC monitoring every 6 months with MRI Abdomen without or without and with contrast (CPT® 74181 or CPT® 74183) is indicated

Practice Notes

- Patients with single-ventricle physiology who have undergone the Fontan Procedure which redirects venous blood flow to the pulmonary circulation invariably develop liver complications, which can include the development of nodules and cirrhosis secondary to the altered vascular anatomy, and thus are at risk for hepatocellular carcinoma. In addition, the congestive hepatopathy associated with the Fontan procedure makes differentiation of focal liver lesions from congestive changes more challenging than other cirrhotic conditions. Thus most institutions use MRI rather
than US for monitoring in the setting of cirrhosis. There are no current society-endorsed guidelines and institutions may vary in the monitoring of chronic liver disease in this patient population. The above algorithm represents an accepted approach and is consistent with the consensus from the Fontan-Associated Liver Disease proceedings from the American College of Cardiology Shareholders Meeting (2015) as well as an institutional algorithm.10

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AB-27: MR Cholangiopancreatography (MRCP) - General

MRCP is an alternative to endoscopic retrograde cholangiopancreatography (ERCP) for evaluating the biliary system and pancreatic ducts.

AB-27.1: MRCP

- MRCP (Magnetic Resonance CholangioPancreatography) is a non-invasive imaging procedure which is used to visualize the biliary and pancreatic ductal system. It is used most often in the following circumstances: Suspected gallstone pancreatitis (See AB-33: Pancreatitis)
  - Suspected biliary pain (See AB-2.3: Right Upper Quadrant Pain including Suspected Gallbladder Disease and AB-2.5: Epigastric Pain and Dyspepsia)
  - Pancreatic cyst and pseudocyst evaluation (See AB-31: Pancreatic Lesion)
  - Evaluation of abnormal liver chemistries (See AB-30.1: Abnormal Liver Chemistries)
  - Evaluation of the pancreas secondary to abdominal trauma with suspected duct injury or pseudocyst
  - Recurrent pancreatitis of unknown etiology (See AB-33: Pancreatitis)
  - Evaluation and follow-up of Primary Sclerosing Cholangitis (See AB-23.4: Primary Sclerosing Cholangitis (PSC))
  - Evaluation of jaundice (See AB-30.1: Abnormal Liver Chemistries)
  - Evaluation of congenital anomalies of the cystic and hepatic ducts
  - Post-surgical biliary anatomy and complications (See AB-42.3: Liver Transplant, Post-Transplant)

- Code assignment for MRCP
  - In general, there is no specific CPT code to describe MRCP. To report an MRCP, one of the MRI Abdomen codes should be selected, depending on contrast needs (CPT® 74181, CPT® 74182, or CPT® 74183).
  - There is a Level II HCPCS code for MRCP, S8037, used by some insurers. However this code (and any other code beginning with the letter “S”) is not payable by Medicare.
  - Reporting or billing a second MRI code to represent the “MRCP portion” of the study is not supported. When this occurs, it is usually seen as 2 simultaneous MRI requests, an MRI Abdomen without and with contrast (CPT® 74183) AND an additional MRI Abdomen without contrast (CPT® 74181). This second MRI code, as noted, is not supported. Both the primary MRI Abdomen AND the MRCP portion of the study are covered by the single MRI Abdomen code (CPT® 74183).
  - Requests for 3D rendering (either CPT® 76376 or CPT® 76377) are approvable, if requested, in addition to the primary MRI Abdomen code (CPT® 74181, CPT® 74182, or CPT® 74183).
References


**AB-28.1: Gallbladder Polyps**

- Individuals at increased risk for gallbladder malignancy (if surgery not chosen):
  - Age >50
  - Primary Sclerosing Cholangitis
  - Indian ethnicity
  - Sessile polyp or gallbladder wall thickening >4 mm

- Increased risk for gallbladder malignancy:
  - Polyp <6 mm
    - Ultrasound at 6 months, then yearly for 5 years
  - Polyp 6-9 mm (If cholecystectomy is not chosen)
    - Ultrasound at 6 months, then yearly for 5 years

- No increased risk for gallbladder malignancy:
  - Polyp <6 mm
    - Ultrasound at 1, 3, and 5 years
  - Polyp 6-9 mm
    - Ultrasound at 6 months, and then yearly for 5 years

- Gallbladder polyp ≥10 mm:
  - Surgery recommended. If surgery not performed, follow guidelines for increased risk of gallbladder malignancy as noted above.

- Alternative Imaging:
  - Endoscopic ultrasound (EUS) may provide additional information in the diagnosis of gallbladder polyps. There is insufficient data that advanced imaging (CT or MRI) should be used ahead of conventional ultrasound in the investigation of gallbladder polyps.¹

- Findings on ultrasound or EUS suspicious for malignancy:
  - CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170)

- For confirmed gallbladder malignancy:
  - See [ONC-14.6: Gallbladder and Biliary Tumors – Initial Work-up/Staging](#) in the Oncology Imaging Guidelines

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**References**

AB-29.1: Liver Lesion Characterization

Note: Advanced imaging approvals in this section refers to MRI Abdomen without and with contrast (CPT® 74183) and CT Abdomen with contrast (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170).

- **Low-risk** individuals defined as:
  - No known primary malignancy
  - No hepatic dysfunction (abnormal liver tests)
  - No known underlying chronic liver disease
  - No history of alcoholism, sclerosing cholangitis, choledochal cysts, hemochromatosis, or anabolic steroid use

Incidental Liver Lesion discovered on US:

- No further imaging:
  - Asymptomatic simple hepatic cyst
  - Fatty liver (steatosis) without findings suspicious for focal liver lesion or technical limitation of the study

- MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen (CPT® 74160 or CPT® 74170):
  - Indeterminate findings, or hepatic cyst with septations, fenestrations, irregular walls, or daughter cysts

For liver lesions detected on US in individual with underlying chronic liver disease or cirrhosis, see **AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC**

Incidental Liver Lesion discovered on CT:

- <1cm:
  - Low-risk individual:
    - No further advanced imaging
  - MRI Abdomen approvable for:
    - High-risk individual with known primary malignancy with a propensity to metastasize to the liver
    - High-risk individual with history of alcoholism, elevated liver enzymes, sclerosing cholangitis*, choledochal cysts, hemochromatosis, or anabolic steroid use
    - Suspicious imaging features noted by radiologist
  - For high-risk individuals with underlying chronic liver disease
    - See **AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC**
    - If a specific focal lesion is identified, refer to guidelines below regarding specific focal liver lesions.
      (*See **AB-23.4: Primary Sclerosing Cholangitis (PSC)**)
  - 1.0-1.5cm:
    - No further advanced imaging
Benign imaging features including sharp margins, homogeneous low attenuation (<20 Hounsfield Units on noncontrast and/or portal-venous phase imaging), characteristic features of hemangiomas (See below for incompletely characterized hemangiomas), focal fatty sparing or deposition, or perfusional changes, and in low-risk patients with “Flash-filling” imaging features (uniform hyper-enhancement relative to hepatic parenchyma or arterial-phase postcontrast imaging)

MRI Abdomen approvable for:
- Suspicious imaging features (ill-defined margins, heterogeneous density, mural thickening or nodularity, thick septa, intermediate to high attenuation on portal-venous-phase imaging (>20 HU, in the absence of pseuodenhancement), or if pre- and post-contrast imaging demonstrates enhancement >20 HU)
- Any high-risk patient if there is any doubt that the mass is benign
- If radiologist reports that imaging is inadequate to ascertain the presence of benign vs. suspicious features (indeterminate)
- If a specific focal lesion is identified, refer to guidelines below regarding specific focal liver lesions.

> 1.5cm:
- Benign Imaging Features:
  - No further imaging
- MRI Abdomen approvable for:
  - Suspicious or “Flash-Filling” imaging features
  - Radiologist reports that imaging is inadequate to ascertain the presence of benign vs. suspicious features (indeterminate)
  - Any high-risk patient if there is any doubt that the mass is benign
  - If a specific focal lesion is identified, refer to guidelines below regarding specific focal liver lesions.

Additional follow-up imaging for an Indeterminate lesion:
- Indeterminate lesion <1cm, low-risk or average risk individual
  - No further imaging
- Indeterminate lesion <1cm in high-risk individuals with known extra-hepatic malignancy, or other high-risk individuals other than chronic liver disease (See AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC) not fully characterized after initial MRI:
  - See ONC-31.2: Liver Metastases or malignancy-specific guidelines in the Oncology Imaging Guidelines
  - If lesion remains indeterminate, and biopsy cannot be performed, follow-up MRI can be obtained in 3-6 months. Additional imaging in this setting can be considered on an individual basis.
- Indeterminate lesion <1cm in high-risk individuals with known underlying chronic liver disease or cirrhosis
  - See AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC
- Most lesions ≥1cm can be categorized by MRI or histology. For lesions which have been categorized, regardless of size, see below.

For the imaging of specific focal liver lesions:
Abdomen Imaging

- Suspected hepatic adenoma:³
  - MRI is considered the best technique for characterization. Follow-up imaging can be CT or MRI Abdomen every 6 months for 2 years, and then annually, to establish any growth patterns and assess for malignant transformation.

- Hepatic Hemangioma (if not completely characterized on initial CT without a liver protocol):³
  - Multiphase CT Abdomen (CPT® 74160) or MRI Abdomen (CPT® 74183)
  - Additional follow-up imaging is not required if the advanced imaging study demonstrates classic features of hemangioma with the following exception:
    - Giant hemangiomas (>4cm) can be followed by limited abdominal US in 6-12 months. If no change in size, no further follow-up is indicated, unless it becomes symptomatic.
  - See below for pre-operative considerations

- Focal Nodular Hyperplasia (FNH):³
  - MRI Abdomen (CPT® 74183) or CT Abdomen (CPT® 74160 or CPT® 74170) to confirm a diagnosis of FNH. The use of Eovist contrast is often diagnostic in differentiating FNH from other lesions seen on MRI or CT.
  - Additional follow-up is annual US for 2 to 3 years in women diagnosed with FNH who are continuing to use oral contraceptives. Follow-up with CT or MRI can be done if the lesion is not adequately visualized on US.

- Hepatic cysts:³
  - Asymptomatic, simple cysts do not require additional follow-up.
  - For complicated cysts (US shows internal septations, fenestrations, calcifications, irregular walls, as well as the presence of daughter cysts):
    - CT Abdomen or MRI Abdomen can be performed

- Additional indications for advanced imaging (MRI Abdomen or CT Abdomen):
  - If documented that a percutaneous liver biopsy is to be considered if imaging is atypical or inconclusive.¹
  - Fatty liver on US with a focal liver lesion.
  - **If there is a technical limitation to US (e.g. marked heterogeneity, or other specifically noted technical limitations of US such as obscuration by intestinal gas, chest wall deformity, etc.)⁵
  - For suspected liver metastases, See **ONC-31.2: Liver Metastases** in the Oncology Imaging Guidelines

- Preoperative studies for individuals with large hemangiomas or adenomas considered for resection:
  - MRA Abdomen (CPT® 74185) or CTA Abdomen (CPT® 74175) can be considered

- For Indeterminate Lesions ≥1cm in categories for which defined guidelines do not exist (i.e., underlying chronic liver disease, **AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC**, underlying malignancy, **ONC-31.2: Liver Metastases** or the specific malignancy, hepatic adenoma, etc.) a biopsy should be considered when the findings from advanced imaging are inconclusive. In clinical situations when a biopsy cannot be performed (medical contraindication or a liver transplant candidate due to the risk of needle-tract seeding), or is inconclusive, a
short-term surveillance MRI can be performed in 3-4 months to monitor lesion stability. This can be repeated every 6 months, as necessary in this scenario.\(^1\)

- Incidental fatty liver without a focal lesion or technical limitation, discovered on abdominal imaging (US, CT, MRI):
  - No further advanced imaging except as indicated in **AB-45: Liver Elastography**, or in the above guideline.

- Requests for imaging studies to screen individuals at high-risk for NALFD (e.g., diabetes or obesity) or for screening family members of individuals with NALFD is not approvable at this time.\(^4\)

- **Polycystic Liver Disease**
  - Defined as >20 cysts, or the presence of cysts occupying ½ the volume of the hepatic parenchyma
  - Most commonly seen as an extra-renal manifestation of Autosomal Dominant Polycystic Kidney Disease, though may occur as Autosomal Dominant Polycystic Liver Disease.
  - Imaging:
    - For prognostication purposes MRI Abdomen (CPT\(^®\) 74183) or CT Abdomen (CPT\(^®\) 74160 or CPT\(^®\) 74170) can be performed initially to assess liver volume.
    - At this time, there is no evidence that the asymptomatic patient requires surveillance imaging or monitoring.
    - Suspected complications such as cyst rupture or hemorrhage (manifested by acute pain in the upper abdomen):
      - MRI Abdomen (CPT\(^®\) 74183) or CT Abdomen (CPT\(^®\) 74160 or CPT\(^®\) 74170)

- Nuclear Medicine imaging of the Liver (CPT\(^®\) 78201, CPT\(^®\) 78202, CPT\(^®\) 78803, CPT\(^®\) 78215, CPT\(^®\) 78216) are rarely performed, but can be considered when US, CT, and MRI are unavailable or contraindicated for:
  - Evaluation of liver mass, trauma, or suspected focal nodular hyperplasia (FNH).
  - Differentiation of hepatic hemangioma from FNH.
  - Diffuse hepatic disease or elevated liver function tests.

- Contrast-Enhanced Ultrasound (CEUS, CPT\(^®\) 76978 and CPT\(^®\) 76979)
  - Is only considered when MRI or CT cannot be performed, and the clinical situation requires ultrasound contrast to further delineate the nature of the lesion. CEUS of the liver is otherwise considered investigational or experimental at this time.

**Practice Notes**

As noted by the AASLD “…imaging tests, such as ultrasound, computed tomography (CT), and MR, do not reliably reflect the spectrum of liver histology in patients with NAFLD.” In addition, “MR imaging, either by spectroscopy or by proton density fat fraction is an excellent noninvasive modality for quantifying hepatic fat and is being widely used in NAFLD clinical trials…..However, the utility of noninvasively quantifying HS (hepatic steatosis) in patients with NAFLD in routine clinical care is limited”.\(^4\)
Hints for liver lesion imaging:

- Imaging accuracy:
  - A non-contrast CT is less sensitive than ultrasound
  - A non-contrast MRI is better than a non-contrast CT, but inadequate to define the etiology of a lesion
  - Triple-phase scanning is essential in characterizing a liver lesion

How to interpret the radiologist’s descriptors:

- Hemangioma:
  - Hyperechoic
  - Peripheral nodular enhancement
  - Fills in from the periphery (nodular centrifugal fill-in on venous and delayed phases)

- Focal nodular hyperplasia:
  - Homogenous enhancement
  - Washout. No delayed rim enhancement
  - Central scar (with fibrous-appearing septae radiating from the scar)
  - MRI specifics:
    - Homogenous on T1
    - Scar hyperintense on T2
    - Uniformly hyperintense with contrast

- Hepatic adenoma:
  - Irregular enhancement
  - Fat-containing
  - Washout
  - Central hemorrhage
  - No rim enhancement
  - No central scar
  - MRI specifics: Hyperintense signal on T1 and T2-weighted imaging with intra-lesional lipid

- Hepatocellular carcinoma:
  - HCC’s are hypervascular and receive 100% of their blood supply from the hepatic artery, whereas the liver parenchyma receives 30% from the hepatic artery and 70% from the portal vein, and this discrepancy can be exploited during imaging.
  - Dynamic imaging via MRI and CT follows tumor density with time after IV contrast bolus.
  - During the early arterial phase: HCC appears brighter than surrounding liver (hyperintense) due to hepatic arterial supply.
  - May have a necrotic central region
  - Washes out rapidly
  - Delayed post-contrast phase: rim enhancement (a “tumor capsule”)
  - MRI specifics: Hyperintense signal on T1 and T2-weighted imaging with intra-lesional lipid

- Focal fat (pseudo-mass)
  - Area with sharply demarcated borders
  - Absence of mass effect of surrounding architecture
  - Vessels can course through the region
  - No rim enhancement
No central scar

References
16. Bell, Daniel. Et. al. Hepatocellular Carcinoma Radiopia
AB-30: Abnormal Liver Chemistries

AB-30.1: Abnormal Liver Chemistries
AB-30.1: Abnormal Liver Chemistries

The standard laboratory tests commonly referred to as “LFTs” include bilirubin, alkaline phosphatase (alkphos or ALKP), aspartate transaminase (AST), alanine transaminase (ALT), and gamma-glutamyl transferase (GGT). The major patterns of elevation which affect work-up are:

- Hepatocellular (AST and ALT disproportionately elevated to ALKP)
- Cholestatic (ALKP elevated disproportionately to AST and ALT)
- Mixed pattern (ALKP, AST, and ALT all elevated)
- Isolated hyperbilirubinemia (elevated bilirubin and normal ALKP, ALT and AST)
- “R” Ratio
  - “R” Ratio: The so-called “R” ratio can be used to determine whether a pattern of multiple elevated liver chemistries is predominately cholestatic or hepatocellular in origin
  - R=(ALT/Upper limit of normal (ULN))/(ALKP/ULN ALKPH)
  - If the “R” ratio:
    - >5 = hepatocellular
    - <2 = cholestatic
    - 2-5 = mixed pattern
  - For hepatocellular, use AST or ALT elevation guidelines
  - For cholestatic, use ALKPH elevation guidelines
  - Use ULN for ALT as noted below, and ULN for alkphos based on the individual lab report

For elevated AST and/or ALT (>33 IU/l for males, >25 IU/l for females) and other LFTs are normal:

- <2X normal:
  - Repeat lab after 3 weeks and discontinuation of medications associated with elevated LFTs (such as statins, niacin, sulfa, rifampin, tetracycline, estrogen) if applicable.
  - If LFTs remain elevated: Abdominal US (CPT® 76700 or CPT® 76705)
- 2 to 15X normal:
  - Abdominal US (CPT® 76700 or CPT® 76705)
- >15X normal:
  - Abdominal US with Doppler (CPT® 76700 or CPT® 76705 and CPT® 93975)

Elevated alkaline phosphatase level, and other LFTs are normal

- Etiology of elevated ALKP should be determined prior to imaging.
  - If isolated ALKP elevation, GGT should be obtained for confirmation of hepatic etiology, prior to imaging. If ALKP is elevated with other LFTs, no confirmatory test is necessary.
  - For confirmed hepatic etiology of elevated ALKP, Abdominal or RUQ ultrasound (CPT® 76700 or CPT® 76705)
    - If dilated biliary ducts on US: MRCP
  - If no dilated biliary ducts: anti-mitochondrial antibody (AMA) should be checked prior to advanced imaging.
    - If AMA is negative, and ALKP >2X ULN: MRCP
If AMA is negative, and ALKP 1 to 2X ULN: observe for 6 months, if ALKP remains elevated: MRCP

- Isolated elevated bilirubin (no other LFTs elevated).
  - An isolated elevated bilirubin should be fractionated into direct (conjugated) and indirect (unconjugated) levels.
    - If elevation is unconjugated, and no other LFT elevations: No advanced imaging.
    - If elevation is conjugated: RUQ ultrasound
      - If biliary ducts dilated: MRCP
      - If biliary ducts not dilated: check AMA prior to advanced imaging.
        - If negative and elevation persists or is unexplained, MRCP or liver biopsy can be considered.

- For patients with elevated LFTs and suspicion of sclerosing cholangitis, such as those with IBD, See AB-23.4: Primary Sclerosing Cholangitis (PSC).

- For patients with elevated LFTs and history of underlying malignancy, please refer to the specific oncology guidelines, when appropriate.

- Requests for additional advanced imaging (CT, MRI, etc.) are based on the US or MRCP results, as appropriate to the finding (for example, if a lesion is identified that needs further characterization, refer to liver lesion imaging as per AB-29.1: Liver Lesion Characterization).

- Clinical jaundice, no known predisposing condition
  - Abdominal ultrasound (CPT® 76700 or CPT® 76705)
  - For further imaging, follow guideline for elevated bilirubin

- Clinical jaundice, suspected mechanical obstruction based on clinical condition or laboratory values (e.g., known choledocholithiasis, acute and chronic pancreatitis, suspected stricture from a recent invasive procedure, previous biliary surgery, suspected tumor), or US findings suggesting mechanical biliary obstruction, non-diagnostic or technically limited US (e.g., large amounts of intestinal gas, obesity with BMI >35):
  - CT Abdomen with contrast (CPT® 74160) or
  - MRI and/or MRCP (CPT® 74183 or CPT® 74181)

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AB-31.1: Pancreatic Cystic Lesions

Screening studies for pancreatic cancer can be considered in those who are considered high risk in the following guideline: ONC-13: Pancreatic Cancer in the Oncology Imaging Guidelines.

- **Note:**
  - Patients who are not medically fit for surgery should not undergo further surveillance of incidentally found pancreatic cysts, irrespective of size.
  - Surveillance should be discontinued if an individual is no longer a surgical candidate. However, follow-up imaging can be performed if requested for a symptomatic cyst (such as the development of jaundice secondary to cyst), in which palliative treatment might be available.

- This guideline applies to the following pancreatic cystic lesions:
  - Intraductal papillary mucinous neoplasms (IPMN)
  - Mucinous cystic neoplasms (MCN)
  - Serous Cystadenomas (SCA)
  - Solid-pseudopapillary neoplasms (SPN)

- Pancreatic Cyst seen on Imaging-Initial Management:
  - MRI Abdomen (CPT® 74183) and/or MRCP are the tests of choice for initial evaluation.
  - CT Pancreatic protocol (CPT® 74170) or EUS are alternatives in patients who are unable to undergo MRI.
  - Indeterminate cysts may benefit from a second imaging modality or EUS prior to proceeding with surveillance. MRI/MRCP can be approved to better characterize the lesion, without reference to the timeframe for follow-up imaging, if a previous US or CT Abdomen has been performed.
  - Radiographic diagnosis of a non-neoplastic cyst or classic features of a serous cystadenoma
    - No further imaging
  - If any of the following are present the individual should proceed to EUS + FNA and depending on findings, surgical consultation:
    - Main duct >5mm
    - Cyst ≥3cm
    - Change in main duct caliber with upstream atrophy
  - If EUS does not reveal findings of main duct involvement, patulous ampulla, cytology with high-grade dysplasia or pancreatic malignancy, or a mural nodule, then follow up MRI should performed in 6 months.

- Pancreatic Cyst Follow up Imaging
  - If high risk features (See below High Risk Considerations and Features) are not present, then the next follow-up imaging proceeds as follows:
    - Cyst <1cm: MRI in 2 years
    - Cyst 1-<2cm: MRI in 1 year
    - Cyst 2-3cm: if cyst is not clearly an IPMN or MCN then proceed with EUS. If it is an IPMN or MCN, then MRI at 6-12 months.
- If the cyst is determined to be a serous cystadenoma, then no further evaluation unless symptomatic.

Additional Surveillance for a presumed IPMN or MCN (imaging from time of presentation):

(Note: MRCP or MRI/MRCP is the preferred modality for surveillance due to non-invasiveness, lack of radiation, and improved delineation of the main pancreatic duct. In addition, since the timeframes for surveillance imaging are based on the size of the cyst as well as characteristics such as the presence or absence of high-risk features, it is necessary to have an adequate description of these findings from the previous imaging study, either by inclusion of the previous imaging report, or an adequate description of the findings. Finally, the date of the previous study is needed so that the appropriate timing for the next study can be determined.)

- **Cyst <1cm**
  - MRI every 2 years for 4 years.
  - If stable after 4 years consider lengthening of interval imaging.
  - If increase in cyst size, then MRI or EUS in 6 months.
  - If stable, repeat again in 1 year and if stable return to MRI every 2 years.

- **Cyst 1-<2cm**
  - MRI yearly for 3 years
  - If stable for 3 years, then change to MRI every 2 years for 4 years
  - If stable after the additional 4 years, consider lengthening of interval for surveillance.
  - If increase in cyst size, repeat MRI in 6 months. If stable, repeat MRI in 1 year and if remains stable, resume original surveillance schedule.

- **Cyst 2-<3cm**
  - MRI every 6-12 months for 3 years
  - If stable after 3 years, change to MRI every year for 4 years
  - If remains stable, consider lengthening of surveillance interval

- **Cyst ≥3cm**
  - MRI alternating with EUS every 6 months for 3 years
  - If stable for 3 years, increase interval to MRI alternating with EUS yearly for 4 years.
  - If remains stable, consider lengthening of surveillance interval.
  - If increase in cyst size, EUS + FNA

- **Additional considerations**
  - Individuals with asymptomatic cysts that are diagnosed as pseudocysts on initial imaging and clinical history, or are determined to be serous cystadenomas, do not require further evaluation.

- **High-Risk Considerations and Features**
  - Individuals with IPMNs or MCNs with new onset or worsening diabetes
  - Rapid increase in cyst size (>3mm/year) during surveillance may have an increased risk of malignancy and should undergo a short-interval MRI or EUS.
  - Additional high-risk features which may prompt early evaluation are:
    - Jaundice secondary to the cyst
    - Acute pancreatitis secondary to the cyst
• Significantly elevated CA 19-9
• Presence of a mural nodule or solid component either within the cyst or in the pancreatic parenchyma
• Dilation of the main pancreatic duct >5mm
• Focal dilation of the pancreatic duct concerning for main duct IPMN or an obstructing lesion
• IPMNs or MCNs measuring ≥3cm in diameter
• Presence of high-grade dysplasia or pancreatic cancer on cytology. In this circumstance, imaging should be at the discretion of the provider.

➤ Post-op surveillance
   ◆ Surgically resected serous cystadenomas, pseudocyst, or other benign cyst:
     □ No additional imaging after resection
   ◆ Surgically resected mucinous cystic neoplasms (MCNs) without an associated pancreatic malignancy (can have low, intermediate, or high-grade dysplasia):
     □ No additional post-op surveillance
   ◆ Surgically resected MCNs with invasive cancer:
     □ Standard surveillance-based pancreatic cancer guidelines (See ONC-13.5: Surveillance/Follow Up in the Oncology Imaging Guidelines) for 5 years. No surveillance required after 5 years.
   ◆ Surgically resected IPMNs
     □ IPMN with cancer
       ■ Pancreatic cancer surveillance guidelines (See ONC-13.5: Surveillance/Follow Up in the Oncology Imaging Guidelines)
     □ IPMN with high-grade dysplasia
       ■ MRI Abdomen (CPT® 74183) or EUS every 6 months
     □ IPMN with low- or intermediate-grade dysplasia
       ■ MRI Abdomen (CPT® 74183) every 2 years
   ◆ Surgically resected solid-pseudopapillary neoplasm with negative margins:
     □ MRI Abdomen (CPT® 74183) yearly for 5 years.

➤ See AB-27: MR Cholangiopancreatography (MRCP) for coding guidelines for MRCP.

AB-31.2: Incidental Pancreatic Mass or Suspected Metastatic Disease to Pancreas

➤ CT Abdomen with contrast with dual phase imaging (CPT® 74160), or CT Abdomen without and with contrast (CPT® 74170) (dedicated pancreatic protocol) since the majority of pancreatic tumors will enhance following IV contrast.2

References
AB-32: Pancreatic Pseudocysts

AB-32.1: Pancreatic Pseudocysts

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AB-32.1: Pancreatic Pseudocysts
See AB-33.1: Acute Pancreatitis
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AB-33.1: Acute Pancreatitis

Knowledge base:
- Acute pancreatitis (2 of 3 of the following criteria):
  - Characteristic abdominal pain (typically epigastric or left upper quadrant pain with radiation to the back, chest, or flank)
  - Amylase or lipase >3 times the upper limit of normal
  - Radiographic evidence of pancreatitis on cross-sectional imaging
- Early Phase takes place in the first week
  - Goals of imaging:\(^1\)
    - Establish the correct diagnosis or provide an alternative diagnosis
    - Establish the etiology
    - Stage the morphologic severity
    - Assess for complications in patients who deteriorate or fail to improve
- Late phase can last weeks to months thereafter
  - Goals of imaging:\(^1\)
    - Monitor established pancreatic collections
    - Delineate the presence of symptomatic and asymptomatic complications
    - Guide interventional procedures
- Etiologies of pancreatitis:
  - Gallstones and alcohol account for 75-80% of all causes\(^1\)
  - Hypercalcemia, hypertriglyceridemia, medications, a benign or malignant obstruction, pancreatic mass, genetic causes (hereditary pancreatitis), autoimmune pancreatitis (IgG4), infectious etiologies, ischemia secondary to vascular disease, anatomic abnormalities (e.g., pancreas divisum), physiologic abnormalities (Sphincter of Oddi dysfunction), idiopathic causes.
- Complications:
  - Early Phase:\(^2\)
    - Generally manifests as a systemic inflammatory response
    - In the first week, imaging findings correlate poorly with clinical severity\(^1\)
    - Advanced imaging is most useful when performed 5-7 days after admission, when local complications have developed and pancreatic necrosis can be clearly defined.
    - IEP = acute interstitial edematous pancreatitis
    - Necrotizing Pancreatitis
  - Late Phase:\(^2\)
    - AFPC (Acute peripancreatic fluid collection) occurs during the first 4 weeks. If it does not resolve within 4 weeks, it can become organized and develop into a pseudocyst, which contains only fluid with no nonliquefied components
    - Walled-off necrosis (sequelae of necrotizing pancreatitis): inhomogenous nonliquefied components, encapsulated with a wall
- Note: Most cases of pancreatitis are mild. More severe cases are usually hospitalized and imaging performed in that setting is generally not managed by eviCore. The majority of imaging requests are for the initial evaluation of suspected pancreatitis in patients with epigastric pain, and then the follow-up imaging of
discharged patients with respect to complications experienced during the hospitalization, to further elucidate the etiology of the pancreatitis if this was not previously established, or to evaluate continued post-discharge symptoms.

Imaging:
- Initial imaging for suspicion of pancreatitis (typical symptoms, <48 to 72 hours, first-time presentation):
  - Abdominal ultrasound (CPT® 76700 or CPT® 76705)
    - Purpose is to establish the presence/absence of gallstones and biliary ductal dilation.
    - Doppler ultrasound (CPT® 93975) can be approved to assess vasculature, if requested
  - If ultrasound performed and is nondiagnostic due to technical limitation (obesity, overlying gas, etc.):
    - MRI/MRCP (CPT® 74183 or CPT® 74181)
    - CT Abdomen and Pelvis with contrast (CPT® 74177) if ultrasound is nondiagnostic and MRI/MRCP cannot be performed.
  - In suspected acute biliary pancreatitis and/or cholangitis (dilated ducts or choledocholithiasis on ultrasound, elevated liver chemistries with a negative ultrasound, suspicion of cholangitis (classic triad is RUQ pain, fever, and jaundice)):
    - MRI/MRCP (CPT® 74183 or CPT® 74181)
- Initial imaging with atypical signs and symptoms when diagnoses other than pancreatitis are being considered (e.g., bowel perforation, bowel ischemia):
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - NOTE: While MRI/MRCP will give better evaluation of the pancreatic parenchyma as well as biliary and pancreatic ducts, it does NOT provide coverage and adequate evaluation of the bowel to assess alternative diagnoses such as bowel ischemia or perforation.
    - MRI/MRCP (CPT® 74181 or CPT® 74183) can be considered for pregnant patients (non-contrast), or those with renal insufficiency (without or without and depending on request)
- Follow-up imaging (late phase and thereafter):
  - Continued or worsening symptoms:
    - CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI and/or MRCP (CPT® 74183 or CPT® 74181)
  - Follow-up of known pancreatic or peri-pancreatic fluid collections (including pseudocysts), to follow-up symptomatic collections, or for interventional planning:
    - MRI/MRCP (CPT® 74183 or CPT® 74181) or CT Abdomen and Pelvis (CPT® 74177)
      - Note: If requested, CT Abdomen with or without and with (CPT® 74160 or CPT® 74170) or Abdominal ultrasound (CPT® 76705 or CPT® 76700) can be approved.
(Note: Frequency or intervals for additional follow-up is not defined and depends on clinical circumstances, response to therapy, etc.)
- If, despite initial imaging, the etiology of the pancreatitis is still in doubt:
  - MRI/MRCP (CPT® 74183 or CPT® 74181) or CT Abdomen and Pelvis with (CPT® 74177)
    - Note: If requested, CT Abdomen with or without and with (CPT® 74160 or CPT® 74170) can be approved.
- Acute recurrent pancreatitis
  - Abdominal ultrasound (CPT® 76705 or CPT® 76700)
  - MRI/MRCP (CPT® 74183 or CPT® 74181)
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - See AB-33.2: Chronic Pancreatitis.

**AB-33.2: Chronic Pancreatitis**

Clinical signs of chronic pancreatitis include history of alcohol use, abdominal pain, weight loss, steatorrhea, malabsorption, recurrent pancreatitis, fatty food intolerance, low fecal elastase.

- If chronic pancreatitis is suspected:
  - Initial imaging:
    - CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170)
      - If diagnostic criteria are met (pancreatic calcification in combination with pancreatic atrophy and/or dilated pancreatic duct):
        - No further imaging indicated (see below regarding worsening symptoms)
    - If initial CT is inconclusive or nondiagnostic of chronic pancreatitis:
      - MRI/MRCP with secretin enhancement (CPT® 74183 or CPT® 74181)
      - If MRI/MRCP are inconclusive or nondiagnostic of chronic pancreatitis:
        - Endoscopic ultrasound (EUS) is the appropriate next imaging study
      - If EUS is inconclusive, pancreatic function testing and/or ERCP can be performed
      - Note: If abdominal ultrasound is requested at any stage for evaluation of chronic pancreatitis, this can be approved in lieu of advanced imaging
    - If initial imaging fails to confirm chronic pancreatitis, but the clinical suspicion remains, the above testing can be repeated in 6 months.
  - Known chronic pancreatitis with worsening symptoms or pain
    - CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170), MRI/MRCP (CPT® 74183 or CPT® 74181) or Abdominal ultrasound (CPT® 76700 or CPT® 76705) can be approved
    - Note: Possible etiologies of worsening pain include:
      - Peptic ulcer disease
      - GI cancers
      - Pseudocysts
      - Duodenal or common bile duct obstruction
      - Pancreatic duct stone or strictures
      - Inflammatory masses at the head of the pancreas
For pre-surgical planning or post-surgical evaluation for treatment of complications of chronic pancreatitis
- CT Abdomen with or without and with contrast (CPT® 74160 or CPT® 74170), or MRI/MRCP (CPT® 74183 or CPT® 74181) or Abdominal ultrasound (CPT® 76700 or CPT® 76705)

Routine screening for pancreatic cancer in chronic pancreatitis
- Chronic pancreatitis is a risk factor for the development of pancreatic cancer. However, there is no current consensus on whether or how to conduct pancreatic screening in this population. For pancreatic cancer screening guidelines in inherited syndromes, including hereditary pancreatitis, See ONC-13.1: Screening Studies for Pancreatic Cancer in the Oncology Imaging Guidelines

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AB-34.1: Spleen

- Incidental splenic findings on US:
  - CT Abdomen (CPT® 74170) or MRI Abdomen (CPT® 74183) can be obtained.

- Incidental splenic findings on CT or MRI:
  - Imaging is diagnostic of a benign lesion (simple cyst, hemangioma) or characteristics are benign-appearing (homogeneous, low attenuation, no enhancement, smooth margins):
    - No follow-up imaging.
  - Imaging characteristics are not diagnostic:
    - Prior imaging available:
      - One year stability: no follow up imaging
      - Lack of stability: consider MRI if not done, biopsy, or PET/CT (CPT® 78815).
    - No prior imaging:
      - No known malignancy:
        - Suspicious imaging features: (suggesting possible malignancy)
          - MRI Abdomen (CPT® 74183) if not already done or biopsy
          - If MRI still inconclusive and biopsy is not feasible then PET/CT (CPT® 78815) can be considered
        - Indeterminate imaging features: (equivocal but not suspicious for malignancy)
          - Follow up MRI Abdomen (CPT® 74183) in 6 and 12 months.
      - Known malignancy:
        - <1 cm: follow up MRI Abdomen (CPT® 74183) in 6 and 12 months.
        - ≥1 cm: consider MRI Abdomen (CPT® 74183) if not done, biopsy
          - If MRI still inconclusive and biopsy is not feasible then PET/CT (CPT® 78815) can be considered
    - (See diagnosis-specific in the Oncology Imaging Guidelines).

- Clinically detected splenomegaly
  - Abdominal US (CPT® 76700 or CPT® 76705) should be the first imaging study to evaluate splenic size.
  - If splenomegaly is confirmed, the following evaluation is indicated prior to advanced imaging:
    - CBC, evaluation of the peripheral blood smear, LFTs, UA, chest x-ray, HIV testing.
    - CT Abdomen without and with contrast or with (CPT® 74170 or CPT® 74160) can be performed if the etiology of the splenomegaly remains unexplained.
    - MRI Abdomen (CPT® 74183) can be considered for pregnant patients, or individuals with iodinated contrast allergy.
  - Nuclear medicine imaging of the liver/spleen (CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215 and CPT® 78216) is rarely performed, but can be considered if CT and MRI are contraindicated, as well as for evaluation of an accessory spleen.
**AB-34.2: Trauma - Spleen**

Ultrasound Abdomen (CPT® 76700 or CPT® 76705) and Pelvis (CPT® 76856 or CPT® 76857) or CT\(^3,4,5\) Abdomen and Pelvis without and with contrast (CPT® 74178) or with contrast (CPT® 74177) are indicated in individuals with blunt abdominal trauma with suspected splenic rupture or in individuals with penetrating trauma to the left upper quadrant. See **AB-10: Blunt Abdominal Trauma**

**Practice Notes**

Splenomegaly is usually the result of systemic disease, and diagnostic studies are directed toward identifying the causative disease. Complete blood count with differential, LFT’s, and peripheral blood smear examination are often performed prior to considering advanced imaging. There is no evidence-based data to support performing serial CT or MRI to follow individuals with incidental splenic lesions.

**References**

AB-35: Indeterminate Renal Lesion

AB-35: Indeterminate Renal Lesion – General Information 128
AB-35.1: Indeterminate Renal Lesion 128
AB-35.2: Pre-operative Assessment 131
AB-35: Indeterminate Renal Lesion – General Information

For acute flank pain, rule out renal stone, See AB-4: Flank Pain, Rule Out or Known Renal/Ureteral Stone

AB-35.1: Indeterminate Renal Lesion

► Incidental Renal Mass on Ultrasound
  ♦ If categorized as simple cyst or Bosniak I or II, no further imaging,
  ♦ Otherwise, CT Abdomen without and with contrast (CPT® 74170), or MRI Abdomen without and with contrast (CPT® 74183).

► CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) can be approved for further characterization if the original study reveals incomplete visualization of a renal lesion (for example, if only partially visualized on a CT Chest).

► Incidental Renal Mass on Non-Contrast CT
  ♦ If characterized as heterogeneous (thick or irregular wall, mural nodule, septa or calcification):
    ▪ Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170)
  ♦ If characterized as homogeneous (thin or imperceptible wall, NO mural nodule, septa or calcification):
    ▪ 10 to 20 HU (Hounsfield units)
      ▪ Likely benign, not fully characterized: no further work-up
    ▪ 21 to 69 HU
      ▪ Indeterminate: MRI or CT Abdomen without and with contrast (CPT® 74183 or CPT® 74170)
    ▪ ≥70 HU
      ▪ Hemorrhagic or proteinaceous cyst, unlikely to be neoplastic: no further work-up
  ♦ If characterized as TSTC (too small to characterize) and homogeneous:
    ▪ If labelled likely benign cyst, not fully characterized:
      ▪ No further work-up
    ▪ If labelled inconclusive based on subjective evaluation:
      ▪ Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) (preferred) or CT Abdomen without and with contrast (CPT® 74170) within 6-12 months

► Incidental Renal Mass on Contrast-Enhanced CT
  ♦ If characterized as heterogeneous: thick or irregular wall, mural nodule, septa or calcification:
    ▪ Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170)
  ♦ If characterized as homogeneous: thin or imperceptible wall, NO mural nodule, septa or calcification:
    ▪ 10 to 20 HU
      ▪ No further work-up
Abdomen Imaging

- >20 HU (solid or complicated cystic mass)
  - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170)
  - If characterized as TSTC, homogeneous:
    - If labelled likely benign cyst, not fully characterized:
      - No further work-up
    - If labelled inconclusive based on subjective evaluation:
      - Considered indeterminate. MRI Abdomen without and with contrast (CPT® 74183) (preferred), or CT Abdomen without and with contrast (CPT® 74170) within 6-12 months

- Incidental cystic renal mass on CT or MRI without and with contrast (completely characterized, and does NOT contain fat)
  - Bosniak I (benign simple) or II (minimally complicated)
    - No further work-up
  - Bosniak IIF
    - CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) at 6 and 12 months, then yearly for 5 years
    - If no changes for 5 years, cyst is considered benign and of no clinical significance
  - Bosniak III or IV should be referred for additional management or if chosen, active surveillance See ONC-17.4: Surveillance in the Oncology Imaging Guidelines

- Incidental solid renal mass or incidental mass too small to characterize evaluated on CT or MRI without and with contrast and does NOT contain fat
  - TSTC
    - If labelled likely benign cyst:
      - No further work-up
    - If labelled inconclusive based on subjective evaluation:
      - MRI Abdomen without and with contrast (CPT® 74183) (preferred), or CT Abdomen without and with contrast (CPT® 74170) within 6-12 months
  - If solid mass <1.0cm
    - MRI Abdomen without and with contrast (CPT® 74183) (preferred), or CT Abdomen without and with contrast (CPT® 74170) beginning at 6 months, then yearly for 5 years
    - If stable at 5 years (average growth ≤3mm per year): No further work-up
    - If mass shows growth (≥4mm per year) or morphologic change: refer for management, consider renal biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted image MRI Abdomen without and with contrast (CPT® 74183) can be performed
Solid mass 1.0-4.0cm:
- Considered a small renal neoplasm: refer for management, consider biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted imaging MRI Abdomen without and with contrast (CPT® 74183) can be performed. If active surveillance chosen due to limited life expectancy or co-morbidities, See **ONC-17.4: Surveillance** in the Oncology Imaging Guidelines

Solid renal mass >4.0cm
- Considered a renal neoplasm: refer for management, or biopsy. If biopsy is technically challenging or relatively contraindicated, a T2 weighted image MRI Abdomen without and with contrast (CPT® 74183) can be performed. If active surveillance chosen due to limited life expectancy or co-morbidities, See **ONC-17.4: Surveillance** in the Oncology Imaging Guidelines

Incidental renal mass containing fat (contains a region of interest measuring <-10 HU)
- No calcification angiomyolipoma (AML)
  - Solitary and without documentation of growth:
    - <4cm: no further work-up
    - If no prior imaging study for comparison, one follow-up MRI Abdomen (CPT® 74183) or CT Abdomen (CPT® 74170) can be repeated in 6-12 months to assess for any growth.
  - ≥4cm, and considered an AML with potential for clinical symptoms: refer for management.
  - Multiple lesions or growth documented based on old studies:
    - Refer for management. If active surveillance chosen due to limited life expectancy or co-morbidities, See **ONC-17.4: Surveillance** in the Oncology Imaging Guidelines.

With calcification (suspected renal cell carcinoma):
- CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) if only a non-contrast CT has been performed. If active surveillance chosen due to limited life expectancy or co-morbidities, See **ONC-17.4: Surveillance** in the Oncology Imaging Guidelines.

Active Surveillance: For all Active Surveillance indications, See **ONC-17.4: Surveillance** in the Oncology Imaging Guidelines

NOTE: PET/CT or PET/MRI are not recommended because their role evaluating the incidental renal mass is limited.1
**Bosniak Classification:**

I- Benign simple cyst with a hairline thin wall without septa, calcification, or solid component. Homogeneous near-water attenuation density (10 to 20 HU) without enhancement.

II- Benign minimally complicated cyst that may contain a few hairline thin septa that may have “perceived” but not measurable enhancement. Fine calcification or a segment of slightly thickened calcification may be present in the wall or septa. Also, a well-marginated nonenhancing homogeneous mass <3cm with density above simple fluid attenuation (hyperdense cyst).

IIIF- Usually benign complicated renal cyst with multiple hairline thin septa or minimal smooth thickening of the wall or septa. Wall or septa may contain thick and nodular calcification and may have “perceived” but not measurable enhancement. Also, a well-marginated intrarenal nonenhancing mass >3cm with density above simple fluid.

III -Indeterminate complicated cystic renal mass with thickened irregular walls or septa that have measurable enhancement.

IV-Malignant cystic renal mass with enhancing soft tissue components (cystic renal cell carcinoma).

From the Journal of the American College of Radiology

**AB-35.2: Pre-operative Assessment**

- Pre-operative assessment for robotic kidney surgery
  - If not previously performed:
    - CT Abdomen without and with contrast (CPT® 74170) OR
    - MRI Abdomen without and with contrast (CPT® 74183)
    - CTA Abdomen (CPT® 74175) or CTA Abdomen and Pelvis (CPT® 74174) OR
    - MRA Abdomen (CPT® 74185), or MRA Abdomen and Pelvis (CPT® 74185 and CPT® 72198)

**References**

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AB-36.1: Renal Failure

- Ultrasound kidney and bladder (CPT® 76770 or CPT® 76775), preferably with Doppler (CPT® 93975 or CPT® 93976), is the preferred imaging study for the evaluation of acute or chronic renal failure.

- MRA Abdomen (CPT® 74185) can be utilized when there is suspected:
  - Renal vein/caval thrombosis
  - Renal artery stenosis as cause of renal failure
  - MRA with contrast may be contraindicated in severe renal failure or patients on dialysis due to the risk of gadolinium agents in causing nephrogenic systemic sclerosis.

- CT Abdomen without contrast (CPT® 74150) is not needed except to rule out ureteral obstruction or retroperitoneal mass.

- Nuclear renal imaging (CPT® 78701, CPT® 78707, CPT® 78708, CPT® 78709) can be considered for ANY of the following:
  - Renal transplant follow-up
  - Kidney salvage vs. nephrectomy surgical decisions
  - Acute renal failure with no evidence of obstruction on recent ultrasound.
  - Chronic renal failure to estimate prognosis for recovery.

- Nuclear medicine studies of the kidney (CPT® 78700 or CPT® 78701) can be considered for evaluation of the following anatomic renal anomalies:
  - Suspected horseshoe kidney
  - Suspected solitary or ectopic kidney

References
AB-37.1: Renovascular Hypertension

See PVD-6.6: Renovascular Hypertension/Renal Artery Stenosis in the Peripheral Vascular Disease Imaging Guidelines.
AB-38.1: Polycystic Kidney Disease

- Retroperitoneal ultrasound¹ (CPT® 76770 or CPT® 76775) can be performed for:
  - Suspected polycystic kidney disease
  - Screening individuals at risk for autosomal dominant polycystic disease (ADPKD)
    - In the absence of any clinical change, follow-up screening is not indicated if a screening ultrasound was performed at age 40 or later and was negative for any cysts (The negative predictive value of an ultrasound in this age group is 100% for both PKD1 and PKD2, if no cysts are identified.).
    - If an initial ultrasound is negative for any cysts, a follow-up ultrasound can be performed at the discretion of the ordering provider for individuals <40 years of age.

- MRI Abdomen without contrast (CPT® 74181) can be performed:
  - If a cystic renal lesion is detected in an individual at-risk of PKD, for prognostic purposes
  - For volume averaging (Total Kidney Volume – TKV) prior to treatment for PKD (Jynarque, tolvaptan)
    - Optimal follow-up imaging intervals in this setting have not yet been established. Requests for follow-up imaging can be considered on a case-by-case basis.

Practice Notes

- Ultrasound is very effective in establishing a diagnosis of ADPKD, though may miss early small cysts. However, the negative predictive value in the various age groups of a negative ultrasound is as follows:
  - ≥40: 100% for PKD1 and PKD2
  - 30-39: 100% for PKD1 and 96.8% for PKD2
  - 5-29: 99.1% for PKD1 and 83.5% for PKD2

- In addition, the preferable advanced imaging study is MRI Abdomen without contrast (CPT® 74181). This is because of the increased risk of gadolinium-induced nephrogenic fibrosis in individuals with PKD.

Reference

# AB-39: Hematuria and Hydronephrosis

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**AB-39.1: Hematuria with Urinary Tract Infection (UTI)**

Signs and symptoms of UTI: urinary frequency, burning on urination, urgency, dysuria, positive urine leukocyte esterase, presence of WBCs in the urine, fever, elevated WBC as per the testing laboratory’s range

- Females ≤40 years of age should receive at least a 3-day regimen of antibiotics followed by repeat dipstick urinalysis or complete urinalysis with microscopic exam. If the hematuria resolves, advanced imaging is not indicated. If symptoms persist, CT Urogram (CPT® 74178) is indicated.
- CT Urogram\(^1\) (CPT® 74178) for females >40 years of age
- Males with UTI should be imaged: See **AB-40: Urinary Tract Infection (UTI)**

**NOTE:** 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or CPT® 76376) for a CT Urogram can be approved.

**AB-39.2: Hematuria, not Related to Urinary Tract Infection (UTI) or Flank Pain (Asymptomatic Hematuria)**

- Multiphasic CT Urogram (CPT® 74178)
- If CT contraindicated (renal insufficiency, contrast allergy):
  - MR Urography without and with contrast (CPT® 74183 and CPT® 72197) or MR Urography without contrast (CPT® 74181 and CPT® 72195) if contrast contraindicated (e.g. pregnancy)
- If both Multiphase CT and MRI are contraindicated:
  - CT Urogram without contrast (CPT® 74176) or Renal US (CPT® 76775 or CPT® 76770) can be approved
- If persistent or recurrent asymptomatic hematuria with an initial negative urologic work-up, repeat imaging within 3 to 5 years should be considered.

**NOTE:** 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or CPT® 76376) for a CT Urogram can be approved.

**AB-39.3: Hematuria and Flank Pain (suspicion for renal/ureteral stones)**

- CT Abdomen and Pelvis without contrast (CPT® 74176) or CT Urogram (CPT® 74178)
- NOTE: 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or CPT® 76376) for a CT Urogram can be approved.
AB-39.4: Hydronephrosis of unexplained or indeterminate cause³, ⁴

- CT Urogram (CPT® 74178)

- NOTE: 3-D Reconstruction enhances a CT Urogram. Requests for 3-D reconstruction (CPT® 76377 or CPT® 76376) for a CT Urogram can be approved.

- Patients with known uncomplicated hydronephrosis, neurogenic bladder, myelomeningocele (open spinal dysraphism), or spina bifida can have follow-up/surveillance imaging with Retroperitoneal Ultrasound (CPT® 76770) every 6 to 12 months

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AB-40: Urinary Tract Infection

These guidelines refer to UTI without Hematuria.
For UTI with Hematuria, See AB-39: Hematuria and Hydronephrosis

AB-40.1: Upper (Pyelonephritis)

- CT Abdomen and Pelvis without and with contrast (CPT® 74178) or CT Abdomen and Pelvis with contrast (CPT® 74177) if:
  - Suspected complicated: diabetes, immune-compromised, history of stones, prior renal surgery, or fever ≥101 F (≥38.5 C).
  - Not responding to therapy after 3 days.
  - Recurrent pyelonephritis (at least 1 prior pyelonephritis).
  - Males with first time UTI, or recurrent UTI without etiology.

- MRI Abdomen without or with and without contrast (CPT® 74181 or CPT® 74183)
  - Elevated Creatinine

- Pregnant women should be evaluated initially by renal ultrasound (CPT® 76770 or CPT® 76775) and if further imaging is necessary, MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195).

AB-40.2: Lower

- CT Abdomen and Pelvis without and with contrast (CPT® 74178) if:
  - Suspected complicated: diabetes or immunocompromised or history of stones or prior renal surgery, or fever ≥101 F (≥38.5 C).
  - Not responding to therapy after 3 days.
  - Males with first time UTI or recurrent UTI without etiology.
  - Recurrent UTI ≥3 per year.
  - Recommendation by urologist or specialists.

- MRI Abdomen and MRI Pelvis without or with and without contrast (CPT® 74181 and CPT® 72195 or CPT® 74183 and CPT® 72197)
  - Elevated Creatinine

References
**AB-41.1: Patent Urachus**

- See **PV-23.1: Patent Urachus** in the Pelvis Imaging Guidelines
| AB-42.1: Liver Transplant, Pre-Transplant          | 147 |
| AB-42.2: Liver Transplant, Living Donor Pre-Transplant Imaging (Donors Imaging) | 148 |
| AB-42.3: Liver Transplant, Post-Transplant Imaging         | 148 |
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| AB-42.6: Kidney Transplant, Post-Transplant                   | 150 |
| AB-42.7: Heart Transplant                                     | 151 |
AB-42.1: Liver Transplant, Pre-Transplant

Cardiac studies specific to liver transplantation:

- Stress echocardiogram which should be pharmacologic, or MPI, initially and can be repeated annually prior to transplant. Requests for cardiac catheterization for an abnormal stress study should be reviewed by cardiologist.
- Echocardiography or Echocardiography with bubble studies to exclude portopulmonary hypertension (POPH) and/or Hepatopulmonary Syndrome (HPS). Request for right heart catheterization if there is evidence of POPH should be reviewed by cardiologist. (Note: AASLD guidelines suggest right heart catheterization for POPH with RSVP ≥45).
- See CD-1.6: Transplant Individuals in the Cardiac Imaging Guidelines

Individuals on transplant list without Hepatocellular Carcinoma (HCC):

- CT Chest with or without contrast (CPT® 71260 or CPT® 71250) for placement on the transplant list, with repeat studies based on clinical indications per Chest Imaging Guidelines.
- CT or MRI Abdomen (CPT® 74160 or CPT® 74170 or CPT® 74183) for placement on the transplant list (i.e., initial placement or part of a transplant evaluation) and can be repeated annually.
- Abdominal US (CPT® 76700 or CPT® 76705) and Doppler (CPT® 93975) every 6 months
- MRI Bone Marrow Blood Supply (CPT® 77084) or bone-scan one time.
- Vascular evaluation in anticipation of transplant:
  - CTA or MRA Abdomen (CPT® 74175 or CPT® 74185)
- Immediately prior to transplant:
  - ANY of the above studies can be repeated immediately prior to transplant, if requested.
  - In addition, CT Abdomen and Pelvis (CPT® 74177) or CT Pelvis (CPT® 72193) if requested, can be performed.

Individual on transplant list with known HCC:

- CT or MRI Abdomen (CPT® 74170 or CPT® 74160, or CPT® 74183) every 3 months.
- CT Chest (CPT® 71260) every 6 months.
- Bone scan every 6 months.
- If under active locoregional therapy to control tumor growth in waitlisted individuals (i.e., tumor ablation), CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260) can be approved as requested according to the transplant center’s protocol.
- Abdominal US (CPT® 76700 or CPT® 76705) with Doppler (CPT® 93975) every 6 months
- MRI Bone Marrow Blood Supply (CPT® 77084), CTA or MRA Abdomen (CPT® 74175 or CPT® 74185) and imaging immediately prior to transplant, as per the guideline note above in individuals without HCC

Individual on transplant list with known cholangiocarcinoma:
As per guidelines for individuals without HCC except that CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260) can be repeated according to the transplant institution’s protocol

Individual on the transplant list with known Primary Sclerosing Cholangitis (PSC):
- In addition to the standard studies for an individual on the transplant list without HCC:
  - MRCP (See AB-27: MRCP for acceptable CPT Codes) can be requested as per the transplant institution’s protocol.

**AB-42.2: Liver Transplant, Living Donor Pre-Transplant Imaging (Donors Imaging)**
- CT Abdomen or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) to transplant to assess liver anatomy and volumetrics.
- MRCP to assess biliary anatomy (See AB-27: MRCP for proper coding)
- CTA or MRA Abdomen (CPT® 74175 or CPT® 74185) to assess vascular anatomy

**AB-42.3: Liver Transplant, Post-Transplant Imaging**
- Cardiac Imaging:
  - See CD-1.6: Transplant Patients in the Cardiac Imaging
- Suspected post-operative complications:
  - Vascular thrombosis (suspected hepatic artery thrombosis)
    - Doppler ultrasound (CPT® 93975)
    - CTA or MRA Abdomen (CPT® 74175 or CPT® 74185)
  - Suspicion of biliary anastomotic strictures:
    - MRCP (See AB-27.1: MRCP for appropriate CPT codes)
    - Vascular imaging as above for vascular thrombosis may also be requested and approved for this indication
  - Other suspected post-operative complications (e.g., infection, etc.)
    - Imaging as requested by the transplant institution or team
- Transplant individuals without prior HCC or cholangiocarcinoma:
  - Routine post-transplant imaging is not indicated.
  - If cirrhosis develops post-transplant:
    - See AB-26: Cirrhosis and Liver Screening for Hepatocellular Carcinoma (HCC); Ascites and Portal Hypertension for HCC screening guidelines.
  - Fibrosis assessment post-liver transplant:
    - Transient elastography (CPT® 91200), which is the most studied modality in this setting.
- Surveillance after transplant for HCC:
  - Based on RETREAT score
    - 0 points: No additional screening needed
    - 1-3 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 6 months for 2 years.
4 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 6 months for 5 years

≥5 points: CT or MRI Abdomen (CPT® 74160, or CPT® 74170, or CPT® 74183) and CT Chest (CPT® 71260 or CPT® 71250) every 3 months for 2 years, then every 6 months between the 2nd and 5th years.

- If there is a suspicion of recurrent tumor based on clinical findings and/or sequentially increasing AFP:
  - CT Abdomen (CPT® 74160 or CPT® 74170) or MRI Abdomen (CPT® 74183)

- Imaging after transplant for primary sclerosing cholangitis (PSC):
  - Suspected recurrence of PSC;
  - MRCP (See AB-27: MRCP for proper coding)

- Imaging after transplant for cholangiocarcinoma:
  - Liver ultrasound (CPT® 76705 or CPT® 76700) or MRI Abdomen and MRCP (CPT® 74183) every 6 months for 5 years post-transplantation.
  - CT Chest (CPT® 71250 or CPT® 71260) every 6 months for 5 years post-transplantation

Practice Note

Consensus guidelines regarding post-transplant surveillance imaging have not yet been established. Guidelines are based on a reasonable approach and are in accordance with suggestions by the American Association for the Study of Liver Diseases (AASLD) and others.

The RETREAT score is a protocol used to estimate the risk of tumor recurrence after liver transplantation in patients who have been transplanted for the treatment of hepatocellular carcinoma. It is comprised of 3 factors which are assessed before and after transplant. Points are assigned based on criteria which include the alpha-fetoprotein level before liver transplantation, the presence or absence of microvascular invasion, and the sum of the diameter of the largest viable tumor and the number of viable nodules on pathologic examination of the explant liver. The RETREAT score is calculated as follows:

<table>
<thead>
<tr>
<th>Risk Factor</th>
<th>Score</th>
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<tr>
<td>Alpha-fetoprotein level before LT</td>
<td></td>
</tr>
<tr>
<td>0-20</td>
<td>0</td>
</tr>
<tr>
<td>21-99</td>
<td>1</td>
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<tr>
<td>100-999</td>
<td>2</td>
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<tr>
<td>≥1000</td>
<td>3</td>
</tr>
<tr>
<td>Microvascular invasion present</td>
<td>2</td>
</tr>
<tr>
<td>Sum of the diameter of the largest viable tumor and the number of viable nodules</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1.1-4.9</td>
<td>1</td>
</tr>
<tr>
<td>5.0-9.9</td>
<td>2</td>
</tr>
<tr>
<td>≥10</td>
<td>3</td>
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</table>
AB-42.4: Post-Transplant Lymphoproliferative Disorder (PTLD)

- CT Chest/Abdomen/Pelvis with contrast (CPT® 71260 and CPT® 74177) for known or suspected PTLD.

- Additional evaluation of suspected PTLD is the same as the evaluation of lymphoma. See ONC-27.2: Diffuse Large B Cell Lymphoma (DLBCL) in the Oncology Imaging Guidelines for further recommendations

- There is insufficient evidence-based data to support the routine use of imaging to screen for PTLD.

**Practice Note**

Post-transplant lymphoproliferative disease (PTLD) is a major complication of solid organ transplantation and the spectrum ranges from benign hyperplasia to malignant lymphoma. It has an incidence of 1-20%, and is usually related to Epstein-Barr virus infection in the setting of immunosuppression.

AB-42.5: Kidney Transplant, Pre-Transplant Imaging Studies

See CD-1.6: Transplant Patients in the Cardiac Imaging Guidelines for guidelines on cardiac stress testing.

- Individuals on the kidney transplant waiting list can undergo advanced imaging per that institution’s protocol as long as the studies do not exceed the following:
  - Diagnostic left heart catheterization if stress test is positive for reversible ischemia, or if duration of diabetes is >25 years and individual has additional cardiac risk factors.
  - Carotid duplex study (CPT® 93880 bilateral study or CPT® 93882 unilateral study) if there is history of stroke, TIA, or if carotid bruit is present on exam.
  - CT Abdomen and Pelvis (CPT® 74176 or CPT® 74177) or CTA Abdomen (CPT® 74175) one time.

- Donor Transplant Imaging Studies
  - CTA Abdomen (CPT® 74175) is the study of choice prior to transplant to evaluate donors
  - MRI Abdomen without and with contrast (CPT® 74183) can be substituted for a CTA in individuals with contrast allergy

AB-42.6: Kidney Transplant, Post-Transplant

- Ultrasound of transplanted kidney:
  - Current ultrasound imaging protocols of the transplanted kidney commonly include a Doppler study and are coded as CPT® 76776.
    - Do not report non-invasive vascular codes CPT® 93975 and CPT® 93976 in conjunction with CPT® 76776.
  - Ultrasound of the transplanted kidney performed without duplex Doppler should be reported as a limited retroperitoneal ultrasound (CPT® 76775).
AB-42.7: Heart Transplant

See CD-1.6: Transplant Patients in the Cardiac Imaging Guidelines

References
4. Cincinnati Children's Hospital Medical Center. Evidence based clinical practice guideline for management of EBV-associated post-transplant lymphoproliferative disease (PTLD) in solid organ transplant.
## AB-43: Hepatic and Abdominal Arteries

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**AB-43.1: Hepatic Arteries and Veins**

- CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) if ONE of the following:
  - Evaluation of portal and hepatic veins prior to or following TIPS (transjugular intrahepatic portosystemic shunt)
  - Evaluation of portal and hepatic veins prior to or following surgical intervention for portal hypertension
  - Evaluation of hepatic vasculature prior to and following embolization procedure
  - Evaluation of hepatic vasculature prior to planned hepatectomy
  - Evaluation of liver donor
  - Possible portal vein thrombosis with negative or inadequate Doppler study of the portal vein, ONE of the following:
    - Hypercoagulable state
    - Abdominal malignancy
  - Preoperative evaluation for pancreatic cancer
  - Budd-Chiari Syndrome
    - Doppler ultrasound is initial imaging study.
    - Any of the above studies or CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) can be performed if there is a need for further advanced imaging to clarify positive findings (e.g. rule out tumor thrombosis, assess thrombosis extension, or evaluate indeterminate hepatic nodules) or if there is a continued clinical high suspicion of Budd-Chiari Syndrome despite negative or inconclusive Doppler ultrasound results.
    - Follow-up advanced imaging, as requested, is appropriate to determine response to anti-coagulation therapy.

**Practice Notes**

- Primary Budd-Chiari Syndrome is due to thrombotic occlusion of the hepatic venous outflow tract. Most individuals have an underlying prothrombotic condition such as a myeloproliferative disease, an inherited thrombophilia (e.g. Factor V Leiden), a systemic disease such as vasculitis, or hormonal factors, such as recent oral contraceptive use. Secondary Budd-Chiari Syndrome is caused by malignant tumors or extrinsic compression of the hepatic veins.

**AB-43.2: Abdominal Veins other than Hepatic and Portal Veins**

- CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185) if ONE of the following:
  - Nephrotic syndrome
  - Suspicion of iliac vein thrombus
  - Suspicion of inferior vena cava thrombus
  - Renal vein thrombosis
  - Mesenteric vein thrombosis
AB-43.3: Renal Vein Thrombosis

- MRA Abdomen (CPT® 74185) if ONE of the following:
  - Nephrotic syndrome
  - Proteinuria – 3 grams or more in 24 hours
  - Lupus nephritis
  - Hypercoagulable state, ONE of the following:
    - Antiphospholipid antibodies
    - Behçet’s syndrome
    - Protein C deficiency
    - Protein S deficiency

References

AB-44: Suspected Neuroendocrine Tumors of the Abdomen

For the evaluation of a suspected neuroendocrine tumor of the abdomen: See ONC-15.2: Gastrointestinal/Pancreatic Neuroendocrine Cancers - Suspected/Diagnosis in the Oncology Imaging Guidelines.
AB-45: Liver Elastography

- Vibration-Controlled Transient Elastography (VCTE) (e.g. Fibroscan, CPT® 91200) may be considered appropriate to assess for advanced fibrosis and cirrhosis in the following conditions:
  - Hepatitis C
  - Hepatitis B
  - Chronic alcoholic liver disease
  - All other chronic liver diseases

- Special consideration for Magnetic Resonance Elastography (MRE, CPT® 76391):
  - Suspected NAFLD (Non-alcoholic fatty liver disease)
    - Transient Elastography (CPT® 91200) is the initial imaging modality to stage fibrosis
    - If Transient Elastography failure despite use of an XL-probe, OR BMI ≥35 in individuals with suspected NAFLD, MRE is approvable
  - For NAFLD in low risk populations (e.g. signs of fatty liver found on imaging only) MRE would be considered investigational.

- The use of VCTE and MRE are considered experimental and investigational for all other indications with regards to liver disease

- The use of other ultrasound elastographic techniques (CPT® 76981, CPT® 76982, and CPT® 76983), including but not limited to acoustic radiation force impulse imaging or real-time tissue elastography for any indication is considered experimental or investigational at this time

**Practice Note**
For the assessment of cirrhosis in patients with hepatitis C, the AGA noted that MRE has little to no increase in identifying cirrhosis, but had poorer specificity and thus higher false-positive rates than VCTE. In view of this, the AGA concluded that MRE has a poorer diagnostic performance in this setting, compared to VCTE. In their recommendations for the assessment of fibrosis in chronic liver disease, VCTE was recommended over MRE with the exception of NAFLD in high risk populations, in which MRE resulted in a lower rate of false positives compared to VCTE. This was considered a conditional recommendation with a low quality of evidence. The role of MRE was reviewed again in 2019 (Castera, et. al.) in Gastroenterology and the pathway recommendations form the basis of our current guideline with respect to the role of MRE in fatty liver disease.
References
AB-46: Hiccups

➢ Hiccups <48 hours without any localizing or specific symptoms:
  ◦ No advanced imaging

➢ Hiccups ≥48 hours:
  ◦ History and physical examination, laboratory and CMP and baseline chest x-ray
  ◦ Abnormal or negative chest x-ray with symptoms referable to the chest:
    ▪ CT Chest with contrast (CPT® 71260)
  ◦ Lab or history/physical findings suggest a gastrointestinal etiology:
    ▪ CT Abdomen with contrast (CPT® 74160)

References
AB-47: Retroperitoneal Fibrosis

- Individuals diagnosed with retroperitoneal fibrosis:
  - ONE of the following every 3 months until stability demonstrated:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - MRI Abdomen and Pelvis with and without contrast (CPT® 74183 and CPT® 72197)
    - Retroperitoneal or Abdominal ultrasound (CPT® 76770 or CPT® 76700) can be approved if requested.
  - After stability established repeat imaging can be approved every 6 months.
  - Requests for non-contrasted studies in individuals with renal insufficiency is appropriate. Gadolinium may induce nephrogenic systemic fibrosis in individuals with moderate or severe renal insufficiency, especially if the GFR is <30 ml/min.
  - Additional imaging:
    - CT Chest (CPT® 71260) can also be performed upon initial diagnosis if requested, to further evaluate for the possibility of malignancy as an underlying etiology.

- PET/CT (CPT® 78815)
  - Can be considered initially, after diagnosis, to establish avidity patterns to assess for the likelihood of malignancy and for stratification for the likelihood of response to steroids.
  - Follow-up can be considered if there is documentation of an anticipated therapeutic change based on the results (such as a change in immunosuppression therapy or stent removal).

- Methysergide-induced retroperitoneal fibrosis:
  - Methysergide for migraine treatment is generally no longer available but is rarely being used at some centers. It has a known complication of retroperitoneal fibrosis.
  - Individuals can be screened at baseline and then every 6 months with ONE of the following:
    - CT Abdomen and Pelvis with contrast (CPT® 74177)
    - CT Abdomen and Pelvis without contrast (CPT® 74176)
    - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
    - MRI Abdomen and Pelvis without contrast (CPT® 74181 and CPT® 72195)
    - Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775)

Practice Note
Retroperitoneal fibrosis is a rare disease, and may be idiopathic (IgG4 or non-IgG-4 related) or secondary. Secondary causes include malignancy, infections, previous radiation therapy, previous abdominal surgery, drugs such as methysergide, and biologic agents.
References


# Breast Imaging Guidelines

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<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>AAA</td>
<td>abdominal aortic aneurysm</td>
</tr>
<tr>
<td>ACE</td>
<td>angiotensin-converting enzyme</td>
</tr>
<tr>
<td>AVM</td>
<td>arteriovenous malformation</td>
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<tr>
<td>BI-RADS</td>
<td>Breast Imaging Reporting and Database System</td>
</tr>
<tr>
<td>BP</td>
<td>blood pressure</td>
</tr>
<tr>
<td>BRCA</td>
<td>tumor suppressor gene</td>
</tr>
<tr>
<td>CAD</td>
<td>computer-aided detection</td>
</tr>
<tr>
<td>CBC</td>
<td>Complete blood count</td>
</tr>
<tr>
<td>COPD</td>
<td>chronic obstructive pulmonary disease</td>
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<tr>
<td>CT</td>
<td>computed tomography</td>
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<tr>
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<td>computed tomography angiography</td>
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<tr>
<td>CTV</td>
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<tr>
<td>DCIS</td>
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<tr>
<td>DVT</td>
<td>deep venous thrombosis</td>
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<td>electrocardiogram</td>
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<td>FDA</td>
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<td>FDG</td>
<td>fluorodeoxyglucose</td>
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<td>FNA</td>
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<td>positron emission tomography</td>
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<td>PFT</td>
<td>pulmonary function tests</td>
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<td>PPD</td>
<td>purified protein derivative of tuberculin</td>
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<td>RODEO</td>
<td>Rotating Delivery of Excitation Off-resonance MRI</td>
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<tr>
<td>SPN</td>
<td>solitary pulmonary nodule</td>
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<tr>
<td>SVC</td>
<td>superior vena cava</td>
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**BI-RADS™ Categories Chart**

**Category 0: Incomplete**
Need additional imaging evaluation or prior mammograms for comparison.

**Category 1: Negative**
There is nothing to comment on. The breasts are symmetrical and no masses, architectural disturbances, or suspicious calcifications are present.

**Category 2: Benign Finding**
This is also a negative mammogram, but the interpreter may wish to describe a finding. Involuting, calcified fibroadenomas, multiple secretory calcifications, fat-containing lesions (such as oil cysts, lipomas, galactoceles, and mixed density hamartomas) all have characteristic appearances, and may be labeled with confidence. The interpreter might wish to describe intramammary lymph nodes, implants, etc. while still concluding that there is no mammographic evidence of malignancy.

**Category 3: Probably Benign Finding – Short Interval Follow-up Suggested**
A finding placed in this category should have a very high probability of being benign. It is not expected to change over the follow-up interval, but the radiologist would prefer to establish its stability. Data is becoming available that sheds light on the efficacy of short interval follow-up. At the present time, most approaches are intuitive. These will likely undergo future modification as more data accrue as to the validity of an approach, the interval required, and the type of findings that should be followed.

**Category 4: Suspicious Abnormality – Biopsy Should Be Considered**
There are lesions that do not have the characteristic morphologies of breast cancer but have a definite probability of being malignant. The radiologist has sufficient concern to urge a biopsy. If possible, the relevant possibilities should be cited so that the patient and her physician can make the decision on the ultimate course of action.

**Category 5: Highly Suggestive of Malignancy-Appropriate Action Should Be Taken**
These lesions have a high probability of being cancer and should be biopsied or treated surgically.

**Category 6: Known Biopsy-Proven Malignancy – Appropriate Action Should Be Taken**
These lesions have been biopsied and are known to be malignant.
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<thead>
<tr>
<th>Category</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>Category A</td>
<td>Almost entire fatty</td>
</tr>
<tr>
<td>Category B</td>
<td>Scattered fibro glandular densites</td>
</tr>
<tr>
<td>Category C</td>
<td>Heterogeneously dense</td>
</tr>
<tr>
<td>Category D</td>
<td>Extremely dense</td>
</tr>
</tbody>
</table>
BR-1: Breast Ultrasound

- Routine performance of breast ultrasound as stand-alone screening or with screening mammography is inappropriate.\(^1\,2,3\)
  - Ultrasound screening for women whose only indication is dense breast tissue is not indicated.\(^1\,2,3\)
  - Equivocal or Occult Findings:
    - Radiologist Report recommendation for Breast ultrasound (CPT® 76641 or CPT® 76642) and inconclusive or conflicting findings on mammography or MRI Breast

- Breast ultrasound (CPT® 76641: unilateral, complete OR CPT® 76642: unilateral, limited) can be used to further evaluate abnormalities found on mammogram, especially in differentiating cysts from solid lesions.\(^1\)
  - A clinical office visit is not necessary prior to breast ultrasound when an abnormality has been identified on recent (within the last 60 days) mammogram.

- BI-RADS™ Cat 3 ultrasound follow up imaging for stable findings at 6 months
  - If repeat imaging remains BI-RADS™ 3, repeat at 12 months, 18 months, and 24 months from the date of the initial imaging. After 2 years of stability, the finding should be assessed as benign (Cat 2).\(^16\)
  - If repeat imaging is BI-RADS™ 1 or 2, then imaging reverts to routine per individuals risk profile.

- Palpable breast masses or other clinical abnormalities (such as skin change, pain, nipple inversion) should be evaluated with mammography and breast ultrasound, in any order, regardless of age. Ultrasound can enhance biopsy.\(^3\)

- Axilla ultrasound (CPT® 76882)
  - For women with clinically suspicious lymph nodes, preoperative axillary ultrasound with a FNA or biopsy can help identify patients who have positive nodes.\(^3\)
    - See CH-2.2: Axillary Lymphadenopathy in the Chest Imaging Guidelines
  - Bilateral should be coded CPT® 76882 x 2

- US guided breast biopsy (CPT® 19083) includes the imaging component.
  - Additional lesions should be billed using CPT® 19084.

- Ultrasound Breast can be repeated at least 6 months after an US directed breast biopsy to document successful lesion sampling if histology is benign and nonspecific, equivocal or uncertain.

- 3D Reconstruction (CPT® 76376 or CPT® 76377) is not considered medically necessary for breast ultrasound. It is commonly requested in conjunction with automated breast ultrasound (ABUS); there is no evidence to support its clinical usefulness
State Specific Density Reporting and Imaging Mandate Laws

Breast density notification laws have been put into effect by many states. Breast density notification laws vary, but some also contain mandates for additional imaging, which may include MRI and/or ultrasound. For applicable requests involving members in these states, their legislative mandates should be followed. The pertinent language in these mandates is provided via the link below.

Link: State Specific Mandates
**BR-2: MRI Breast**

- The use of gadolinium contrast is required for the evaluation of breast parenchyma.
- The use of gadolinium contrast is not necessary for the evaluation of implant integrity in asymptomatic, average-risk patients.
- Computer-aided detection (CAD) is included with the MRI Breast CPT® 77049 and CPT® 77048 procedures. The use of HCPCS code C8937 (CAD including computer algorithm analysis of MRI Breast data for lesion detection/characterization, pharmacokinetic analysis, with further physician review for interpretation) is unnecessary with these procedures.
  - The use of CAD has little influence on the sensitivity and specificity of MRI Breast interpretation.\(^9\)
  - The use of HCPCS code C8937 (CAD including computer algorithm analysis of MRI Breast data for lesion detection/characterization, pharmacokinetic analysis, with further physician review for interpretation) is currently considered investigational, experimental, and/or unproven.
  - Since the CAD software automatically performs 3D imaging, CPT® 76376 or CPT® 76377 should not be used in conjunction with CPT® 77049, CPT® 77048 or HCPCS code C8937
- Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; bilateral (CPT® 77049) is preferred in most individuals for the evaluation of breast parenchyma.
- Magnetic resonance imaging, breast, without and with contrast material(s), including computer-aided detection (CAD real-time lesion detection, characterization and pharmacokinetic analysis), when performed; unilateral (CPT® 77048) may be preferred in some individuals after mastectomy, per physician request.
- Magnetic resonance imaging, breast, without contrast material; bilateral (CPT® 77047) or Magnetic resonance imaging, breast, without contrast material; unilateral (CPT® 77046) may be performed if there are clinical reasons or concerns regarding the use of gadolinium contrast.
- MRI guided breast biopsy (CPT® 19085) includes the imaging component.
  - Additional lesions should be billed using CPT® 19086.
- MRI Breast can be repeated at least 6 months after an MRI directed breast biopsy to document successful lesion sampling if histology is benign and nonspecific, equivocal or uncertain.\(^5\)
MRI Breast – Practice Notes

Although MRI Breast has superior sensitivity in identifying new unknown malignancies, it carries a significant false positive risk when compared to mammogram and ultrasound. Incidental lesions are seen on 15% of MRI Breast and increase with younger age. The percentage of incidental lesions that turn out to be malignant varies from 3% to 20% depending on the patient population. Cancer is identified by MRI Breast in only 0.7% of those with “inconclusive mammographic lesions”.6,7
BR-3: Breast Reconstruction

- CTA or MRA of the body part from which the free tissue transfer flap is being taken, can be performed for breast reconstruction preoperative planning.\textsuperscript{2,3}
  - For example, CTA Abdomen and/or Pelvis (CPT\textsuperscript{®} 74175 or CPT\textsuperscript{®} 72191 or CPT\textsuperscript{®} 74174) or MRA Abdomen and/or Pelvis (CPT\textsuperscript{®} 74185 and/or CPT\textsuperscript{®} 72198) for Deep Inferior Epigastric Perforators (DIEP) flap.\textsuperscript{8}

- There is currently insufficient evidence-based data to support the need for routine advanced imaging for TRAM flaps or other flaps performed on a vascular pedicle.\textsuperscript{8}
BR-4: MRI Breast is NOT Indicated

- MRI Breast should not be used to determine biopsy recommendations for suspicious or indeterminate lesion(s) that can be readily biopsied, either using imaging guidance or physical exam, such as palpable masses and microcalcifications.\(^3,6\)

- Patients with dense breasts as determined by mammogram
  - To date, evidence does not suggest improved outcomes for women whose only risk factor is breast density [See heading “Equivocal or Occult Findings” (Radiologist Report) in BR-5: MRI Breast Indications].\(^13,14,15\)

- Low risk, probably benign (BI-RADS™ 3) lesions
  - Repeat the original type study (mammogram, US, or MRI) in 6 months
    - If repeat imaging remains BI-RADS™ 3, repeat original study at 12 months, 18 months, and 24 months from the date of the initial imaging. After 2 years of stability, the finding should be assessed as benign (Cat 2).\(^16\)
    - If repeat imaging is BI-RADS™ 1 or 2, then imaging reverts to routine per individual’s risk profile.

- Suspicious (BI-RADS™ 4 or 5) lesion on mammogram and/or ultrasound.
  - A lesion categorized as have BI-RADS™ 4 or 5 should be biopsied.\(^16\)

- Surveillance MRI for silent/asymptomatic rupture of silicone implants is considered investigational, as there is no evidence basis that surveillance reduces morbidity and/or mortality.\(^17,18\)

- Routine surveillance MRI Breast following mastectomy is not indicated\(^45\)
BR-5: MRI Breast Indications

› MRI Breast is indicated for breast augmentation, breast implants (saline or silicone), breast reconstruction, free injection, and capsular contracture to:
  ◆ Evaluate or confirm breast implant rupture when mammography or ultrasound is uninterpretable.¹

› Phyllodes Tumor (Cystosarcoma Phyllodes)
  ◆ MRI Breast is indicated preoperatively to establish extent of disease where a diagnosis of malignant phyllodes tumor has previously been established by tissue diagnosis.¹⁸,¹⁹,²⁰ (See Practice Note)

› Equivocal or Occult Findings
  ◆ Radiologist Report Recommendation for MRI Breast and inconclusive or conflicting findings on mammography or ultrasound of a finding that is not a discrete palpable mass.
  ◆ A probably benign lesion on MRI (MRI BI-RADS™ 3) should undergo repeat MRI in 6 months
    ◄ If repeat imaging remains BI-RADS™ 3, repeat at 12 months, 18 months, and 24 months from the date of the initial imaging. After 2 years of stability, the finding should be assessed as benign (Cat 2).¹⁶
    ◄ If repeat imaging is BI-RADS™ 1 or 2, then imaging reverts to routine per individuals risk profile.

› MRI Breast can be repeated at least 6 months after an MRI directed breast biopsy to document successful lesion sampling if histology is benign and nonspecific, equivocal or uncertain.⁵

› Newly Diagnosed Breast Cancer⁴ (including DCIS).¹,⁶,²⁴,²⁵,²⁶

› Newly Diagnosed Paget's Disease⁵ (thereafter treat as DCIS according to these guidelines).²⁶,²⁸

› Residual or Recurrent Malignancy
  ◆ Assessment of residual tumor in patients who have undergone lumpectomy and have close or positive margins, when the findings may indicate a significant change in surgical management.²⁹
  ◆ Evaluate clinical suspicion of recurrence, following evaluations with mammography and/or ultrasound, if those evaluations are inconclusive or conflict with physical examination or other clinical indicators. This applies to intact breasts, reconstructed breasts, and possible chest wall recurrences following mastectomy.²⁹

› Indications for annual MRI Breast screening See table below:
# High Risk Indications

**MRI screening to begin at age 20:**

1. Li-Fraumeni Syndrome (TP53 mutation) should start annual breast screening MRI starting at age 20 or at the age of the earliest diagnosed breast cancer in the family, whichever comes first.

**MRI screening to begin at diagnosis but not prior to age 25:**

2. *Patients with a history of:*
   - Atypical ductal hyperplasia (ADH)
   - Atypical lobular hyperplasia (ALH)
   - Lobular carcinoma in situ (LCIS)

**MRI screening to begin at age determined by gene mutation:**

3. BRCA 1 or BRCA 2, Peutz-Jehgers Syndrome (STK11/LKB1 gene variations) begin age 25
4. PTEN Mutation (Cowden Syndrome), CDH1, NF1, PALB2 begin age 30
5. ATM, CHEK2, NBN begin age 40
6. The following have unknown or insufficient evidence of breast cancer risk and additional MRI screening is not indicated at this time:
   - BARD1, MSH2, MLH1, MSH6, PMS2, EPCAM, RAD51C, Genetic variants of unknown significance, genetic variants favoring polymorphism, genetic variants of intermediate penetrance.

**MRI screening begins at age 40, or 10 years before the age of relative when first diagnosed with breast cancer, but not prior to the age of 25:**

7. First-degree relative (parent, sibling, child) with BRCA 1 or BRCA 2, if patient has not been tested for BRCA mutation. (If patient has been tested and negative for mutation then annual screening is not indicated.)
8. Two or more first-degree relatives with breast or ovarian cancer.
9. One first-degree relative with breast cancer or ovarian cancer that was diagnosed ≤age 50.
10. One first-degree relative with bilateral breast cancer, or both breast and ovarian cancer.
11. A first or second-degree male relative (father, brother, uncle, grandfather) diagnosed with breast cancer.
12. Clinical lifetime risk estimated at greater than or equal to 20% using genetic risk or clinical risk estimator such as Gail, Claus, Tyrer-Cuzick or BRCAPRO models.
Additional Risks:

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<td>13.</td>
<td>Women with history of radiation to the chest between ages 10 and 30; breast screening should start 8 to 10 years post-therapy, or at age 25, whichever comes first.4,12,30</td>
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Personal History of Breast Cancer

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<tr>
<td>14.</td>
<td>MRI Breast surveillance (annual) is indicated for patients with a personal history of breast cancer.</td>
</tr>
</tbody>
</table>

**MRI Breast Indications - Practice Notes**

- MRI should not be used in lieu of mammographically, clinically, and/or sonographically suspicious findings (ACR Practice Guidelines).
- State Specific Density Reporting and Imaging Mandate Laws (Link to State Specific Mandates)
  - Breast density notification laws have been put into effect by many states. Breast density notification laws vary, but some also contain mandates for additional imaging, which may include MRI and/or ultrasound. For applicable requests involving members in these states, their legislative mandates should be followed. The pertinent language in these mandates is provided via the link above.
- Phyllodes Tumor (Cystosarcoma Phyllodes)
  - Phyllodes tumor is usually benign and has clinical characteristics of fibroadenoma, although they may exhibit rapid growth. Breast MRI has not been shown to be of value in distinguishing fibroadenoma from phyllodes tumor.
  - Diagnosis is made by tissue diagnosis (percutaneous core biopsy or excisional biopsy). FNA biopsy is inaccurate in phyllodes tumor diagnosis and is not recommended.
  - Treatment is wide local excision. Axillary lymph node dissection is not necessary. It has a predilection for local recurrence following local excision.
  - If biopsy establishes a diagnosis of malignant phyllodes (cystosarcoma phyllodes), it should be treated as a soft tissue sarcoma (See **ONC-12: Sarcomas – Bone, Soft Tissue and GIST** in the Oncology Imaging Guidelines).18,19,20
BR-6: Nipple Discharge/Galactorrhea

- Pathologic nipple discharge is defined as unilateral, bloody or serous, arising from a single duct, persistent, and spontaneous.
  - If the nipple discharge is pathologic, ductography should be attempted.
  - If mammogram and ultrasound are negative, and ductography is unavailable or technically limited, MRI Breast can be performed.\textsuperscript{31,32,33,34}

- Physiologic nipple discharge is predominantly bilateral, but may be unilateral. It is commonly multi-duct. It is predominantly milky, but may be white or a variety of colors including serous, yellow, green, brown, or gray. Evaluation for hyperprolactinemia can be considered (See \textbf{Practice Note}).\textsuperscript{31,32,33,34}

- Mammogram and ultrasound (CPT\textsuperscript{®} 76641: unilateral, complete or CPT\textsuperscript{®} 76642: unilateral, limited) should be obtained as initial imaging, with clinical pathway determined by results.\textsuperscript{31,32,33,34}

- If nipple discharge is physiologic, there are no suspicious findings on clinical exam, and mammogram and ultrasound are negative, no additional imaging is necessary, and the patient can be reassured.\textsuperscript{31,32,33,34}

\textbf{Nipple Discharge/Galactorrhea - Practice Notes}

- For milky discharge, prolactin and TSH levels are recommended to diagnose prolactinoma; pituitary imaging is not needed if normal serum Prolactin.
BR-7: Breast Pain (Mastodynia)

- Mammogram and ultrasound are the initial imaging for breast pain.\textsuperscript{39}
- Advanced imaging is NOT routinely indicated in patients with breast pain and negative evaluation (evaluation includes patient history and physical exam, pregnancy test, mammogram and ultrasound (CPT\textsuperscript{®} 76641: unilateral, complete or CPT\textsuperscript{®} 76642: unilateral, limited)).\textsuperscript{39}
  - If evaluation is not negative, See \textbf{BR-5: MRI Breast Indications}

\textit{Breast Pain – Practice Notes}

- The risk of malignancy following a negative clinical examination (clinical breast exam, mammogram, ultrasound) has been estimated to be only 0.5%.\textsuperscript{39}
BR-8: Alternative Breast Imaging Approaches

- New and/or alternative breast imaging techniques include:
  - Nuclear breast imaging, including:
    - Scintimammography
    - Molecular breast imaging (MBI)
    - Breast specific gamma imaging (BSGI)
  - PET Mammography (PEM)
  - Thermography
  - Impedance Mammography
  - Other techniques to detect oxygen consumption, light absorption, microwave transmission, nitrous oxide production
  - CT Breast
  - Cone Beam CT Breast

- While alternative breast imaging techniques may have FDA approval, they remain investigational with respect to both screening and diagnosis of breast cancer.

Alternative Breast Imaging Approaches - Practice Notes

- Positron Emission Mammography
  - There is currently insufficient data available to generate appropriateness criteria for this modality, and this procedure should be considered investigational at this time
    - High-resolution positron-emission mammography (PEM) by Naviscan™ PET Systems, also referred to as Naviscan™ or PET mammography, performs high-resolution metabolic imaging for breast cancer using an FDG tracer. The PEM detectors are integrated into a conventional mammography system, allowing acquisition of the emission images immediately after the mammogram.
    - Requesting providers often ask for PEM as CPT® 78811 or “PET scan of the breast”.
    - The spatial resolution of this technique is at the individual duct level (1.5 mm) and allows visualization of intraductal as well as invasive breast cancers. This technique is especially adept at detecting ductal carcinoma in situ.
    - Early clinical trials have shown high clinical accuracy in characterizing lesions identified as suspicious on conventional imaging or physical examination, as well as in detecting incidental breast cancers not seen on other imaging modalities.
    - A prospective multi-center clinical trial for women with newly diagnosed breast cancer anticipating breast-conservation surgery was performed. These women underwent both high-resolution PEM imaging and breast MRI. Results showed that PEM and MRI had comparable breast-level sensitivity, although MRI had greater lesion-level sensitivity and more accurately depicted the need for mastectomy. PEM had greater specificity at the breast and lesion levels. Of these, 3.6% of the women had tumors seen only with PEM.
    - The radiation exposure from a PEM study is 23 times higher than for digital mammography.
BR-9: Suspected Breast Cancer in Males

- Breast cancer in men presents as a mass, skin/nipple change, or pathologic nipple discharge.

- For men <25 years of age with an indeterminate palpable mass, ultrasound is recommended as initial imaging followed by mammography if ultrasound is inconclusive or suspicious.

- For men ≥25 years of age with an indeterminate palpable mass or with a concerning physical examination, mammography is recommended initially followed by ultrasound if mammography is inconclusive or suspicious.

- There is limited evidence on the use of MRI in the evaluation of male breast disease.

- Further diagnostic pathway for suspicious clinical or imaging findings usually requires tissue diagnosis.
References


5. National Comprehensive Cancer Network (NCCN) Guidelines Version 2.2017 – May 17, 2017. Thyroid Carcinoma. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Breast Cancer Screening and Diagnosis 2.2017. ©2017 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines, go online to NCCN.org.


22. NCCN Guidelines Version 1.1017: Breast Cancer Risk Reduction National Comprehensive Cancer Network (NCCN) Guidelines Version 2.2017: Breast Cancer. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Breast Cancer 2.2017 ©2014 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines, go online to NCCN.org.


42. NCCN Guidelines Version 3.2018, Breast Cancer Screening and Diagnosis. National Comprehensive Cancer Network (NCCN) Guidelines Version 3.2018: Breast Cancer. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Breast Cancer 3.2018 ©2018 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines, go online to NCCN.org.


## Cardiac Imaging Guidelines

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## Abbreviations for Cardiac Imaging Guidelines

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<th>Abbreviation</th>
<th>Description</th>
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<tr>
<td>ACC</td>
<td>American College of Cardiology</td>
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<tr>
<td>ACS</td>
<td>acute coronary syndrome</td>
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<tr>
<td>AHA</td>
<td>American Heart Association</td>
</tr>
<tr>
<td>ASCOT</td>
<td>Anglo-Scandinavian Cardiac Outcomes Trial</td>
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<tr>
<td>ASD</td>
<td>atrial septal defect</td>
</tr>
<tr>
<td>BMI</td>
<td>body mass index</td>
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<tr>
<td>CABG</td>
<td>coronary artery bypass grafting</td>
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<tr>
<td>CAD</td>
<td>coronary artery disease</td>
</tr>
<tr>
<td>CHF</td>
<td>congestive heart failure</td>
</tr>
<tr>
<td>COPD</td>
<td>chronic obstructive pulmonary disease</td>
</tr>
<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>CCTA</td>
<td>coronary computed tomography angiography</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>EBCT</td>
<td>electron beam computed tomography</td>
</tr>
<tr>
<td>ECP</td>
<td>external counterpulsation (also known as EECP)</td>
</tr>
<tr>
<td>ECG</td>
<td>electrocardiogram</td>
</tr>
<tr>
<td>ETT</td>
<td>exercise treadmill stress test</td>
</tr>
<tr>
<td>FDG</td>
<td>Fluorodeoxyglucose, a radiopharmaceutical used to measure myocardial metabolism</td>
</tr>
<tr>
<td>HCM</td>
<td>hypertrophic cardiomyopathy</td>
</tr>
<tr>
<td>IV</td>
<td>intravenous</td>
</tr>
<tr>
<td>LAD</td>
<td>left anterior descending coronary artery</td>
</tr>
<tr>
<td>LDL-C</td>
<td>low density lipoprotein cholesterol</td>
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<tr>
<td>LHC</td>
<td>left heart catheterization</td>
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<tr>
<td>LV</td>
<td>left ventricle</td>
</tr>
<tr>
<td>LVEF</td>
<td>left ventricular ejection fraction</td>
</tr>
<tr>
<td>MI</td>
<td>myocardial infarction</td>
</tr>
<tr>
<td>MPI</td>
<td>myocardial perfusion imaging (SPECT study, nuclear cardiac study)</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
<tr>
<td>mSv</td>
<td>millisievert (a unit of radiation exposure) equal to an effective dose of a joule of energy per kilogram of recipient mass</td>
</tr>
<tr>
<td>MUGA</td>
<td>multi gated acquisition scan of the cardiac blood pool</td>
</tr>
<tr>
<td>PCI</td>
<td>percutaneous coronary intervention (includes percutaneous coronary angioplasty (PTCA) and coronary artery stenting)</td>
</tr>
<tr>
<td>PET</td>
<td>positron emission tomography</td>
</tr>
<tr>
<td>PTCA</td>
<td>percutaneous coronary angioplasty</td>
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<tr>
<td>RHC</td>
<td>right heart catheterization</td>
</tr>
<tr>
<td>SPECT</td>
<td>single photon emission computed tomography</td>
</tr>
<tr>
<td>TEE</td>
<td>transesophageal echocardiogram</td>
</tr>
<tr>
<td>TIA</td>
<td>Transient Ischemic Attack</td>
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<tr>
<td>VSD</td>
<td>ventricular septal defect</td>
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</table>
## Glossary

**Agatston Score**: a nationally recognized calcium score for the coronary arteries based on Hounsfield units and size (area) of the coronary calcium.

**Angina**: principally chest discomfort, exertional (or with emotional stress) and relieved by rest or nitroglycerine.

**Anginal variants or equivalents**: a manifestation of myocardial ischemia which is perceived by patients to be (otherwise unexplained) dyspnea, unusual fatigue, more often seen in women and may be unassociated with chest pain.

**ARVD/ARVC – Arrhythmogenic Right Ventricular Dysplasia/Cardiomyopathy**: a potentially lethal inherited disease with syncope and rhythm disturbances, including sudden death, as presenting manifestations.

**BNP**: B-type natriuretic peptide, blood test used to diagnose and track heart failure (n-T-pro-BNP is a variant of this test).

**Brugada Syndrome**: an electrocardiographic pattern that is unique and might be a marker for significant life-threatening dysrhythmias.

**Double Product** (Rate Pressure Product): an index of cardiac oxygen consumption, is the systolic blood pressure times heart rate, generally calculated at peak exercise; over 25000 means an adequate stress load was performed.

**Fabry’s Disease**: an infiltrative cardiomyopathy, can cause heart failure and arrhythmias.

**Hibernating myocardium**: viable but poorly functioning or non-functioning myocardium which likely could benefit from intervention to improve myocardial blood supply.

**Optimized Medical Therapy** should include (where tolerated): antiplatelet agents, calcium channel antagonists, partial fatty acid oxidase inhibitors (e.g. ranolazine), statins, short-acting nitrates as needed, long-acting nitrates up to 6 months after an acute coronary syndrome episode, beta blocker drugs (optional), angiotensin-converting enzyme (ACE) inhibitors/angiotensin receptor blocking (ARB) agents (optional).

**Platypnea**: shortness of breath when upright or seated (the opposite of orthopnea) and can indicate cardiac malformations, shunt or tumor.

**Silent ischemia**: cardiac ischemia discovered by testing only and not presenting as a syndrome or symptoms.

**Syncope**: loss of consciousness; near-syncope is not syncope.

**Takotsubo cardiomyopathy**: apical dyskinesis oftentimes associated with extreme stress and usually thought to be reversible.

**Troponin**: a marker for ischemic injury, primarily cardiac.
## CD-1: General Guidelines

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Practice Estimate of Effective Radiation Dose chart for Selected Imaging Studies

<table>
<thead>
<tr>
<th>Imaging Study</th>
<th>Estimate of Effective Radiation Dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sestamibi myocardial perfusion study (MPI)</td>
<td>9-12 mSv</td>
</tr>
<tr>
<td>PET myocardial perfusion study:</td>
<td></td>
</tr>
<tr>
<td>Rubidium-82</td>
<td>3 mSv</td>
</tr>
<tr>
<td>NH3</td>
<td>2 mSv</td>
</tr>
<tr>
<td>Thallium myocardial perfusion study (MPI)</td>
<td>22-31 mSv</td>
</tr>
<tr>
<td>Diagnostic conventional coronary angiogram (cath)</td>
<td>5-10 mSv</td>
</tr>
<tr>
<td>Computed tomography coronary angiography (CTCA)</td>
<td>5-15 mSv</td>
</tr>
<tr>
<td>(with prospective gating)</td>
<td>Less than 5 mSv</td>
</tr>
<tr>
<td>CT of Abdomen and pelvis</td>
<td>8-14 mSv</td>
</tr>
<tr>
<td>Chest x-ray</td>
<td>&lt;0.1 mSv</td>
</tr>
</tbody>
</table>

CD-1.1: General Issues – Cardiac

- Cardiac imaging is not indicated if the results will not affect patient management decisions. If a decision to perform cardiac catheterization or other angiography has already been made, there is often no need for imaging stress testing.

- A current clinical evaluation (within 60 days) is required prior to considering advanced imaging, which includes:
  - Relevant history and physical examination and appropriate laboratory studies and non-advanced imaging modalities, such as recent ECG (within 60 days), chest x-ray or ECHO/ultrasound, after symptoms started or worsened.
    - Effort should be made to obtain copies of reported “abnormal” ECG studies in order to determine whether the ECG is uninterpretable for ischemia on ETT
    - Most recent previous stress testing and its findings should be obtained
    - Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.
  - Vital signs, height, and weight or BMI or description of general habitus is needed.
  - Advanced imaging should answer a clinical question which will affect management of the patient’s clinical condition.
  - Assessment of ischemic symptoms can be determined by the following:
    - Typical angina (definite):
      - Angina pectoris is classified as typical when all of the following are present:
        - Substernal chest discomfort (generally described as pressure, heaviness, burning, or tightness)
        - Brought on by exertion or emotional stress
        - Relieved by rest or nitroglycerin
      - May radiate to the left arm or jaw
      - When clinical information is received indicating that a patient is experiencing chest pain that is "exertional" or "due to emotional stress" and relieved with rest, this meets the typical angina definition under the
Pre-Test Probability Grid. No further description of the chest pain is required (location within the chest is not required).

- The Pre-Test Probability Grid (Table 1) is based on age, gender, and symptoms. All factors must be considered in order to approve for stress testing with imaging using the Pre-Test Probability Grid.

- **Atypical angina (probable):** Chest pain or discomfort (arm or jaw pain) that lacks one of the characteristics of definite or typical angina.

- **Non-anginal chest pain:** Chest pain or discomfort that meets one or none of the typical angina characteristics.

- **Anginal equivalents:** symptoms consistent with patient’s known angina pattern in an individual with a history of CABG or PCI.

### Table-1

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>Gender</th>
<th>Typical / Definite Angina Pectoris</th>
<th>Atypical / Probable Angina Pectoris</th>
<th>Non-anginal Chest Pain</th>
<th>Asymptomatic</th>
</tr>
</thead>
<tbody>
<tr>
<td>39 and younger</td>
<td>Men</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Very low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>40 - 49</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
<td>Very low</td>
</tr>
<tr>
<td>50 - 59</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
<td>Very low</td>
</tr>
<tr>
<td>60 and over</td>
<td>Men</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
<tr>
<td></td>
<td>Women</td>
<td>High</td>
<td>Intermediate</td>
<td>Intermediate</td>
<td>Low</td>
</tr>
</tbody>
</table>

- **High** Greater than 90% pre-test probability
- **Intermediate** Between 10% and 90% pre-test probability
- **Low** Between 5% and 10% pre-test probability
- **Very Low** Less than 5% pre-test probability
**CD-1.2: Stress Testing without Imaging – Procedures**

The *Exercise Treadmill Test (ETT)* is without imaging.

- Necessary components of an ETT include:
  - ECG that can be interpreted for ischemia.
  - Patient capable of exercise on a treadmill or similar device (generally at 4 METs or greater; see functional capacity below).

- An abnormal ETT (exercise treadmill test) includes any one of the following:
  - ST segment depression (usually described as horizontal or downsloping, greater or equal to 1.0 mm below baseline)
  - Development of chest pain
  - Significant arrhythmia (especially ventricular arrhythmia)
  - Hypotension during exercise

- Functional capacity greater than or equal to 4 METs equates to the following:
  - Can walk four blocks without stopping
  - Can walk up a hill
  - Can climb one flight of stairs without stopping
  - Can perform heavy work around the house

**Practice Note**

An observational study found that, compared with the Duke Activity Status Index, subjective assessment by clinicians generally underestimated exercise capacity see reference 25.

**CD-1.3: Stress Testing with Imaging – Procedures**

- Imaging Stress Tests include any one of the following:
  - Stress Echocardiography see CD-2.6: Stress Echocardiography (Stress Echo) – Coding
  - MPI see CD-3.1: Myocardial Perfusion Imaging (MPI) – Coding
  - Stress perfusion MRI see CD-5.3: Cardiac MRI – Indications for Stress MRI

- Stress testing with imaging can be performed with maximal exercise or chemical stress (adenosine, dipyridamole, dobutamine, or regadenoson) and does not alter the CPT® codes used to report these studies.

**CD-1.4: Stress Testing with Imaging – Indications**

- Stress echo, MPI or stress MRI, can be considered if there are new, recurrent, or worsening cardiac symptoms and any of the following:
  - High pretest probability (greater than 90% probability of CAD) per Table 1
  - A history of CAD based on:
    - A prior anatomic evaluation of the coronaries OR
    - A history of CABG or PCI
  - Evidence or high suspicion of ventricular tachycardia
  - Age 40 years or greater and known diabetes mellitus
  - Coronary calcium score ≥ 100
- Poorly controlled hypertension defined as systolic BP greater than or equal to 180mmHg, if provider feels strongly that CAD needs evaluation prior to BP being controlled.
- ECG is uninterpretable for ischemia due to any one of the following:
  - Complete Left Bundle Branch Block (bifascicular block involving right bundle branch and left anterior hemiblock does not render ECG uninterpretable for ischemia)
  - Ventricular paced rhythm
  - Pre-excitation pattern such as Wolff-Parkinson-White
  - Greater or equal to 1.0 mm ST segment depression (NOT nonspecific ST/T wave changes)
  - LVH with repolarization abnormalities, also called LVH with strain (NOT without repolarization abnormalities or by voltage criteria)
  - T wave inversion in the inferior and/or lateral leads. This includes leads II, AVF, V5 or V6. (T wave inversion isolated in lead III or T wave inversion in lead V1 and V2 are not included).
  - Patient on digitalis preparation
- Continuing symptoms in a patient who had a normal or submaximal exercise treadmill test and there is suspicion of a false negative result.
- Patients with recent equivocal, borderline, or abnormal stress testing where ischemia remains a concern, regardless of symptoms.
- Heart rate less than 50 bpm in patients, including those on beta blocker, calcium channel blocker, or amiodarone, where it is felt that the patient may not achieve an adequate workload for a diagnostic exercise study.
- Inadequate ETT:
  - Physical inability to achieve target heart rate (85% MPHR or 220-age). Target heart rate is calculated as 85% of the maximum age predicted heart rate (MPHR). MPHR is estimated as 220 minus the patient's age.
  - History of false positive exercise treadmill test: a false positive ETT is one that is abnormal however the abnormality does not appear to be due to macrovascular CAD.

Stress echo, MPI or stress MRI, can be considered regardless of symptoms for any of the following:
- Within 3 months of an acute coronary syndrome (e.g. ST segment elevation MI [STEMI], unstable angina, non-ST segment elevation MI [NSTEMI]), one MPI can be performed to evaluate for inducible ischemia if all of the following related to the most recent acute coronary event apply:
  - Individual is hemodynamically stable
  - No recurrent chest pain symptoms and no signs of heart failure
  - No prior coronary angiography or imaging stress test since the current episode of symptoms
- Assessing myocardial viability in patients with significant ischemic ventricular dysfunction (suspected hibernating myocardium) and persistent symptoms or heart failure such that revascularization would be considered.
  - Note: MRI, cardiac PET, MPI, or Dobutamine stress echo can be used to assess myocardial viability depending on physician preference.
- PET and MPI perfusion studies are usually accompanied by PET metabolic examinations (CPT® 78459). TI-201 MPI perfusion studies may assess viability without accompanying PET metabolism information.
  - Unheralded syncope (not near syncope)
  - Asymptomatic patient with an uninterpretable ECG that:
    - Has never been evaluated or
    - Is a new uninterpretable change.
  - Patient with an elevated cardiac troponin.
  - One routine study 2 years or more after a stent
    - Except with a left main stent where it can be done at 1 year.
  - One routine study at 5 years or more after CABG, without cardiac symptoms.
  - Every 2 years if there was documentation of previous “silent ischemia” on the imaging portion of a stress test but not on the ECG portion.
  - To assess for CAD prior to starting a Class IC antiarrhythmic agent (flecainide or propafenone) and annually while taking the medication.
  - Prior anatomic imaging study (coronary angiogram or CCTA) demonstrating coronary stenosis in a major coronary branch, which is of uncertain functional significance, can have one stress test with imaging.

- Evaluating new, recurrent, or worsening left ventricular dysfunction/CHF see CD-9.1: CHF– Imaging for additional indications.

**CD-1.5: Stress Testing with Imaging – Preoperative**

- There are 2 steps that determine the need for imaging stress testing in (stable) preoperative patients:
  - Would the patient qualify for imaging stress testing independent of planned surgery?
    - If yes, proceed to stress testing guidelines;
    - If no, go to step 2
  - Is the surgery considered high, moderate or low risk? (see Table 2) If high or moderate-risk, proceed below. If low-risk, there is no evidence to determine a need for preoperative cardiac testing.
    - **High Risk Surgery**: All patients in this category should receive an imaging stress test if there has not been an imaging stress test within 1 year* unless the patient has developed new cardiac symptoms or a new change in the EKG since the last stress test.
    - **Intermediate Surgery**: One or more risk factors and unable to perform an ETT per guidelines if there has not been an imaging stress test within 1 year* unless the patient has developed new cardiac symptoms or a new change in the EKG since the last stress test.
    - **Low Risk**: Preoperative imaging stress testing is not supported.
  - Clinical Risk Factors (for cardiac death & non-fatal MI at time of non-cardiac surgery)
    - Planned high-risk surgery (open surgery on the aorta or open peripheral vascular surgery)
History of ischemic heart disease (previous MI, previous positive stress test, use of nitroglycerin, typical angina, ECG Q waves, previous PCI or CABG)
- History of compensated previous congestive heart failure (history of heart failure, previous pulmonary edema, third heart sound, bilateral rales, chest x-ray showing heart failure)
- History of previous TIA or stroke
- Diabetes Mellitus
- Creatinine level > 2 mg/dL

*Time interval is based on consensus of eviCore executive cardiology panel.

**Table 2**

<table>
<thead>
<tr>
<th><strong>Cardiac Risk Stratification List</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High Risk (&gt; 5%)</strong></td>
</tr>
<tr>
<td>➢ Open aortic and other major open vascular surgery</td>
</tr>
<tr>
<td>➢ Open peripheral vascular surgery</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
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<tr>
<td></td>
</tr>
</tbody>
</table>

**CD-1.6: Transplant Patients**

- Stress Testing in patients for Non-Cardiac Transplant
  - Individuals who are candidates for any type of organ, bone marrow, or stem cell transplant can undergo imaging stress testing every year (usually stress echo or MPI) prior to transplant.
  - Individuals who have undergone organ transplant are at increased risk for ischemic heart disease secondary to their medication. Risk of vasculopathy is 7% at one year, 32% at five years and 53% at ten years. An imaging stress test can be repeated annually after transplant for at least two years or within one year of a prior cardiac imaging study if there is evidence of progressive vasculopathy.
  - After two consecutive normal imaging stress tests, repeated testing is not supported more often than every other year without evidence for progressive vasculopathy or new symptoms.
  - Stress testing after five years may proceed according to normal patterns of consideration.

- Post-Cardiac transplant assessment of transplant CAD:
  - One of the following imaging studies may be performed annually:
    - MPI
    - Stress ECHO
    - Stress MRI
    - Cardiac PET perfusion
**CD-1.7: Non-imaging Heart Function and Cardiac Shunt Imaging**

- Procedures reported with CPT® 78414 and CPT® 78428 are essentially obsolete and should not be performed in lieu of other preferred modalities.
- Echocardiogram is the preferred method for cardiac shunt detection, rather than the cardiac shunt imaging study described by CPT® 78428.
- Ejection fraction can be obtained by echocardiogram, MPI, MUGA study, cardiac MRI, cardiac CT, or cardiac PET depending on the clinical situation, rather than by the non-imaging heart function study described by CPT® 78414.

**CD-1.8: Genetic lab testing in the evaluation of CAD**

- Corus® CAD genetic expression score – refer to lab management program guidelines

**CD-1.9: CAD Risk factor modification**

- Risk factor modification
  - Statins remain the mainstay of medical treatment for cardiovascular risk reduction with an abundance of scientific evidence regarding their efficacy.
  - PCSK9 drugs are a new addition to the treatment of hyperlipidemia
    - Refer to specialty drug coverage criteria for these drugs.

**References**


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## CD-2.1: Transthoracic Echocardiography (TTE) – Coding

<table>
<thead>
<tr>
<th>TTE CODES</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Transthoracic Echocardiography</strong></td>
<td></td>
</tr>
<tr>
<td>TTE for congenital cardiac anomalies, complete</td>
<td>93303</td>
</tr>
<tr>
<td>TTE for congenital cardiac anomalies, follow-up or limited</td>
<td>93304</td>
</tr>
<tr>
<td>TTE with 2-D, M-mode, Doppler and color flow, complete</td>
<td>93306</td>
</tr>
<tr>
<td>TTE with 2-D, M-mode, without Doppler or color flow</td>
<td>93307</td>
</tr>
<tr>
<td>TTE with 2-D, M-mode, follow-up or limited</td>
<td>93308</td>
</tr>
<tr>
<td><strong>Doppler Echocardiography</strong></td>
<td></td>
</tr>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display</td>
<td>+93320*</td>
</tr>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display, follow-up or limited study</td>
<td>+93321*</td>
</tr>
<tr>
<td>Doppler echo, color flow velocity mapping</td>
<td>+93325</td>
</tr>
<tr>
<td><em>CPT® 93320 and CPT® 93321 should not be requested or billed together</em></td>
<td></td>
</tr>
</tbody>
</table>

| C codes are unique temporary codes established by CMS. C codes were established for contrast echocardiography. Each echocardiography C code corresponds to a standard echo code (Class I CPT code) The C code and the matching CPT code should not both be approved. |

| Myocardial strain imaging                       |       |
| Myocardial strain imaging using speckle tracking-derived assessment of myocardial mechanics (List separately in addition to codes for echocardiography imaging) | 93356 |

| Investigational Codes                          |       |
| 0439T Myocardial contrast perfusion echocardiography, at rest or with stress, for assessment of myocardial ischemia or viability | Investigational |
**CD-2.1.1: Transthoracic Echocardiography (TTE) – Coding - General Information**

- The most commonly performed study is a complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306).
  - CPT® 93306 includes the Doppler exams, so CPT® codes 93320-93325 should **not** be assigned together with CPT® 93306.
  - Doppler codes (CPT® 93320, CPT® 93321, and CPT® 93325) are ‘add-on codes’ (as denoted by the + sign) and are assigned in addition to code for the primary procedure.

- For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307.

- Limited transthoracic echocardiogram should be billed if the report does not “evaluate or document the attempt to evaluate” all of the required structures.
  - A limited transthoracic echocardiogram is reported with CPT® 93308.
  - CPT® 93321 (not CPT® 93320) should be reported with CPT® 93308 if Doppler is included in the study. CPT® 93325 can be reported with CPT® 93308 if color flow Doppler is included in the study.
  - A limited congenital transthoracic echocardiogram is reported with CPT® 93304.

- Doppler echo may be used for evaluation of the following:
  - Shortness of breath
  - Known or suspected valvular disease
  - Known or suspected hypertrophic obstructive cardiomyopathy
  - Shunt detection

**Practice Notes**

- Providers performing echo on a pediatric patient, may not know what procedure codes they will be reporting until the initial study is completed.

- If a congenital issue is found on the initial echo, a complete echo is reported with codes CPT® 93303, CPT® 93320, and CPT® 93325 because CPT® 93303 does NOT include Doppler and color flow mapping.

- If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2-D, Doppler, and color flow mapping.

- Since providers may not know the appropriate code/s that will be reported at the time of the pre-authorization request, they may request all 4 codes (CPT® 93303, CPT® 93320, CPT® 93325, and CPT® 93306).

- CPT® 76376 and CPT® 76377 are not unique to 3D Echo. These codes also apply to 3D rendering of MRI and CT studies. see [CD-2.8: 3D Echocardiography – Coding](#)

- CPT® 93325 may also be used with fetal echocardiography.
CD-2.2: Transthoracic Echocardiography (TTE) – Indications

- TTE can be performed for the following:
  - New or worsening cardiac signs or symptoms, including, but not limited to:
    - Dyspnea
    - Chest pain
    - Palpitations
    - Syncope
    - Heart failure
    - Murmur
  - Hypertension – can be done once with initial evaluation
  - New signs or symptoms of cerebral ischemia or peripheral embolic event
  - Valve function and structure:
    - History and/or physical examination suggesting significant valvular disorder
    - Valve Surgery
      - If valve surgery is being considered can have TTE twice a year
      - Post-surgery at 6 weeks to establish baseline, then one routine study (surveillance) 3 years or more after valve surgery (repair or prosthetic valve implantation).
      - TAVR follow-up is indicated at, 1 month, and at one year post-procedure and annually thereafter.
        - A baseline post-op TTE is usually performed within one week after surgery. This baseline study may also be approved as an outpatient if not performed in the hospital prior to discharge
        - See: CD-4.8: Transcatheter Aortic Valve Replacement (TAVR)
      - Mitral valve clip follow-up may be approved at 1 month, at 6 months, and at one year post-procedure
  - Ventricular function assessment including, but not limited to the following:
    - Chemotherapy induced cardiomyopathy see: CD-12.1: Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)
    - Post myocardial infarction can be done once in follow-up. This should not be done less than 6 weeks post MI
    - Evaluation prior to ICD/CRT placement, if baseline has not been established
  - Cardiac structure: an echocardiogram can be done to assess cardiac structure when there are new or worsening cardiac signs or symptoms, suggesting disorders such as, but not limited to:
    - Infiltrative diseases (e.g. sarcoid, amyloid)
    - Ventricular septal defect (VSD)
    - Papillary muscle rupture/dysfunction
    - Hypertrophy including:
      - asymmetric septal hypertrophy
      - spade heart
      - hypertensive concentric hypertrophy
      - infiltrative hypertrophy
      - pacemaker insertion complication
      - pericardial effusion
- cardiac injury due to blunt chest trauma

- **Cardiac Defects or Masses**
  - Embolic source in patients with recent Transient Ischemic Attack (TIA), stroke, or peripheral vascular emboli as an initial study before TEE.
  - ASD repair or VSD repair:
    - Within the first year of surgery
    - Incomplete septal defect repair may be followed yearly
  - Tumor evaluation including myxomas
  - Clot detection
  - Evaluation of adult congenital heart disease see also: **PEDCD-2.2:** Congenital Heart Disease
    - Routine yearly surveillance of adult congenital heart disease is allowed following incomplete or palliative repair, with residual abnormality and without a change in clinical status.
    - Screening for the presence of bicuspid aortic valve is recommended for first-degree relatives of patients with bicuspid aortic valve.
    - Screening of the ascending aorta in known or suspected connective tissue disease that predisposes to an aortic aneurysm or dissection (e.g., Marfan syndrome, hereditary forms of ascending aortopathy)
    - Also see **PVD-2.2:** Screening for vascular related genetic connective tissue Disorders (Familial Aneurysm Syndromes/Spontaneous Coronary Artery Dissection (SCAD)/Ehlers-Danlos/Marfan/Loeys-Dietz)

- **Inflammatory**
  - Pericardial effusion/pericardial disease including pericardial cysts
  - Congenital heart disease
  - Endocarditis including:
    - Fever
    - Positive blood cultures indicating bacteremia or
    - A new murmur

- **Pacemaker insertion complication**

- **Screening for first-degree relatives of patients with hypertrophic cardiomyopathy (HCM)**
  - First-degree relatives who are 12 to 18 years old should be screened yearly for HCM by 2D- echocardiography, and ECG.
  - First-degree relatives who are older than age 18 should have 2D-echo and ECG every five years to screen for delayed adult-onset LVH.
  - Systematic screening is usually not indicated for first-degree relatives who are younger than age 12 unless there is a high-risk family history or the child is involved in particularly intense competitive sports.
  - Affected individuals identified through family screening or otherwise should be evaluated every 12 to 18 months with 2D-echo, Holter monitor, and blood pressure response during maximal upright exercise.

- **New abnormality on an EKG that has not been evaluated**

- **Thoracic aortic aneurysm/dissection** see **PVD-6.2:** Thoracic Aortic Aneurysm, **PVD-6.8:** Aortic Dissection
Patients with BAVs and no demonstrable aortopathy may be followed every 3 years with TTE for the development of aortic enlargement
- Initial evaluation prior to solid organ transplant or hematopoietic stem cell transplant (HSCT)

**CD-2.3: Frequency of Echocardiography Testing**

- Repeat routine echocardiograms are not supported (annually or otherwise) for evaluation of clinically stable syndromes
- Every three years, when there is a history of:
  - Bicuspid aortic valve
  - Mild aortic or mitral stenosis
  - Prosthetic heart valve
- Once a year (when no change in clinical status), when there a history of:
  - Significant valve dysfunction, including moderate or severe regurgitation or stenosis
  - Significant valve deformity, such as thickened myxomatous valve or bileaflet prolapse, regardless of extent of regurgitation or stenosis
  - Hypertrophic cardiomyopathy see **CD-2.2: Transthoracic Echocardiography (TTE) – Indications, CD-2.7: Stress Echocardiography – Indications, other than ruling out CAD**
  - Chronic pericardial effusions
  - Left ventricular contractility/diastolic function prior to planned medical therapy for heart failure or to evaluate the effectiveness of on-going therapy
  - Pre-operative aortic root dilatation; see also **CD-11.2.9: Congenital Valvular Aortic Stenosis**
  - Pulmonary hypertension (can be done more frequently with change in therapy)
  - Systemic Scleroderma
  - Prior TAVR
- Anytime, without regard for the number or timing of previous ECHO studies, if there is a change in clinical status or new signs or symptoms such as:
  - Cardiac murmurs
  - Myocardial infarction or acute coronary syndrome
  - Congestive heart failure (new or worsening)
    - New symptoms of dyspnea
    - Orthopnea
    - Paroxysmal nocturnal dyspnea
    - Edema
    - Elevated BNP
  - Pericardial disease
  - Stroke/transient ischemic attack
  - Decompression illness
  - Prosthetic valve dysfunction or thrombosis
  - A history of prior cardiac transplant, per transplant center protocol
Practice note:

Decisions regarding routine echocardiographic follow-up should not be based on the degree of regurgitation alone, but should take into account associated structural valvular and cardiac abnormalities. For example: a structurally normal mitral valve with moderate mitral regurgitation by color flow Doppler and normal left atrial size, does not generally require routine echocardiographic follow-up. However, a thickened, myxomatous appearing mitral valve with bi-leaflet prolapse and only trivial or mild mitral regurgitation, should be followed echocardiographically at routine intervals.

CD-2.4: Transesophageal Echocardiography (TEE) – Coding

<table>
<thead>
<tr>
<th>Transesophageal Echocardiography</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>TEE with 2-D, M-mode, probe placement, image acquisition, interpretation and report</td>
<td>93312</td>
</tr>
<tr>
<td>TEE probe placement only</td>
<td>93313</td>
</tr>
<tr>
<td>TEE image acquisition, interpretation, and report only</td>
<td>93314</td>
</tr>
<tr>
<td>TEE for congenital anomalies with 2-D, M-mode, probe placement, image acquisition, interpretation and report</td>
<td>93315</td>
</tr>
<tr>
<td>TEE for congenital anomalies, probe placement only</td>
<td>93316</td>
</tr>
<tr>
<td>TEE for congenital anomalies, image acquisition, interpretation and report only</td>
<td>93317</td>
</tr>
<tr>
<td>TEE for monitoring purposes, ongoing assessment of cardiac pumping function on an immediate time basis</td>
<td>93318</td>
</tr>
</tbody>
</table>

Doppler Echocardiography*

<table>
<thead>
<tr>
<th>Doppler Echocardiography*</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display</td>
<td>+93320</td>
</tr>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display, follow-up or limited study</td>
<td>+93321</td>
</tr>
<tr>
<td>Doppler echo, color flow velocity mapping</td>
<td>+93325</td>
</tr>
</tbody>
</table>

*Doppler echo, if performed, may be reported separately in addition to the primary TEE codes: CPT® 93312, CPT® 93314, CPT® 93315, and CPT® 93317.

The complete transesophageal echocardiogram service, including both (1) probe (transducer) placement and (2) image acquisition/interpretation, is reported with CPT® 93312.

- Probe placement only is reported with CPT® 93313.
- The image acquisition/interpretation only is reported with CPT® 93314.
Physicians assign codes CPT® 93312, CPT® 93313, and/or CPT® 93314 to report professional services if the test is performed in a hospital or other facility where the physician cannot bill globally.
- Modifier -26 (professional component) is appended to the appropriate code
- CPT® 93313 and CPT® 93314 should never be used together. If both services are provided, CPT® 93312 is reported.

Hospitals should report TEE procedures using CPT® 93312 (the complete service). CPT® 93313 and CPT® 93314 are not used for hospital billing.

Monitoring of patients undergoing cardiac surgery is CPT® 93318.

**CD-2.5: Transesophageal Echocardiography (TEE) – Indications**

- Limited transthoracic echo window
- Assessing valvular dysfunction, especially mitral regurgitation, when TTE is inadequate
- Pre-operative planning for cardiac surgery
- Embolic source or intracardiac shunting when TTE is inconclusive
  - **Examples:** atrial septal defect, ventricular septal defect, patent foramen ovale, aortic cholesterol plaques, thrombus in cardiac chambers, valve vegetation, tumor
- Embolic events when there is an abnormal TTE or a history of atrial fibrillation
  - Clarify atria/atrial appendage, aorta, mitral/aortic valve beyond the information that other imaging studies have provided
  - Cardiac valve dysfunction
    - Differentiation of tricuspid from bicuspid aortic valve
    - Congenital abnormalities
- Assessing for left atrial thrombus prior to cardioversion of atrial fibrillation.
- Prior to planned atrial fibrillation ablation/pulmonary vein isolation procedure.
- Repeat TEE studies are based upon findings in the original study and documentation of the way in which repeat studies will affect patient management, such as the following:
  - Left atrial appendage (LAA) closure device (e.g., WATCHMAN®)
    - 45 days post procedure
    - 12 months post procedure
  - See also **CD-13.5: Percutaneous Mitral Valve Repair (mitral valve clip)**
CD-2.6: Stress Echocardiography (Stress Echo) – Coding

<table>
<thead>
<tr>
<th>Stress ECHOCARDIOGRAPHY</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;*</td>
<td>93350</td>
</tr>
<tr>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: including performance of continuous electrocardiographic monitoring, with physician supervision*</td>
<td>93351</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Doppler Echocardiography</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display**</td>
<td>+93320</td>
</tr>
<tr>
<td>Doppler echo, pulsed wave and/or spectral display, follow-up/limited study</td>
<td>+93321</td>
</tr>
<tr>
<td>Doppler echo, color flow velocity mapping**</td>
<td>+93325</td>
</tr>
</tbody>
</table>

*CPT® 93350 and CPT® 93351 do not include Doppler studies

*Doppler echo (CPT® +93320 and CPT® +93325), if performed, may be reported separately in addition to the primary SE codes: CPT® 93350 or CPT® 93351.

<table>
<thead>
<tr>
<th>CPT®</th>
<th>Stress Echocardiography</th>
</tr>
</thead>
<tbody>
<tr>
<td>93350</td>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report;* C8928</td>
</tr>
<tr>
<td>93351</td>
<td>Echo, transthoracic, with (2D), includes M-mode, during rest and exercise stress test and/or pharmacologically induced stress, with report: including performance of continuous electrocardiographic monitoring, with physician supervision* C8930</td>
</tr>
</tbody>
</table>

CD-2.7: Stress Echocardiography–Indications, other than ruling out CAD

See: CD-1.4: Stress Testing with Imaging – Indications. In addition to the evaluation of CAD, stress echo can be used to evaluate the following conditions:
- Dyspnea on exertion (specifically to evaluate pulmonary hypertension)
- Right heart dysfunction
- Valvular heart disease, especially when the outcome would affect a therapeutic or interventional decision
- Pulmonary hypertension, when the outcome will measure response to therapy and/or prognostic information
- Hypertrophic cardiomyopathy
  - In a patient with a history of hypertrophic cardiomyopathy who has been previously evaluated with a stress echo, another stress echo may be appropriate if there are worsening symptoms or if there has been a therapeutic change (for example: change in medication, surgical procedure performed).

In general spectral Doppler (CPT® 93320 or 93321) and color-flow Doppler (CPT® 93325) are necessary in the evaluation of the above conditions and can be added to the stress echo code.
CD-2.8: 3D Echocardiography – Coding

- The procedure codes used to report 3D rendering for echocardiography are not unique to echocardiography and are the same codes used to report the 3D post-processing work for CT, MRI, ultrasound, and other tomographic modalities.
  - CPT® 76376, not requiring image post-processing on an independent workstation, is the most common code used for 3D rendering done with echocardiography
  - CPT® 76377 requires the use of an independent workstation

CD-2.9: 3D Echocardiography – Indications

- Echocardiography with 3-dimensional (3D) rendering is becoming universally available, yet its utility remains limited based on the current literature.
- 3D Echo may be indicated when an primary echocardiogram is approved and one of the following is needed:
  - Left ventricular volume and ejection fraction assessment when measurements are needed for treatment decision (e.g. implantation of ICD, alteration in cardiotoxic chemotherapy)
  - Mitral valve anatomy specifically related to mitral valve stenosis
  - Guidance of transcatheter procedures

CD-2.10: Myocardial strain imaging (CPT® 93356)

- See CD-12.2: Cancer Therapeutics-Myocardial Strain Imaging

CD-2.11: Myocardial contrast perfusion echocardiography (CPT® 0439T)

- Investigational see CD-2.1: Transthoracic Echocardiography (TTE) – Coding

References


<table>
<thead>
<tr>
<th>CD-3: Nuclear Cardiac Imaging</th>
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<tbody>
<tr>
<td><strong>CD-3.1:</strong> Myocardial Perfusion Imaging (MPI) – Coding</td>
</tr>
<tr>
<td><strong>CD-3.2:</strong> MPI – Indications</td>
</tr>
<tr>
<td><strong>CD-3.3:</strong> MUGA – Coding</td>
</tr>
<tr>
<td><strong>CD-3.4:</strong> MUGA Study – Cardiac Indications</td>
</tr>
<tr>
<td><strong>CD-3.5:</strong> MUGA Study – Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)</td>
</tr>
<tr>
<td><strong>CD-3.6:</strong> Myocardial Sympathetic Innervation Imaging in Heart Failure</td>
</tr>
<tr>
<td><strong>CD-3.7:</strong> Myocardial Tc-99m Pyrophosphate Imaging</td>
</tr>
<tr>
<td><strong>CD-3.8:</strong> Cardiac Amyloidosis</td>
</tr>
</tbody>
</table>
CD-3.1: Myocardial Perfusion Imaging (MPI) – Coding

### Nuclear Cardiac Imaging Procedure Codes

<table>
<thead>
<tr>
<th>Myocardial Perfusion Imaging (MPI)</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPI, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)</td>
<td>78451</td>
</tr>
<tr>
<td>MPI, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection</td>
<td>78452</td>
</tr>
</tbody>
</table>

- The most commonly performed myocardial perfusion imaging are single (at rest or stress, CPT® 78451) and multiple (at rest and stress, CPT® 78452) SPECT studies.
  - Evaluation of the individual’s left ventricular wall motion and ejection fraction are routinely performed during MPI and are included in the code’s definition.
  - First pass studies, (CPT® 78481 and CPT® 78483), MUGA, (CPT® 78472 and CPT® 78473) and SPECT MUGA (CPT® 78494) should not be reported in conjunction with MPI codes.
  - Attenuation correction, when performed, is included in the MPI service by code definition. No additional code should be assigned for the billing of attenuation correction.
- **Multi-day Studies:** It is not appropriate to bill separately for the rest and stress segments of MPI even if performed on separate calendar dates. A single code is assigned to define the entire procedure on the date all portions of the study are completed.
- 3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with MPI.
- Separate codes for such related services as treadmill testing (CPT® 93015 - CPT® 93018) and radiopharmaceuticals should be assigned in addition to MPI.

### CD-3.2: MPI – Indications

- See: [CD-1.4: Stress Testing with Imaging-Indications](#)
CD-3.3: MUGA – Coding

<table>
<thead>
<tr>
<th>Nuclear Cardiac Imaging Procedure Codes</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUGA (Multi Gated Acquisition) – Blood Pool Imaging</td>
<td></td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress, wall motion study plus ejection fraction, with or without quantitative processing</td>
<td>78472</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium; planar, multiple studies, wall motion study plus ejection fraction, at rest and stress, with or without additional quantification</td>
<td>78473</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing</td>
<td>78494</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure) [Use in conjunction with CPT® 78472]</td>
<td>+78496</td>
</tr>
</tbody>
</table>

- The technique employed for a MUGA service guides the code assignment. CPT® 78472 is used for a planar MUGA scan at rest or stress, and CPT® 78473 for planar MUGA scans, multiple studies at rest and stress.

- The two most commonly performed MUGA scans are the studies defined by CPT® 78472 and SPECT MUGA, CPT® 78494.

- Planar MUGA studies (CPT® 78472 and CPT® 78473) should not be reported in conjunction with:
  - MPI (CPT® 78451 - CPT® 78454)
  - First pass studies (CPT® 78481- CPT® 78483), and/or
  - SPECT MUGA (CPT® 78494).

- CPT® +78496 is assigned only in conjunction with CPT® 78472.
  - See: CD-3.4: MUGA Study – Cardiac Indications
  - This add-on code should not be performed as a routine protocol.
CD-3.4: MUGA Study – Cardiac Indications

MUGA (Multi Gated Acquisition) – Blood Pool Imaging Indications

- Echocardiography is the preferred method of following left ventricular systolic function. Indications below refer to scenarios in which MUGA may be performed rather than ECHO:
  - Prior ECHO demonstrates impaired systolic function (EF < 50%).
  - Pre-existing left ventricular wall motion abnormalities from ischemic heart disease or ischemic or non-ischemic cardiomyopathies.
  - ECHO is technically limited and prevents accurate assessment of LV function.
  - AICD placement:
    - MUGA to assess LV ejection fraction when there are conflicting results between other forms of testing and the issue is clinically relevant, e.g., MPI LVEF is 80% and an echo EF is 30%, the MUGA would be appropriate.
    - However, if the MPI LVEF is 80% and the echo EF is 50%, this would not be appropriate even though the difference is significant since the echo EF is still normal.
  - Congestive heart failure:
    - MUGA to measure response to cardiac medications for CHF if echocardiogram was performed and was technically difficult
    - Previous low LV ejection fraction determination was < 50% and receiving potentially cardiotoxic chemotherapy
    - Documentation of other need for information given by MUGA that cannot be obtained by ECHO

- First pass studies (CPT® 78481 and CPT® 78483) may be approved when indications are met for MUGA and/or there is need for information that cannot be obtained by MUGA

MUGA is NOT indicated for the following:

- A prior MUGA is not a reason to approve another MUGA (it is not necessary to compare LVEF by the same modality)

- To resolve differences in ejection fraction measurements between ECHO and MPI unless there is clear documentation as to how quantitative measurement of LVEF will affect patient management (e.g. implantation of an AICD).

Practice Notes

- LV ejection fraction measurement is variable and can vary by +/-5-10% without any accompanying change in clinical status. Normal physiologic changes in intravascular volume, catecholamine levels, fever, and medications are among the many factors which cause variation in LVEF in the absence of myocardial pathology.

- Right ventricular first pass study, (CPT® +78496), may be indicated if there is clear documentation of a concern regarding right ventricular dysfunction or overload.
CD-3.5: MUGA Study – Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)

- See CD-12.1: Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)

CD-3.6: Myocardial Sympathetic Innervation Imaging in Heart Failure

- In heart failure, the sympathetic nervous system is activated in order to compensate for the decreased myocardial function. Initially, this is beneficial, however, long-term this compensatory mechanism is detrimental and causes further damage.

- Markers have been developed, using radioactive iodine, in an attempt to image this increased myocardial sympathetic activity. Currently, AdreView™ (Iodine-123 meta-iodobenzylguanidine), is the only FDA-approved imaging agent available for this purpose. eviCore currently considers AdreView to be experimental and investigational.

- The AMA has established the following set of Category III codes to report these studies:
  - 0331T - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment
  - 0332T - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT.

CD-3.7: Myocardial Tc-99m Pyrophosphate Imaging

<table>
<thead>
<tr>
<th>Myocardial Tc-99m Pyrophosphate Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>MUGA (Multi Gated Acquisition) – Blood Pool Imaging</td>
</tr>
<tr>
<td>Myocardial Imaging, infarct avid, planar, qualitative or quantitative</td>
</tr>
<tr>
<td>Myocardial Imaging, infarct avid, planar, qualitative or quantitative with ejection fraction by first pass technique</td>
</tr>
<tr>
<td>Myocardial Imaging, infarct avid, planar, qualitative or quantitative tomographic SPECT with or without quantification</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging Limited area</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging SPECT Note: When reporting CPT® 78803, planar imaging of a limited area or multiple areas should be included with the SPECT</td>
</tr>
</tbody>
</table>

- Historically this method of imaging the myocardium was used to identify recent infarction, hence, the term “infarct-avid scan.” Although still available, the sensitivity and specificity for identifying infarcted myocardial tissue are variable and the current use for this indication is limited. See CD-5: Cardiac MRI.
CD-3.8: Cardiac Amyloidosis

- Tc-99m pyrophosphate imaging may be used to identify cardiac amyloidosis (CPT® 78803). Chest SPECT and planar imaging may be used, as well as whole-body imaging for identification of systemic ATTR (transthyretin) amyloidosis.
- For a single planar imaging session alone (without a SPECT study), report CPT® 78800 Radiopharmaceutical Localization Imaging Limited area
- Tc-99m pyrophosphate imaging may be indicated to identify cardiac amyloidosis for any of the following:
  - Individuals with heart failure and unexplained increase in left ventricular wall thickness.
  - African-Americans over the age of 60 years with heart failure, unexplained or with increased left ventricular wall thickness (> 12 mm).
  - Individuals over the age of 60 years with unexplained heart failure and preserved ejection fraction.
  - Individuals, especially elderly males, with unexplained neuropathy, bilateral carpal tunnel syndrome or atrial arrhythmias in the absence of usual risk factors, and signs/symptoms of heart failure.
  - Evaluation of cardiac involvement in individuals with known or suspected familial amyloidosis.
  - Diagnosis of cardiac ATTR in individuals with CMR or echocardiography consistent with cardiac amyloidosis.
  - Patients with suspected cardiac ATTR amyloidosis and contraindications to CMR such as renal insufficiency or an implantable cardiac device.14

References
   doi.org/10.1016/j.amjcard.2009.02.059.


| CD-4.1: Cardiac CT and CTA – General Information and Coding | 34 |
| CD-4.2: CT for Coronary Calcium Scoring (CPT® 75571) | 35 |
| CD-4.3: CCTA – Indications for CCTA | 35 |
| CD-4.4: CCTA – Additional Indications | 36 |
| CD-4.5: Fractional Flow Reserve by Computed Tomography | 37 |
| CD-4.6: CT Heart – Indications | 37 |
| CD-4.7: CT Heart for Congenital Heart Disease | 38 |
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CD-4.1: Cardiac CT and CTA – General Information and Coding

The high negative predictive value (98%-99%) of CCTA in ruling out significant coronary artery disease has been confirmed in multiple studies.

<table>
<thead>
<tr>
<th>Cardiac Imaging Procedure Codes</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT, heart, without contrast, with quantitative evaluation of coronary calcium</td>
<td>75571</td>
</tr>
<tr>
<td>The code set for Cardiac CT and CCTA (CPT® 75572-CPT® 75574), include quantitative and functional assessment (for example, calcium scoring) if performed</td>
<td></td>
</tr>
<tr>
<td>CPT® 75571 describes a non-contrast CT of the heart with calcium scoring and should be reported only when calcium scoring is performed as a stand-alone procedure.</td>
<td></td>
</tr>
<tr>
<td>Can be used to report a preliminary non-contrast scan which indicates an excessive amount of calcium such that the original scheduled study must be discontinued.</td>
<td></td>
</tr>
<tr>
<td>CPT® 75571 should not be reported in conjunction with any of the contrast CT/CTA codes (CPT® 75572- CPT® 75574).</td>
<td></td>
</tr>
<tr>
<td>Cardiac CT and CCTA</td>
<td>CPT®</td>
</tr>
<tr>
<td>CT, heart, with contrast, for evaluation of cardiac structure and morphology (including 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed).</td>
<td>75572</td>
</tr>
<tr>
<td>CT, heart, with contrast, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed).</td>
<td>75573</td>
</tr>
<tr>
<td>CTA, heart, coronary arteries and bypass grafts (when present), with contrast, including 3D image post-processing (including 3D image post-processing, assessment of cardiac function, and evaluation of venous structures, if performed).</td>
<td>75574</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission, analysis of fluid dynamics and simulated maximal coronary hyperemia, generation of estimated FFR model, with anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
<td>0501T</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission</td>
<td>0502T</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; analysis of fluid dynamics and simulated maximal coronary hyperemia, and generation of estimated FFR model</td>
<td>0503T</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
<td>0504T</td>
</tr>
</tbody>
</table>
3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with Cardiac CT and CCTA.

Only one code from the set: CPT® 75572 - CPT® 75574 can be reported per encounter.

CPT® 75574 includes evaluation of cardiac structure and morphology when performed; therefore, additional code/s should not be assigned.

**CD-4.2: CT for Coronary Calcium Scoring (CPT® 75571)**

**CD-4.2.1: CT Calcium Scoring for CAD Screening**

Coronary calcium scoring as a standalone test is considered investigational in asymptomatic patients with any degree of CAD risk.

Medicare policies do not cover certain screening studies including Coronary Calcium Scoring.

Texas Heart Attack Preventive Screening Law (HR 1290) mandates that insurers in Texas cover either a calcium scoring study (CPT® 75571 or HCPCS S8092) or a carotid intima-media thickness study (ultrasound—Category III code 0126T) every five years for certain populations. To qualify, the following must apply:

- Must be a Texas resident.
- Must be a member of a fully-insured Texas health plan.
- Must be a man age 45 to 75 or a woman age 55 to 75.
- Must have either diabetes or a Framingham cardiac risk score of intermediate or higher.
- Must not have had a calcium scoring study or a carotid intima-media thickness study within the past 5 years.

**CD-4.2.2: CT Calcium Scoring Indications**

Symptomatic individuals with a ‘very low’, or ‘low’ pretest probability of CAD*, see Table 1 in CD-1.1: General Issues – Cardiac.

**CD-4.3: CCTA – Indications for CCTA**

Symptomatic individuals who have a ‘low’ or ‘intermediate’ pretest probability of CAD*, see Table 1 in CD-1.1: General Issues – Cardiac:

- ‘Low’ or ‘intermediate’ pre-test probability of coronary disease with persistent symptoms after a stress test.
- Replace performance of invasive coronary angiogram in individuals with low risk of CAD (i.e. Pre-op non-coronary surgery).
- For symptomatic individuals, evaluate post-CABG graft patency when only graft patency is a concern and imaging of the native coronary artery anatomy is not needed, such as in early graft failure.
CD-4.4: CCTA – Additional Indications

- Re-do CABG
  - To identify whether bypass grafts are located directly beneath the sternum, so that alternative ways to enter the chest can be planned.

- Evaluate coronary artery anomalies and other complex congenital heart disease of cardiac chambers or great vessels.
  - Report CPT® 75574 for evaluating coronary artery anomalies.
  - Report CPT® 75573 for congenital heart disease.
    - To evaluate the great vessels, Chest CTA (CPT® 71275) can be performed instead of CCTA or in addition to CCTA. For anomalous pulmonary venous return, can add CT abdomen and pelvis with contrast (CPT® 74177).

- Anomalous coronary artery(ies) suspected for diagnosis or to plan treatment and less than age 40 with a history that includes one or more of the following:
  - Persistent exertional chest pain and normal stress test,
  - Full sibling(s) with history of sudden death syndrome before age 30 or with documented anomalous coronary artery
  - Resuscitated sudden death and contraindications for conventional coronary angiography
  - Prior nondiagnostic coronary angiography in determining the course of the anomalous coronary artery in relation to the great vessels, origin of a coronary artery or bypass graft location.

- Unexplained new onset of heart failure

- Evaluation of newly diagnosed congestive heart failure or cardiomyopathy.
  - No prior history of coronary artery disease, the ejection fraction is less than 50 percent, and low or intermediate risk on the pre-test probability assessment, and
  - No exclusions to cardiac CT angiography.
  - No cardiac catheterization, SPECT, cardiac PET, or stress echocardiogram has been performed since the diagnosis of congestive heart failure or cardiomyopathy.

- Ventricular tachycardia (6 beat runs or greater) if CCTA will replace conventional invasive coronary angiography.

- Equivocal coronary artery anatomy on conventional cardiac catheterization.

- Newly diagnosed dilated cardiomyopathy.

- Preoperative assessment of the coronary arteries in patients who are going to undergo surgery for aortic dissection, aortic aneurysm, or valvular surgery if CCTA will replace conventional invasive coronary angiography.

- Vasculitis/Takayasu’s/Kawasaki’s disease

- **Cardiac Trauma**: Chest CTA (CPT® 71275) and CCTA (CPT® 75574) are useful in detecting aortic and coronary injury and can help in the evaluation of myocardial and pericardial injury see **CD-10.1: Cardiac Trauma – Imaging**
CD-4.5: Fractional Flow Reserve by Computed Tomography

- Fractional flow reserve (FFR) is typically measured using invasive techniques. FFR can be obtained noninvasively from coronary computed tomography angiography data (FFR-CT).
- Indications for FFR-CT
  - To further assess CAD seen on a recent CCTA that is of uncertain physiologic significance

CD-4.6: CT Heart – Indications

- Cardiac vein identification for lead placement in patients needing left ventricular pacing.
- Pulmonary vein isolation procedure (ablation) for atrial fibrillation
  - Cardiac MRI (CPT® 75557 or CPT® 75561), chest MRV (CPT® 71555), chest CTV (CPT® 71275), or cardiac CT (CPT® 75572) can be performed to evaluate the anatomy of the pulmonary veins prior to an ablation procedure performed for atrial fibrillation.
  - Study may be repeated post-procedure between 3-6 months after ablation because of a 1%-2% incidence of asymptomatic pulmonary vein stenosis
  - See CD-8.2: Pulmonary Vein Imaging – Indications
- If echocardiogram is inconclusive for:
  - Cardiac or pericardial tumor or mass
  - Cardiac thrombus
  - Pericarditis/constrictive pericarditis
  - Complications of cardiac surgery
- Clinical suspicion of arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC), especially if patient has presyncope or syncope if the clinical suspicion is supported by established criteria for ARVD.
- Recurrent laryngeal nerve palsy due to cardiac chamber enlargement.
- Cardiac CT (CPT® 75572) can be performed instead of TEE for assessment of left atrial appendage (LAA) occlusion device. See CD-2.5: Transesophageal Echocardiography (TEE) – Indications
- Coronary imaging is not included in the code definition for CPT® 71275.
  - The AMA definition for CPT® 71275 reads: “CTA Chest (non-coronary), with contrast material(s), including non-contrast images, if performed, and image post-processing.”
**CD-4.7: CT Heart for Congenital Heart Disease**

- Coronary artery anomaly evaluation
  - A cardiac catheterization was performed, and not all coronary arteries were identified.

- Thoracic arteriovenous anomaly evaluation
  - A cardiac MRI or chest CT angiogram was performed and suggested congenital heart disease.

- Complex adult congenital heart disease evaluation
  - No cardiac CT or cardiac MRI has been performed, and there is a contraindication to cardiac MRI.
  - A cardiac CT or cardiac MRI was performed one year ago or more.

**CD-4.8: Transcatheter Aortic Valve Replacement (TAVR)**

- Once the decision has been made for aortic valve replacement, the following may be used to determine if a patient is a candidate for TAVR:
  - CTA of chest (CPT® 71275), abdomen and pelvis (combination code CPT® 74174) are considered appropriate, and
  - Cardiac CT (CPT® 75572) may be considered to measure the aortic annulus or
  - Coronary CTA (CCTA CPT® 75574) may be considered to both measure the aortic annulus and assess the coronary arteries in lieu of heart catheterization.

- Post TAVR:
  - TTE follow-up is indicated at:
    - A baseline post-op TTE is indicated within one week after surgery if not performed in the hospital prior to discharge.
    - 1 month
    - One year post-procedure
    - Then annually thereafter.

**References**


AHA/ACC/AACVPR/AAPA/ABC/ACPM/ADA/AGS/APH/A/ASPC/NLA/PCNA Guideline on the
Management of Blood Cholesterol: A Report of the American College of Cardiology/American Heart
doi:10.1161/cir.0000000000000625.


Planning Transcatheter Left Atrial Appendage Occlusion. JACC: Cardiovascular Interventions.
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### CD-5.1: Cardiac MRI – Coding

<table>
<thead>
<tr>
<th>Cardiac Imaging Procedure Codes</th>
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<tbody>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast</td>
<td>75557</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast; with stress imaging</td>
<td>75559</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences</td>
<td>75561</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences; with stress imaging</td>
<td>75563</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure)</td>
<td>+75565</td>
</tr>
</tbody>
</table>

➢ Only one procedure code from the set (CPT® 75557- CPT® 75563) should be reported per session.

➢ Only one flow velocity measurement (CPT® +75565) should be reported per session when indicated.
  - Requests for cardiac MRI that contain more than one cardiac/chest MRI CPT® Code must be forwarded for Medical Director Review.

### CD-5.2: Cardiac MRI – Indications (excluding Stress MRI)

➢ Assess myocardial viability (to differentiate hibernating myocardium from scar) when necessary to determine if revascularization should be performed (CPT® 75561)

➢ Assessment of global ventricular function and mass if a specific clinical question is left unanswered by a recent echocardiogram and results will affect patient management (CPT® 75557 or CPT® 75561). Particularly useful in evaluating:
  - Cardiomyopathy (ischemic, diabetic, hypertrophic, or muscular dystrophy)
  - Noncompaction
  - Amyloid heart disease
  - Post cardiac transplant
  - Hemochromatosis
  - Post transfusion hemosiderosis
  - Hypertrophic heart disease
  - Myocarditis, cardiac aneurysm, trauma, and contusions
  - Monitoring cancer chemotherapy effect on the heart (especially if an accurate assessment of right ventricular function is documented as necessary).

➢ Pre and postoperative congenital heart disease assessment (e.g. Tetralogy of Fallot, patent ductus arteriosus, platypnea, atrial septal defects, restrictive VSD, anomalous pulmonary arteries or veins or anomalous coronary arteries) (CPT® 75557 or CPT® 75561).
  - Chest MRA (CPT® 71555) may be added if the aorta or pulmonary artery need to be visualized beyond the root.
- Report CPT® +75565 in conjunction with CPT® 75557 or CPT® 75561, only if there is a need to clarify findings on a recent echocardiogram and cardiac Doppler study.

- Chest MRA alone (CPT® 71555) can be performed in certain situations (e.g. suspected dissection, coarctation, known or suspected aortic aneurysm).

- Coarctation of the aorta
  - Follow-up (surveillance) imaging after repair of coarctation:
    - **Adults**: chest MRA (CPT® 71555) every 2 to 3 years and before and after any intervention for re-coarctation
    - **Infants and children**: ECHO every month for several months, then ECHO every 6 months to one year thereafter

- Arrhythmogenic right ventricular dysplasia or arrhythmogenic cardiomyopathy (ARVD/ARVC) suspicion (including presyncope or syncope, established criteria for ARVD (CPT® 75557 or CPT® 75561).

- Differentiate constrictive pericarditis from restrictive cardiomyopathy (CPT® 75561).

- Evaluate cardiac tumor or mass when echocardiogram is inconclusive.

- Initial evaluation for cardiac sarcoidosis.

- Anomalous coronary arteries: Cardiac MRI (CPT® 75561) or CCTA (CPT® 75574) is much better at detecting this than conventional angiography.

- Assess coronary arteries in Kawasaki’s disease.

- Fabry disease
  - Late enhancement MRI may predict the effect of enzyme replacement therapy on myocardial changes that occur with this disease (CPT® 75561).

- Evaluate valvular heart disease when echocardiogram is inconclusive. Appropriate procedures include:
  - CPT® 75557 or CPT® 75561 and CPT® 75565

- Pulmonary vein anatomy for planned ablation procedures in patients with atrial fibrillation. Report cardiac MRI (CPT® 75557 or CPT® 75561) or chest MRV (CPT® 71555), but not both see CD-8: Pulmonary Artery and Vein Imaging for guidelines on follow-up imaging after ablation procedure.

- Suspected cardiac thrombus when echocardiogram is inconclusive (CPT® 75557).

- Right ventricular function evaluation (CPT® 75557 in conjunction with CPT® +75565) if a recent ECHO has been done, and there is documented need to perform cardiac MRI in order to resolve an unanswered question.

- Shunting through a VSD (CPT® 75557 in conjunction with CPT® +75565) if a recent ECHO has been done, including a bubble study, and there is documented need to perform cardiac MRI in order to resolve an unanswered question.

- Evaluate for iron overload due to conditions requiring frequent blood transfusions (i.e. sickle cell, thalassemia, hemochromatosis, etc.) (CPT® 75557).
CD-5.3: Cardiac MRI – Indications for Stress MRI

- For indications for Stress MRI see CD-1.4: Stress Testing with Imaging – Indications. Also, if a nuclear perfusion (MPI) stress test was performed and was equivocal, a stress MRI is appropriate.

CD-5.4: Cardiac MRI – Aortic Root and Proximal Ascending Aorta

- See- PVD-6.2: Thoracic Aortic Aneurysm (TAA) in the Peripheral Vascular Disease imaging guidelines

CD-5.5: Cardiac MRI – Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade

- Contrast-enhanced cardiac MRI (CPT® 75561) is useful for evaluating pericarditis, neoplastic and other effusion, tamponade or myocardial infiltration if a specific clinical question is left unanswered by echocardiogram or another recent imaging study.

References


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<td>CD-6.4: Cardiac PET – Metabolic – Indications</td>
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CD-6.1: Cardiac PET – Coding

<table>
<thead>
<tr>
<th>Cardiac Imaging Procedure Codes</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study</td>
<td>78459</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study at rest or stress (exercise or pharmacologic)</td>
<td>78491</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and/or stress (exercise or pharmacologic)</td>
<td>78492</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan</td>
<td>78429</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan</td>
<td>78430</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan</td>
<td>78431</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (e.g., myocardial viability);</td>
<td>78432</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (e.g., myocardial viability); with concurrently acquired computed tomography transmission scan</td>
<td>78433</td>
</tr>
<tr>
<td>Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)</td>
<td>78434</td>
</tr>
</tbody>
</table>

- 3D rendering, (CPT® 76376/CPT® 76377), should not be billed in conjunction with PET.
- Separate codes for such related services as treadmill testing (CPT® 93015/CPT® 93018) and radiopharmaceuticals should be assigned in addition to perfusion PET.
- 78434 is an add-on code for cardiac PET perfusion and is considered investigational.

CD-6.2: Cardiac PET – Perfusion – Indications

- CPT® 78430, 78431, 78491 and CPT® 78492
- Meets all of the criteria for an imaging stress test and additionally any one of the following:
  - Individual is obese (for example BMI >40 kg/m²) or
Individual has large breasts or implants

- Equivocal nuclear perfusion (MPI) stress test
- Routine use in post heart transplant assessment of transplant CAD
- CMS (Medicare) does not cover reporting for wall motion and ejection fraction performed in conjunction with cardiac perfusion PET. There is not a separate CPT® or HCPCS code associated with these specific services.

**CD-6.3: Cardiac PET – Absolute quantitation of myocardial blood flow (AQMBF)**

- CPT® 78434
- Performance of quantitation of myocardial blood flow by Cardiac PET is currently non-standardized between different vendor products.
- Absolute quantitation of myocardial blood flow is considered experimental, investigational and/or unproven (EIU).

**CD-6.4: Cardiac PET – Metabolic – Indications**

- Cardiac PET Metabolic (CPT® 78459 or CPT® 78429)
  - To determine myocardial viability when a previous study has shown significant left ventricular dysfunction when under consideration for revascularization
- Cardiac PET Metabolic and Perfusion (MPI SPECT CPT® 78451 and CPT® 78459, or CPT® 78432, or CPT® 78433)
  - To identify and monitor response to therapy for established or strongly suspected cardiac sarcoid.

**References**

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<td>CD-7.5: Combined Right and Left Heart Catheterization Indications</td>
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<tr>
<td>CD-7.6: Planned (Staged) Coronary Interventions</td>
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</tbody>
</table>
## CD-7.1: Diagnostic Heart Catheterization – Code Sets

<table>
<thead>
<tr>
<th>Cardiac Catheterization Procedure Codes</th>
<th>CPT®</th>
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</thead>
<tbody>
<tr>
<td>Congenital Heart Disease Code “Set”</td>
<td>93530-93533</td>
</tr>
<tr>
<td>Right Heart Catheterization (CHD)</td>
<td>93530</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CHD)</td>
<td>93531</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CHD-TS)</td>
<td>93532</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CAD-ASD)</td>
<td>93533</td>
</tr>
<tr>
<td>Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve</td>
<td>93451-93464, 93566-93568</td>
</tr>
<tr>
<td>RHC without LHC or coronaries</td>
<td>93451</td>
</tr>
<tr>
<td>LHC without RHC or coronaries</td>
<td>93452</td>
</tr>
<tr>
<td>RHC and retrograde LHC without coronaries</td>
<td>93453</td>
</tr>
<tr>
<td>Native coronary artery catheterization;</td>
<td>93454</td>
</tr>
<tr>
<td>with bypass grafts</td>
<td>93455</td>
</tr>
<tr>
<td>with RHC</td>
<td>93456</td>
</tr>
<tr>
<td>with RHC and bypass grafts</td>
<td>93457</td>
</tr>
<tr>
<td>with LHC</td>
<td>93458</td>
</tr>
<tr>
<td>with LHC and bypass grafts</td>
<td>93459</td>
</tr>
<tr>
<td>with RHC and LHC</td>
<td>93460</td>
</tr>
<tr>
<td>with RHC and LHC and bypass grafts</td>
<td>93461</td>
</tr>
<tr>
<td>LHC by trans-septal or apical puncture</td>
<td>+93462</td>
</tr>
<tr>
<td>Angiography of non-coronary arteries and veins performed as a distinct service</td>
<td>Select appropriate codes from the Radiology and Vascular Injection Procedures sections.</td>
</tr>
</tbody>
</table>

- CPT® 93530 to 93533 are appropriate for invasive evaluation of congenital heart disease. See also specific conditions in **CD-11: Adult Congenital Heart Disease**
CD-7.2: Diagnostic Heart Catheterization – Coding Notes

Cardiac catheterization (CPT® 93451-CPT® 93461) includes all “road mapping” angiography necessary to place the catheters, including any injections and imaging supervision, interpretation, and report.

Cardiac catheterization (CPT® 93452-CPT® 93461) (for all conditions other than congenital heart disease) includes contrast injections, imaging supervision, interpretation, and report for imaging typically performed.

Catheter placements in native coronaries or bypass grafts (CPT® 93454-CPT® 93461) include intraprocedural injections for bypass graft angiography, imaging supervision, and interpretation.

Injection codes CPT® 93563-CPT® 93565 should not be used in conjunction with CPT® 93452-CPT® 93461.

Codes CPT® 93451-CPT® 93461 do not include contrast injections and imaging supervision, interpretation, and report for imaging that is separately identified by the following specific procedure codes: CPT® 93566, CPT® 93567 and CPT® 93568.

- Separate diagnostic cardiac catheterization codes should only be assigned in conjunction with interventional procedures in the following circumstances:
  - No prior or recent diagnostic catheterization is available to guide therapy
  - Individual’s condition has significantly changed since the last diagnostic cath
  - The treatment plan may be affected
  - Other vessels may be identified for treatment
  - Further establishment of a diagnosis from a non-invasive study is necessary

CD-7.3: Diagnostic Left Heart Catheterization (LHC)

CD-7.3.1: Diagnostic Left Heart Catheterization (LHC) – general information

- Individuals in acute settings or with active unstable angina should be handled as medical emergencies.
- These guidelines apply to individuals with stable conditions and who are not in the acute setting (acute coronary syndrome or unstable angina).
- Diagnostic Left Heart Catheterization (LHC) is indicated to identify disease for which invasive procedures have been shown to prolong survival:
  - Left main coronary artery disease plus right coronary artery disease plus left ventricular dysfunction.
  - Triple vessel coronary artery disease plus left ventricular dysfunction.
- Incidental angiography can be performed:
  - Iliac/femoral artery angiography when dissection or obstruction to the passage of the catheter/guidewire is encountered.
  - Renal arteriography if the criteria outlined in the Peripheral Vascular Disease Imaging Guidelines are met (See PVD-6.5: Renovascular Hypertension in the Peripheral Vascular Disease (PVD) Imaging Guidelines)
CD-7.3.2: Diagnostic Left Heart Catheterization (LHC) – Indications

LHC may be indicated for any of the following when there is new onset, persistent, or worsening of angina symptoms:

- A recent history of unstable angina- symptoms suggestive of acute coronary syndrome (ACS) occurring at rest, or with minimal exertion resolving with rest:
  - new onset, accelerating, or worsening ischemic symptoms that are suggestive of unstable angina
  - new onset, accelerating, or worsening symptoms consistent with patient’s known angina pattern in an individual with a history of CABG or PCI

- Symptomatic patients with a high pretest probability of CAD:
  - see CD-1.1: General Issues – Cardiac, Pre-Test Probability Grid (Table 1)

- Symptoms concerning for coronary artery ischemia (chest discomfort, shortness of breath, etc.) with evidence of significant ischemia on recent stress testing, such as:
  - At least moderate ischemia (medium to large size defect) on imaging stress test
  - At least moderate size area of hypokinesis on stress echo

- Persistent or worsening symptoms to evaluate progression of known CAD when:
  - Recent noninvasive cardiac testing was equivocal, unsuccessful in delineating the clinical problem, or led to a conclusion that intervention is indicated
  - Angina that is unresponsive to optimized medical therapy see CD-1.1: General Issues – Cardiac and for which invasive procedures are needed to provide pain relief.

LHC is indicated for any of the following to identify disease for which intervention may be needed

- Left ventricular dysfunction (congestive heart failure) in patients suspected of having coronary artery disease.
- Ventricular fibrillation or sustained ventricular tachycardia where the etiology is unclear.
- Unheralded syncope (not near syncope) where the etiology is unclear.
- Recent noninvasive cardiac testing was equivocal, unsuccessful in delineating the clinical problem, or led to a conclusion that intervention is indicated for the following conditions:
  - Cardiomyopathy
  - Suspicion of endocarditis, or myocarditis
  - Significant/serious ventricular arrhythmia
  - An intermediate or large amount of myocardium (>5%) may be in jeopardy
  - Evaluation of coronary grafts
  - Evaluation of previously placed coronary artery stents
  - Evaluation of structural disease
- Evaluation prior to planned surgery
  - Ruling out coronary artery disease prior to planned non-coronary cardiac or great vessel surgery (i.e. cardiac valve surgery, aortic dissection, aortic aneurysm, congenital disease repair such as atrial septal defect, etc.).

Proprietary Information of UnitedHealthcare.
- Pre-organ transplant (non-cardiac). Some institutions perform a heart cath as part of their initial evaluation protocol. Others use an imaging stress test for evaluation. Either is appropriate and can be approved but NOT both.
  - Valvular heart disease when either:
    - There is a discrepancy between the clinical findings (history, physical exam, and non-invasive test results)
    - Valvular surgery is being considered.
  - Suspected pericardial disease.
  - Previous cardiac transplant:
    - Per transplant center protocol
    - To assess for accelerated coronary artery disease associated with cardiac transplantation.

**CD-7.4: Right Heart Catheterization (RHC)**

**CD-7.4.1: General information RHC (CPT® 93451)**
- It is performed most commonly from the femoral vein, less often through the subclavian or internal jugular veins and inter-atrial septal puncture approach.
- It includes a full oximetry for detection and quantification of shunts.
- Pressure measurements are made and are done simultaneously with aortic and left ventricular pressures.
- Cardiac outputs are calculated by several techniques including thermodilution.

**CD-7.4.2: Diagnostic Right Heart Catheterization – Indications**
- Diagnostic Right heart cath is indicated when results will impact the diagnosis and management of any of the following:
  - Atrial septal defect (ASD) including shunt detection and quantification
  - Ventricular septal defect (VSD) including shunt detection and quantification
  - Patent foramen ovale (PFO)
  - Anomalous pulmonary venous return
  - Congenital defects including persistent left vena cava
  - Pulmonary hypertension
  - Pericardial diseases (constrictive or restrictive pericarditis)
  - Valvular disease
  - Right heart failure
  - Left heart failure
  - Preoperative evaluation for valve surgery
  - Newly diagnosed or worsening cardiomyopathy
  - During a left heart cath where the etiology of the symptoms remains unclear.
  - Pre-lung transplant to assess pulmonary pressures
  - Uncertain intravascular volume status with an unclear etiology
  - Assessment post-cardiac transplant
    - For routine endomyocardial biopsy
    - Assess for rejection
    - Assess pulmonary artery pressure
Cardiac Imaging

- Can be done per the institution protocol or anytime organ rejection is suspected and biopsy is needed for assessment
  - Evaluation of right ventricular morphology.
  - Suspected arrhythmogenic right ventricular dysplasia.

CD-7.5: Combined Right and Left Heart Catheterization Indications

- Preoperative evaluation for valve surgery
- The indications for CD-7.3: Diagnostic Left Heart Catheterization are met and any of the following are present:
  - The major component of the patient symptoms is dyspnea
  - The indications are met according to CD-7.4: Right Heart Catheterization
  - Newly diagnosed or worsening cardiomyopathy

CD-7.6: Planned (Staged) Coronary Interventions

- The CPT® codes for percutaneous coronary interventions (PCI) include the following imaging services necessary for the procedure(s):
  - Contrast injection, angiography, ‘road-mapping’, and fluoroscopic guidance
  - Vessel measurement
  - Angiography following coronary angioplasty, stent placement, and atherectomy
- Separate codes for these services should not be assigned in addition to the PCI code/s because the services are already included.
- A repeat diagnostic left heart catheterization is not medically necessary when the patient is undergoing a planned staged percutaneous coronary intervention.

References


### CD-8: Pulmonary Artery and Vein Imaging

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<tr>
<td>CD-8.2</td>
<td>Pulmonary Vein Imaging – Indications</td>
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</tbody>
</table>
CD-8.1: Pulmonary Artery Hypertension (PAH) – Indications

- CT or CTA or MRA of the pulmonary arteries (CPT® 71260 or CPT® 71275 or CPT® 71555) is useful in the assessment of PAH, especially if there is suspicion for recurrent pulmonary emboli.
- In the absence of a clinical change, follow-up imaging for PAH is not indicated.
- Also see:
  - PVD-5: Pulmonary Artery Hypertension in the Peripheral Vascular Disease Imaging Guidelines.
  - CH-25: Pulmonary Embolism (PE) in the Chest Imaging Guidelines.

CD-8.2: Pulmonary Vein Imaging – Indications

- Cardiac MRI (CPT® 75557 or CPT® 75561), Chest MRV (CPT® 71555), Chest CTV (CPT® 71275), or Cardiac CT (CPT® 75572) can be performed to evaluate the anatomy of the pulmonary veins:
  - Prior to an ablation procedure performed for atrial fibrillation.
  - Post-procedure between 3-6 months after ablation because of a 1% to 2% incidence of asymptomatic pulmonary vein stenosis.
    - If no pulmonary vein stenosis is present, no further follow-up imaging is required.
    - If pulmonary vein stenosis is present on imaging following ablation and symptoms of pulmonary vein stenosis (usually shortness of breath) are present, can be imaged at 1, 3, 6, and 12 months.
  - The majority (81%) of pulmonary vein stenosis remain stable over 1 year. Progression occurs in 8.8% and regression occurs in a small percentage.

References

doi:10.1161/circulationaha.105.602250.
doi:10.1016/s0002-9343(01)00797-5.
doi:10.1016/j.jacc.2009.01.004.
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<tr>
<td>CD-9.3: Myocardial Sympathetic Innervation Imaging</td>
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</table>
CD-9.1: CHF – Imaging

Congestive heart failure, including post-cardiac transplant failure:
- An echocardiogram is generally the first study to be done after the clinical evaluation of the patient who is suspected of having heart failure.
- If the ECHO is limited or does not completely answer the question, then further evaluation with MUGA, cardiac MRI or cardiac CT may be appropriate.
- A stress test to assess for CAD may be appropriate. Follow stress testing guideline: CD-1.4: Stress Testing with Imaging – Indications

Arteriovenous fistula with “high output” heart failure:
- CT Chest with contrast (CPT® 71260) and/or CT Abdomen and/or CT Pelvis with contrast (CPT® 74160 or CPT® 72193 or CPT® 74177) OR
- CTA Chest (CPT® 71275) and/or CTA Abdomen and/or CTA Pelvis (CPT® 74175 or CPT® 72191 or CPT® 74174) OR
- MRI Chest and/or MRI Abdomen and/or MRI Pelvis without and with contrast (CPT® 71552 and/or CPT® 74183 and/or CPT® 72197) OR
- MRA Chest and/or MRI Abdomen and/or MRI Pelvis (CPT® 71555 and/or CPT® 74185 and/or CPT® 72198)

Right-sided congestive heart failure can be a manifestation of pulmonary hypertension or serious lung disease.
- Chest CT (CPT® 71260) or chest CTA (CPT® 71275) to evaluate for recurrent pulmonary embolism

CD-9.2: Palliative Care in patients with heart failure

There are currently no widely accepted published guidelines regarding end of life care for end-stage heart failure patients who are not candidates for advanced heart failure treatments such as left ventricular assist devices, heart pumps or heart transplantation. Consideration for palliative care services should be given to such patients.

CD-9.3: Myocardial Sympathetic Innervation Imaging

In heart failure, the sympathetic nervous system is activated in order to compensate for the decreased myocardial function. Initially, this is beneficial, however, long-term this compensatory mechanism is detrimental and causes further damage.

Markers have been developed, using radioactive iodine, in an attempt to image this increased myocardial sympathetic activity. Currently, AdreView™ (Iodine-123 meta-iodobenzylguanidine), is the only FDA-approved imaging agent available for this purpose. eviCore currently considers AdreView™ to be experimental and investigational.

The AMA has established the following set of Category III codes to report these studies:
- 0331T - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment
0332T - Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment, with tomographic SPECT.

References
CD-10.1: Cardiac Trauma – Imaging

Any of the following can be used to evaluate cardiac or aortic trauma:
- Echocardiogram (TTE, TEE)
- Cardiac MRI (CPT® 75557, CPT® 75561, and CPT® 75565)
- Cardiac CT (CPT® 75572)
- CCTA (CPT® 75574)
- Chest CTA (CPT® 71275)

References
# CD-11: Adult Congenital Heart Disease

## CD-11.1: Congenital heart disease – General Information

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## CD-11.2: Congenital Heart Disease Imaging Indications

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## CD-11.3: Aortopathies with CHD

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## CD-11.4: Pregnancy – Maternal Imaging

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</table>
CD-11.1: Congenital heart disease – General Information

This section covers adult congenital heart disease (CHD), for other associated disorders please see the condition specific sections

- Marfan Syndrome
- Hypertrophic cardiomyopathy (HCM)
- Bicuspid aortic valve (BAV)

CD-11.1.1: Definitions

Physiological stages (A, B, C, D)

- Each congenital heart lesion is divided into 4 physiological stages (A, B, C, D)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Physiological stage</th>
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<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
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</tr>
<tr>
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<tr>
<td>Valvar</td>
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<tr>
<td>Aortic enlargement</td>
<td>None</td>
</tr>
<tr>
<td>Exercise capacity limitation</td>
<td>Normal</td>
</tr>
<tr>
<td>Renal hepatic pulmonary dysfunction</td>
<td>None</td>
</tr>
<tr>
<td>Cyanosis/ hypoxemia</td>
<td>None</td>
</tr>
<tr>
<td>Arrhythmias</td>
<td>None</td>
</tr>
<tr>
<td>Pulmonary hypertension</td>
<td>None</td>
</tr>
</tbody>
</table>

CHD Anatomic classification

- Class I-Simple
  - Native disease
    - Isolated small ASD
    - Isolated small VSD
    - Mild isolated pulmonic stenosis
  - Repaired conditions
    - Previously ligated or occluded ductus arteriosus
    - Repaired secundum ASD or sinus venosus defect without significant residual shunt or chamber enlargement
    - Repaired VSD without significant residual shunt or chamber enlargement
Class II-Moderate Complexity
- Repaired or unrepaired conditions
  - Aorto-left ventricular fistula
  - Anomalous pulmonary venous connection, partial or total
  - Anomalous coronary artery arising from the pulmonary artery
  - Anomalous aortic origin of a coronary artery from the opposite sinus
  - AVSD (partial or complete, including primum ASD)
  - Congenital aortic valve disease
  - Congenital mitral valve disease
  - Coarctation of the aorta
  - Ebstein anomaly (disease spectrum includes mild, moderate, and severe variations)
  - Infundibular right ventricular outflow obstruction
  - Ostium primum ASD
  - Moderate and large unrepaired secundum ASD
  - Moderate and large persistently patent ductus arteriosus
  - Pulmonary valve regurgitation (moderate or greater)
  - Pulmonary valve stenosis (moderate or greater)
  - Peripheral pulmonary stenosis
  - Sinus of Valsalva fistula/aneurysm
  - Sinus venosus defect
  - Subvalvar aortic stenosis (excluding HCM; HCM not addressed in these guidelines)
  - Supravalvar aortic stenosis
  - Straddling atrioventricular valve
  - Repaired tetralogy of Fallot
  - VSD with associated abnormality and/or moderate or greater shunt

Class III- Great Complexity (or Complex)
- Cyanotic congenital heart defect (unrepaired or palliated, all forms)
- Double-outlet ventricle
- Fontan procedure
- Interrupted aortic arch
- Mitral atresia
- Single ventricle (including double inlet left ventricle, tricuspid atresia, hypoplastic left heart, any other anatomic abnormality with a functionally single ventricle)
- Pulmonary atresia (all forms)
- TGA (classic or d-TGA; CCTGA or l-TGA)
- Truncus arteriosus
- Other abnormalities of atrioventricular and ventriculoarterial connection (i.e., crisscross heart, isomerism, heterotaxy syndromes, ventricular inversion)
CD-11.1.2: Modalities

- **Echocardiogram- transthoracic (TTE) or transesophageal (TEE)**
  - Transthoracic echocardiography (TTE) is an indispensable tool in the initial and serial follow-up evaluation to identify abnormalities and changes that commonly influence management decisions.

- **Cardiac MRI (CMR)**
  - CMR plays a valuable role in assessment of RV size and function, because it provides data that are reproducible and more reliable than data obtained with alternative imaging techniques.
  - For intracardiac congenital heart disease, CMR will typically include flow velocity mapping for shunts and flow assessment.
  - Imaging that only requires aortic arch imaging, does not require intracardiac CMR, only chest MRA.

- **Cardiac Computed Tomography (CCT) and Cardiac Computed Tomography Angiography (CCTA)**
  - The most important disadvantage of CCT (including CT angiography) as an imaging technique is the associated exposure to ionizing radiation.

- **Cardiac catheterization**
  - (hemodynamic and/or angiographic) in patients with adult CHD AP classification II and III, or interventional cardiac catheterization in patients with adult CHD AP classification I to III should be performed by, or in collaboration with, cardiologists with expertise in adult CHD.

- **Exercise Testing**
  - Exercise test does not imply stress imaging

- **Stress Imaging**
  - Includes-MPI, stress echo, stress MRI
  - PET stress may be included as per CD-6: Cardiac PET

- **Circumstances where CMR, CCT, TEE, and/or Cardiac Catheterization may be Superior to TTE**
  - Assessment of RV size and function in repaired Tetralogy of Fallot (TOF), systemic right ventricles, and other conditions associated with right ventricular (RV) volume and pressure overload
  - Identification of anomalous pulmonary venous connections
  - Serial assessment of thoracic aortic aneurysms, especially when the dilation might extend beyond the echocardiographic windows
  - Accurate assessment of pulmonary artery (PA) pressure and pulmonary vascular resistance
  - Assessment for re-coarctation of the aorta
  - Sinus venosus defects
  - Vascular rings
  - Evaluation of coronary anomalies
  - Quantification of valvular regurgitation
# CD-11.1.3: Coding

<table>
<thead>
<tr>
<th>Modality</th>
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<tbody>
<tr>
<td><strong>Echocardiogram</strong></td>
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<tr>
<td>Transthoracic echocardiogram (TTE)</td>
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<tr>
<td>TTE for congenital cardiac anomalies; complete</td>
<td>93303</td>
</tr>
<tr>
<td>TTE for congenital cardiac anomalies; limited study</td>
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<tr>
<td>TTE (2D) m-mode recording, complete, with spectral and color flow doppler echocardiography</td>
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<tr>
<td>TTE (2D) with or without m-mode recording; complete</td>
<td>93307</td>
</tr>
<tr>
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<tr>
<td><strong>Transesophageal echocardiogram (TEE)</strong></td>
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<td>TEE (2D) including probe placement, imaging, interpretation, and report</td>
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<tr>
<td>TEE for congenital cardiac anomalies; including probe placement, imaging, interpretation, and report</td>
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<tr>
<td><strong>MRI</strong></td>
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<tr>
<td>Cardiac (CMR)</td>
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<td>Cardiac MRI for morphology and function without contrast</td>
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<tr>
<td>Cardiac MRI for morphology and function without and with contrast</td>
<td>75561</td>
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<tr>
<td><strong>Chest MRI</strong></td>
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<td>MRI chest without contrast</td>
<td>71550</td>
</tr>
<tr>
<td>MRI chest with contrast</td>
<td>71551</td>
</tr>
<tr>
<td>MRI chest with &amp; without contrast</td>
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<td><strong>MRI Angiography (MRA)</strong> Chest MRA**</td>
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<td>MRA chest (excluding myocardium) with or without contrast</td>
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<td><strong>CT</strong></td>
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<tr>
<td>Cardiac (CCT)</td>
<td></td>
</tr>
<tr>
<td>CT, heart, with contrast material, for evaluation of cardiac structure and morphology</td>
<td>75572</td>
</tr>
<tr>
<td>CT, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease</td>
<td>75573</td>
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<tr>
<td><strong>CT Angiography-cardiac (CCTA)</strong></td>
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<tr>
<td>CTA heart, coronary arteries and bypass grafts (when present), with contrast, including 3D image post processing</td>
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<tr>
<td><strong>CT-chest</strong></td>
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<td>CT Thorax with contrast</td>
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<tr>
<td>CT Thorax without &amp; with contrast</td>
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<tr>
<td><strong>CT Angiography-chest (chest CTA)</strong></td>
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<td>CTA Chest without and with contrast</td>
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<td><strong>Stress Imaging (echo, MRI, MPI)</strong></td>
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<td>Stress echo</td>
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<td>Echocardiography (TTE), (2D), with or without m-mode, during rest and cardiovascular stress, with interpretation and report</td>
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<tr>
<td>Echocardiography (TTE), (2D), m-mode, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation</td>
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<td>Cardiac MRI for morphology and function without and with contrast, with stress imaging</td>
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<tr>
<td>Pulmonary ventilation (e.g., aerosol or gas) and perfusion imaging</td>
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<tr>
<td>Quantitative differential pulmonary perfusion, including imaging when performed</td>
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<tr>
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<td>78598</td>
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**CD-11.2: Congenital Heart Disease Imaging Indications**

- The following sections are based on the congenital heart lesion. Requests for imaging based on other cardiac conditions, such as CAD, HCM, acquired valvular lesions, should follow the adult cardiac guidelines for those conditions.

**CD-11.2.1: ASD-Atrial septal defects**

- This section does not include patent foramen ovale (PFO) or PFO occluders.
- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram at time of diagnosis
    - CMR, CCT (75573), and/or TEE are useful if echo (TTE) is suboptimal and either:
      - ASD is suspected
      - To evaluate pulmonary venous connections in known ASD
    - Chest MRA or chest CTA may be indicated if echo shows pulmonary venous anomalies
      - If normal then repeat pulmonary vein imaging is not required.
  - Transesophageal echocardiogram (TEE) is recommended to guide percutaneous ASD closure
  - Diagnostic cath is indicated when there is either:
    - Evidence of pulmonary hypertension
Unanswered questions on CMR/CCT for venous drainage.

- TTE is indicated post ASD device placement:
  - 6 months to evaluate for erosion
  - 1 week (if amplazter)
  - 1 month
  - 6 months
  - 12 months
  - then every 1-2 years

- Due to low risk of erosion in PFO devices- PFO device closure requires follow-up at 6-12 months. No additional evaluation unless PFO not closed

- Stress imaging and coronary artery imaging would be based on CD-1.4: Stress Testing with Imaging – Indications

### Follow-up ASD. SD, if surgically closed or if no interventions

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<thead>
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<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
</tr>
</thead>
<tbody>
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</tr>
<tr>
<td>TTE</td>
<td>36-60</td>
</tr>
</tbody>
</table>

#### CD-11.2.2: Anomalous Pulmonary Venous Connections

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram at time of diagnosis
    - CMR and/or Chest MRA, or cardiac CT and/or chest CTA at time of diagnosis if any issues with pulmonary veins or RV volume.
    - Cardiac Cath at time of diagnosis for hemodynamic data and issues not answered on other imaging
  - Routine stress imaging or coronary artery imaging not required.
  - Echo, CMR, CT, per cardiology request for clinical changes
    - Diagnostic heart catheterization if questions unanswered on imaging

### Follow-up Anomalous Pulmonary Venous Connections

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<th>Modality</th>
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<tbody>
<tr>
<td>Echo (TTE)</td>
<td>36-60</td>
</tr>
</tbody>
</table>

#### CD-11.2.3: Ventricular Septal Defect (VSD)

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echo (TTE) at time of diagnosis
    - CMR or CCT can be performed if questions are unanswered on echo
    - Catheterization at time of diagnosis for hemodynamics if pulmonary hypertension (PHT) or shunt size is a question
### Long term follow-up VSD

<table>
<thead>
<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
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<tr>
<td>Echo (TTE)</td>
<td>36</td>
</tr>
</tbody>
</table>

**CD-11.2.4: Atrioventricular Septal Defect (AV Canal, AVSD, endocardial cushion defect)**

- Initial studies—Diagnosis, clinical changes, consideration of surgery
  - Echo (TTE) at time of diagnosis
    - CMR or cardiac CT at time of diagnosis if there are unanswered questions on echo
    - Cardiac cath at time of diagnosis when CMR and TTE leave questions unanswered that affect patient management
  - Stress imaging per **CD-1.4: Stress Testing with Imaging – Indications**

### Long term follow-up AVSD

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<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
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<tbody>
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<td></td>
<td>A</td>
</tr>
<tr>
<td>Echo (TTE)</td>
<td>24-36</td>
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</tbody>
</table>

**CD-11.2.5: Patent Ductus Arteriosus (PDA)**

- Initial studies—Diagnosis, clinical changes, consideration of surgery
  - Echo at time of diagnosis
    - Chest MR or Chest CT if there are questions left unanswered by echo
    - Cardiac Cath for hemodynamics (if planned device closure, diagnostic cardiac cath is not indicated as it is included in the procedure code)
  - Stress imaging per **CD-1.4: Stress Testing with Imaging – Indications**

### Long term follow-up PDA

<table>
<thead>
<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Echo (TTE)</td>
<td>36-60</td>
</tr>
</tbody>
</table>

**CD-11.2.6: Cor Triatriatum**

- Initial studies—Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
    - CMR and/or Chest MRA or cardiac CT and/or chest CTA may be approved
    - Diagnostic cath may be approved if additional information is required for medical management
  - Long term follow-up
    - Stress imaging per **CD-1.4: Stress Testing with Imaging – Indications**
CD-11.2.7: Congenital Mitral Stenosis

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis

Long term follow-up congenital mitral stenosis

<table>
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<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
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<tbody>
<tr>
<td></td>
<td>Physiological stage</td>
</tr>
<tr>
<td>Echo (TTE)</td>
<td></td>
</tr>
</tbody>
</table>

CD-11.2.8: Subaortic Stenosis (SAS)

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - Stress imaging (stress echo or stress MRI) for any of the following:
    - Once at the time of diagnosis
    - New or changed signs or symptoms of ischemia
    - Changes in cardiac function
    - If cardiac intervention is being considered
    - Any signs or symptoms allowed in CD-1.4: Stress Testing with Imaging – Indications

Long term follow-up SAS

<table>
<thead>
<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
</tr>
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<tr>
<td></td>
<td>Physiological stage</td>
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<tr>
<td>Echo (TTE)</td>
<td></td>
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<tr>
<td>Stress imaging</td>
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</tbody>
</table>

CD-11.2.9: Congenital Valvular Aortic Stenosis

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - TEE may be required if TTE limited or equivocal
  - Chest MRA or chest CTA if one of the following:
    - Suspicion of Coarctation based on exam and echocardiogram
    - Proximal ascending aorta not well visualized on TTE

Routine follow-up Congenital Valvular Aortic Stenosis

<table>
<thead>
<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging</th>
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</thead>
<tbody>
<tr>
<td>Stage (valvular AS)</td>
<td>Progressive (stage B) Mild Vmax 2.0-2.9 m/s</td>
</tr>
<tr>
<td>echo (TTE)</td>
<td>3-5 years</td>
</tr>
<tr>
<td>Chest MRA or CTA</td>
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</tbody>
</table>
Dissection more common for a given aortic diameter. Mid-ascending aortic disease more common and may not be reliably seen on echocardiogram.

Initial studies—Diagnosis, clinical changes, consideration of surgery
- Echocardiogram (TTE) at time of diagnosis
- Chest MRA or chest CTA to rule out mid ascending aortic aneurysm if mid aorta was not seen on echocardiogram.

Surveillance
- Echocardiogram (TTE) yearly
  - Chest MRA or CTA if mid ascending aorta not visualized
- For documented thoracic aortic aneurysm (TAA) ≤ 4cm
  - Routine Chest MRA or CTA yearly
- For documented thoracic aortic aneurysm (TAA) > 4cm
  - Chest MRA or CTA every 6 months.
CD-11.3: Aortopathies with CHD

- Dilated aortic arches are not uncommon with several congenital heart disease and postoperative procedures including: Aortic stenosis, Ross repair, Tetralogy of Fallot, Transposition of the great arteries (TGA), Pulmonary atresia, hypoplastic left heart syndrome (HLHS), Truncus Arteriosus, single ventricle patients.

CD-11.3.1: Supravalvular Aortic Stenosis

- Supravalvular aortic stenosis is a relatively rare condition overall but is seen commonly in patients with Williams syndrome or homozygous familial hypercholesterolemia.
  
  - Initial studies: Diagnosis, clinical changes, consideration of surgery
    - Echocardiogram (TTE) at time of diagnosis
    - Chest MRA or chest CTA
    - Cardiac MRI or cardiac CTA to assess coronary ostia
    - Cardiac cath for any patients pre cardiac intervention for coronary arteries
  
  - New cardiac symptoms—any of the following:
    - Cardiac CT or cardiac MR
    - Chest CTA or chest MRA
    - Stress imaging as per CD-1.4: Stress Testing with Imaging – Indications

Routine follow-up supravalvar AS

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<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
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<tr>
<td>Physiological stage</td>
<td>A</td>
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<tr>
<td>TTE</td>
<td>24</td>
</tr>
<tr>
<td>CMR or CCT</td>
<td>36-60</td>
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</table>

CD-11.3.2: Coarctation of the Aorta

- Coarctation is suspected based on clinical findings:
  - BP higher in upper extremities than in the lower extremities
  - Absent femoral pulses
  - Continuous murmur
  - Abdominal bruit
  - Berry aneurysm with hemorrhage
  - Rib notching on x-ray
  - Abnormal thoracic aortic imaging and blood pressures

- Initial studies: Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
    - No further imaging is required if echocardiogram (TTE), blood pressure, and exam rule out Coarctation.
    - Echo and exam are equivocal or positive one of the following is indicated:
      - Chest CTA
      - Chest MRA
Patients with Coarctation of the aorta do not require intracardiac MR unless issue cannot be resolved on echocardiogram.

.screening for intracranial aneurysm by MRA or CTA of head is allowed

.ETT for diagnosis of exercise induced hypertension does not require imaging

.Cardiac MR not required unless issues unresolved by echo for intracardiac anatomy

.Diagnostic cath can be approved prior to stenting of PDA

.Stress imaging, TEE, Cardiac MR or CT, Coronary imaging not routinely

Symptomatic

.Patients with Coarctation are at risk for dissection. When patient has new or worsening symptoms any of the following:

.Echocardiogram (TTE)

.Chest MRA or CTA.

.For exertional symptoms, one of the following:

.Stress imaging-per CD-1.4: Stress Testing with Imaging – Indications

.Cardiac MRI or cardiac CT

Routine follow-up Coarctation of the Aorta

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<tr>
<th>Modality</th>
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<tr>
<td>Physiological stage</td>
<td>A</td>
</tr>
<tr>
<td>Chest MRA or Chest CTA</td>
<td>36-60</td>
</tr>
<tr>
<td>TTE</td>
<td>24</td>
</tr>
</tbody>
</table>

CD-11.3.3: Valvular Pulmonary Stenosis

Overview Initial studies-Diagnosis, clinical changes, consideration of surgery

.Echocardiogram (TTE) at time of diagnosis

.For issues affecting management not well visualized on TTE

.Cardiac MRI or cardiac CT

.Chest MRA or chest CTA

Valvular PS routine follow-up and testing.

.Echocardiogram-stages

.Mild PS – peak gradient <36 mmHg (peak velocity < 3m/s)

.Moderate PS- peak gradient 36-64 mmHg (peak velocity 3-4 m/s)

 Severe PS- peak gradient >64 mmHg (peak velocity > 4 m/s); or mean gradient >35 mmHg.

 Routine stress imaging is not required

 Routine chest or cardiac or ischemia workup not required.

Valvular PS routine imaging

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<td>Physiological stage</td>
<td>A</td>
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<tr>
<td>TTE</td>
<td>36-60</td>
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</table>
Isolated Pulmonary regurgitating after PS repair-Echo and CMR at same interval as TOF

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<tr>
<td>TTE</td>
<td>24</td>
</tr>
<tr>
<td>CMR</td>
<td>36</td>
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</table>

CD-11.3.4: Branch and Peripheral pulmonary stenosis

- Overview
  - Can be seen in newborns as a normal variant in the first 6 months of life
  - Can be seen in surgeries of right ventricular outflow (TOF)
    - Noonan
    - Alagille
    - Williams
    - Maternal rubella exposure
    - Keutel syndrome
- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - Baseline chest MRA or chest CTA
  - Cath may be considered if other advanced imaging is not adequate for management
  - VQ scan or chest MRA for differential blood flow

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<tr>
<td>Cardiac MRI or cardiac CT</td>
<td>36-60</td>
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<tr>
<td>Chest MRA or chest CTA</td>
<td>36-60</td>
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CD-11.3.5: Double chambered RV

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis

Routine follow-up double chambered right ventricle (RV)

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<th>Modality</th>
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<tr>
<td>Physiological stage</td>
<td>A</td>
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<tr>
<td>Echo (TTE)</td>
<td>24-36</td>
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</table>
**CD-11.3.6: Ebstein Anomaly**

- Overview: Initial studies - Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - TEE if either:
    - TTE is not adequate
    - If surgery/intervention planned
  - Cardiac MRI or cardiac CT at time of Diagnosis

**Routine follow-up Ebstein Anomaly**

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<tr>
<td>Echo (TTE)</td>
<td>12-24</td>
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<tr>
<td>Cardiac MRI or cardiac CT</td>
<td>60</td>
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</tbody>
</table>

**CD-11.3.7: Tetralogy of Fallot (TOF, VSD with PS)**

- Includes TOF with pulmonary atresia, VSD PA
- Initial studies: Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - Cardiac MR or Cardiac CTA at time of diagnosis
  - Chest MRA or Chest CTA at time of diagnosis
  - Cardiac catheterization if other advanced imaging leaves unanswered questions
- Prior to cardiac intervention or surgery
  - Repeat imaging Echo/MR/CT
  - Cath prior to surgery or intervention
    - If planned Catheter Pulmonary Valve replacement, procedure includes diagnostic cath and hemodynamics and diagnostic cath is not billed separately
- New or worsening symptoms
  - Repeat advanced imaging
    - New or worsening symptoms
    - New EKG changes
  - Stress imaging (stress echo, stress MRI, or MPI) allowed for typical chest pain, even if intermediate pretest probability at atypical symptoms in patients with known or undefined coronary artery (CA) anatomy or CA pathology
  - VQ scan or MRA chest for left/right perfusion abnormality

**Routine Follow-up Tetralogy of Fallot (TOF)**

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<tr>
<td>Cardiac MRI or CCTA</td>
<td>36</td>
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<tr>
<td>Chest CTA or MRA</td>
<td>36</td>
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</table>
**CD-11.3.8: Right Ventricle-to-Pulmonary Artery Conduit**

- Initial studies-Diagnosis, clinical changes, consideration of surgery. Surgical repair for many lesions such as TOF/ Truncus /Pulmonary atresia
  - Echocardiogram (TTE) at time of diagnosis
  - Cardiac MRI or Cardiac CTA
  - Chest MRA or Chest CTA
  - Prior to interventions or surgery may repeat any of the above imaging
  - Cath allowed for new symptoms or with new imaging findings as needed for management
  - Stress imaging (stress echo, stress MRI or MPI) as requested for symptoms

**Routine follow-up Right Ventricle-to-Pulmonary Artery Conduit**

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<td>Physiological stage</td>
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<tr>
<td>CMR or CCTA</td>
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<tr>
<td>Chest MRA or chest CTA</td>
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</table>

**CD-11.3.9: Transposition of the great arteries (TGA)**

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - Baseline Cardiac MRI or CCTA
  - Baseline Chest MRA or CTA
  - Stress imaging as requested for symptoms or signs of ischemia
  - V/Q scan for left to right PA perfusion or chest MRA
  - Symptomatic patients should be offered stress physiological imaging and repeat anatomic imaging considered if symptoms are suggestive of coronary ischemia (regardless of diamond forester pretest probability category)
  - Cath right and left heart when issues not elucidated on advanced imaging

**Routine follow-up TGA**

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<tr>
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<tr>
<td>Chest MRA or Chest CTA</td>
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</tbody>
</table>
CD-11.3.10: Congenitally corrected TGA

- Initial studies—Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis
  - Baseline CMR and Chest MRA
  - CMR and/or Echo for changes in clinical status

**Routine follow-up congenitally corrected TGA**

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<thead>
<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
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<td>A</td>
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<td>36-60</td>
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<tr>
<td>Chest CTA or chest MRA</td>
<td>36-60</td>
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CD-11.3.11: Fontan Palliation of Single Ventricle Physiology

- Including Tricuspid Atresia and Double Inlet Left Ventricle, HLHS, HRHS, PA, Mitral Atresia, AVC unbalanced, single ventricle, DIRV, pulmonary atresia, HLHS, Glen procedure, TA, double outlet right ventricle (DORV), and single ventricle physiology
- Initial studies—Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE) at time of diagnosis and with any new symptoms
  - CMR or CCTA can be done annually (vs. based on below chart) on patients who have prior issues that were equivocal on echo, and the data is required (i.e. very poor windows)
    - Cardiac catheterization prior to surgical interventions
  - Echo/CMR or CCTA/chest MRA or chest CTA/cath with any new signs or symptoms
  - V/Q scan or MRA for lung perfusion left vs. right

**Routine follow-up Fontan Palliation of Single Ventricle Physiology**

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<th>Physiological stage / intervals for routine imaging (months)</th>
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<td></td>
<td>A</td>
</tr>
<tr>
<td>Echocardiogram (TTE)</td>
<td>12</td>
</tr>
<tr>
<td>CMR or cardiac CT</td>
<td>36</td>
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<tr>
<td>Chest CTA or MRA</td>
<td>36</td>
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</table>

CD-11.3.12: Severe Pulmonary artery hypertension (PHT) and Eisenmenger syndrome

- Initial studies—Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE)
    - Initial diagnosis
    - With new signs or symptoms
  - Cardiac cath
    - Echocardiogram (TTE) results suggest PHT
    - New signs or symptoms with PHT
Long term follow-up Severe Pulmonary artery hypertension (PHT) and Eisenmenger syndrome

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<tr>
<th>Modality</th>
<th>Physiological stage / intervals for routine imaging (months)</th>
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<tr>
<td>TTE</td>
<td>Physiological stage</td>
</tr>
<tr>
<td>CMR or CCT</td>
<td>As needed</td>
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<tr>
<td>Chest MRA or chest CTA</td>
<td>As needed</td>
</tr>
<tr>
<td>Cath</td>
<td>As needed</td>
</tr>
</tbody>
</table>

CD-11.3.13: Coronary artery anomalies

- Initial studies-Diagnosis, clinical changes, consideration of surgery
  - Echocardiogram (TTE)
    - At baseline
    - Any signs or symptoms
  - Coronary CT/MR/Cath for initial evaluation
  - CA from wrong sinus-baseline stress imaging regardless of symptoms
  - Stress imaging for any cardiac signs or symptoms
  - For Kawasaki GL regarding echo, Stress imaging, coronary imaging, see pediatric GL: **PEDCD-6: Kawasaki Disease**

CD-11.4: Pregnancy – Maternal Imaging

- Overview
  - World Health Organization (WHO) classification:
    - WHO classification I: no detectable increased risk of maternal mortality and no/mild increase in morbidity.
      - Uncomplicated small or mild pulmonary stenosis
      - Patent Ductus Arteriosus (PDA)
      - Mitral valve prolapse
      - Successfully repaired simple lesions (atrial or ventricular septal defect, patent ductus arteriosus, anomalous pulmonary venous connection)
    - WHO classification II: small increase in maternal risk mortality or moderate increase in morbidity.
      - Unrepaired atrial or ventricular septal defect
      - Repaired tetralogy of Fallot
    - WHO classification II–III (depending on individual)
      - Mild left ventricular impairment
      - Native or tissue valvular heart disease not considered WHO I or IV
      - Marfan syndrome without aortic dilation
      - Aorta <45 mm in association with bicuspid aortic valve disease
      - Repaired coarctation
    - WHO classification III: significantly increased risk of maternal mortality or severe morbidity. Expert counseling required. If pregnancy is decided upon, intensive specialist cardiac and obstetric monitoring needed throughout pregnancy, childbirth and the puerperium.
- Mechanical valve
- Systemic right ventricle
- Fontan circulation
- Unrepaired cyanotic heart disease
- Other complex congenital heart disease
- Aortic dilation 40–45 mm in Marfan syndrome
- Aortic dilation 45–50 mm in bicuspid aortic valve disease

WHO classification IV: extremely high risk of maternal mortality or severe morbidity; pregnancy contraindicated. If pregnancy occurs, termination should be discussed. If pregnancy continues, care as for WHO class III.

- Pulmonary arterial hypertension from any cause
- Severe systemic ventricular dysfunction (LVEF <30%, NYHA functional class III–IV)
- Severe mitral stenosis; severe symptomatic aortic stenosis
- Marfan syndrome with aorta dilated >45 mm
- Aortic dilation >50 mm in aortic disease associated with bicuspid aortic valve
- Native severe coarctation of the aorta


- Congenital heart disease imaging in pregnancy
  - Echocardiogram (TTE) when planning pregnancy
  - TEE if TTE equivocal
  - CMR can be performed prior to planning pregnancy in those lesions were CMR would be routinely performed at some later date
  - Chest CTA or chest MRA of arch if known disease with aortic involvement or if known dilation
  - Repeat echocardiogram and MR (can be without gad) can be performed based on the II, III, IV, or other risk factors
  - Severe complex CHD, may require echo monthly, or even weekly (every two weeks) (major physiological changes)-may be best as often as needed (Pulmonary hypertension, changes in function, can guide delivery after 24 weeks)
  - Echo can be performed if new signs or Symptoms during pregnancy
  - Post-partum first year can have more frequent imaging
  - Stress imaging pre/during pregnancy for patients with known Coronary artery anomaly, pulmonary hypertension, LVOT obstruction, cardiac dysfunction, single ventricle.
  - WHO II, III, IV, can have echo MR CT stress imaging prior to pregnancy
  - WHO I- one echocardiogram during pregnancy
  - WHO II- one echocardiogram per trimester during pregnancy
  - WHO II/III- echocardiogram every 2 months during pregnancy
  - WHO III/IV- echocardiogram monthly during pregnancy
  - Patients may require more (even weekly) if treatment decision, delivery is considered.
Syndromes that allow cardiac imaging at the time of diagnosis if not previously done.
- De George/velocardiofacial)
- (22q11.2)
- Down syndrome (trisomy 21)
- Holt Oram (TBX5)
- Klinefelter syndrome (47 XXY)
- Noonan (PTPN11, KRAS, SOS1 RAF1, NRAS, BRAF, MAP2K1)
- Turner (45X)
- Williams (7q11.23 deletion)
- Any syndrome associated with congenital heart disease.

Echocardiogram at time of Diagnosis (either genetic testing or clinical features)
CMR or CCTA if arch involved in disease.

References


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<th>CD-12: Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)</th>
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<td>CD-12.1: Oncologic Indications for Cancer Therapeutics – Related Cardiac Dysfunction (CTRCD)</td>
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<tr>
<td>CD-12.2: Cancer Therapeutics-Myocardial Strain Imaging</td>
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</table>
CD-12.1: Oncologic Indications for Cancer Therapeutics – Related Cardiac Dysfunction (CTRCD)

- Echocardiogram evaluation of LV ejection fraction and wall motion analysis is appropriate to determine LV function in individuals on cardiotoxic chemotherapeutic drugs:
  - The time frame should be determined by the provider, but no more often than baseline and at every 6 weeks.
  - May repeat every 4 weeks if cardiotoxic chemotherapeutic drug is withheld for significant left ventricular cardiac dysfunction
  - If the LVEF is < 50% on echocardiogram, follow up can be done with MUGA at appropriate intervals.

- Echocardiography vs. MUGA for Determining Left Ventricular Ejection Fraction (LVEF) in Patients on Cardiotoxic Chemotherapy Drugs:
  - eviCore guidelines support using echocardiography rather than MUGA for the determination of LVEF and/or wall motion EXCEPT in one of the circumstances described previously in CD-3.4: MUGA Study – Cardiac Indications.

Practice Note

- Advantages of Echocardiography in comparison to MUGA in patients on cardiotoxic chemotherapy:
  - No ionizing radiation
  - No IV access required when echo contrast is not used
  - Allows view of the pericardium to look for effusion
  - Allows estimate of pulmonary pressure
  - May allow visualization of a clot or tumor in the Inferior Vena Cava (IVC) and/or the right heart

CD-12.2: Cancer Therapeutics-Myocardial Strain Imaging

- Myocardial strain imaging (CPT® 93356) can be approved in addition to the primary echocardiogram in individuals receiving therapy with cardiotoxic agents for ANY of the following:
  - Initial evaluation-prior to treatment with (either):
    - Medications that could result in cardiotoxicity/heart failure
    - Radiation that could result in cardiotoxicity/heart failure
  - Re-evaluation in an individual previously or currently undergoing therapy with cardiotoxic agents as per echocardiogram parameters. See CD-12.1: Oncologic Indications for Cancer Therapeutics – Related Cardiac Dysfunction (CTRCD)
  - Periodic re-evaluation in a patient undergoing therapy with cardiotoxic agents and worsening symptoms
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<td>CD-13.2: Primary Cardiac Surgery – No Previous Cardiac Surgery</td>
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<td>CD-13.3: Re-operative cardiac surgery</td>
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<td>CD-13.4: Minimally Invasive Aortic Valve Surgery</td>
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<tr>
<td>CD-13.5: Percutaneous Mitral Valve Repair (mitral valve clip)</td>
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</table>
CD-13.1: Pre-Surgical Cardiac Testing – General Information

- It is important to differentiate requests for preoperative CT imaging before cardiac surgery according to type of procedure planned:
  - Primary cardiac operation—individuals who have not had prior heart surgery
  - Redo procedures—individuals who have had a prior procedure (it is important to determine the type of procedure as this may impact which modality is most appropriate for the pre-operative assessment)
  - Minimally invasive procedures, such as minimally invasive aortic valve operations, minimally invasive or robotic mitral operations, TAVR, Mitraclip or other percutaneous valve procedures (such as valve in valve aortic or mitral, percutaneous tricuspid and TMVR which will be increasing in the future)

- In re-operative cardiac surgery, the benefit of preoperative CT is to assess for aortic calcifications, to evaluate the anatomic relationships in the mediastinum, such as the location of the various cardiac chambers and great vessels and proximity to the sternum, and to assess for the location of prior bypass grafts. Information can then be used to change the operative strategy including non-midline approach, peripheral vascular exposure, and alternative cannulation sites and for establishing cardiopulmonary bypass before re-sternotomy. These technique can result in decreased incidence of intraoperative injury to heart, great vessels and prior bypass grafts and lower rates of postoperative stroke.\textsuperscript{10,16,22} IV contrast is necessary with these studies to delineate the anatomic structures. However, in patients with renal insufficiency, the provider might chose to forgo the contrast if does not want to contrast load the patient prior to placing them on the heart-lung machine.

- Aortic atherosclerosis is recognized as the single most important determinant of postoperative stroke.\textsuperscript{1,13} There is evidence to support that preoperative CT is associated with lower postoperative stroke rates and mortality after primary cardiac surgery.\textsuperscript{2,10,20,24}
  - CT chest without contrast can be performed pre-operatively to allow the surgeon to:
    - Visualize the extent and location of aortic atherosclerosis
    - Change the operative strategy such as those problematic areas are avoided

CD-13.2: Primary Cardiac Surgery – No Previous Cardiac Surgery

- CT Chest without contrast (CPT\textsuperscript{®} 71250) to evaluate for the presence of ascending aortic calcifications may be indicated prior to primary cardiac surgery when there is documented high risk for aortic calcification including any of the following:
  - Aortic calcification on chest x-ray or other diagnostic test (TEE, fluoroscopy, etc.)
  - Calcific aortic stenosis
  - End stage renal disease (dialysis)
CD-13.3: Re-operative cardiac surgery

- Patients undergoing re-operative cardiac surgery may undergo one of the following tests for preoperative assessment:
  - CT chest with IV contrast
  - CTA chest
  - CCTA only if prior CABG (this might be in addition to CT with IV contrast as CCTA will not show the extent of the thoracic aorta that needs to be visualized)
  - CT heart usually does not provide the necessary information, and should not be approved routinely.

CD-13.4: Minimally Invasive Aortic Valve Surgery

- See CD-4.8: Transcatheter Aortic Valve Replacement (TAVR)
- For patient undergoing minimally invasive aortic valve surgery and minimally invasive or robotic mitral valve surgery, one of the following can be approved for preoperative assessment of patient suitability for the approach and for subsequent procedure planning.
  - CTA chest, CTA abdomen and pelvis
  - CT chest and CT abdomen and pelvis with contrast

CD-13.5: Percutaneous Mitral Valve Repair (mitral valve clip)

- Percutaneous treatment of mitral regurgitation can be accomplished using venous access to apply a clip device (e.g., Mitraclip® currently FDA approved) to provide edge-to-edge mitral leaflet coaptation, approximating opposing sections of the anterior and posterior mitral valve leaflets. It is indicated for patients with symptomatic, moderate to severe or severe primary mitral regurgitation whose surgical risks are prohibitive, as well as symptomatic moderate to severe or severe secondary mitral regurgitation who have failed optimal medical therapy. This therapy should include, if indicated, cardiac resynchronization therapy.
- The following imaging may be used to determine if a patient is eligible for the procedure:
  - Transthoracic echo with or without 3D rendering
  - Transesophageal echo with or without 3D rendering
  - Heart catheterization, including right heart cath if requested
- Because this is a venous approach, CTA of abdomen, chest, and/or pelvis is not indicated.
- Post procedure transthoracic echo (TTE) can be performed at the following intervals:
  - One month
  - Six months
  - One year
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### Abbreviations

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<tr>
<td>ACE inhibitor</td>
<td>angiotensin-converting enzyme inhibitor</td>
</tr>
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<td>AMI</td>
<td>acute myocardial infarction</td>
</tr>
<tr>
<td>ARVC</td>
<td>arrhythmogenic right ventricular cardiomyopathy</td>
</tr>
<tr>
<td>CC</td>
<td>complications/comorbid conditions</td>
</tr>
<tr>
<td>CHF</td>
<td>congestive heart failure</td>
</tr>
<tr>
<td>CM</td>
<td>cardiomyopathy</td>
</tr>
<tr>
<td>CRT</td>
<td>cardiac resynchronization therapy</td>
</tr>
<tr>
<td>EP</td>
<td>electrophysiology</td>
</tr>
<tr>
<td>ICD</td>
<td>implantable cardioverter defibrillator</td>
</tr>
<tr>
<td>LV</td>
<td>left ventricular</td>
</tr>
<tr>
<td>LVEF</td>
<td>left ventricular ejection fraction</td>
</tr>
<tr>
<td>MCC</td>
<td>major complications/comorbid conditions</td>
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<tr>
<td>MI</td>
<td>myocardial infarction</td>
</tr>
<tr>
<td>NCCM</td>
<td>non-compaction cardiomyopathy</td>
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<tr>
<td>NYHA</td>
<td>New York Heart Association functional classification</td>
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<tr>
<td>VF</td>
<td>ventricular fibrillation</td>
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<td>VT</td>
<td>ventricular tachycardia</td>
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**Glossary**

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<tr>
<th>Class</th>
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<td>I</td>
<td>No symptoms and no limitation in ordinary physical activity, e.g. shortness of breath when walking, climbing stairs etc.</td>
</tr>
<tr>
<td>II</td>
<td>Mild symptoms (mild shortness of breath and/or angina) and slight limitation during ordinary activity.</td>
</tr>
<tr>
<td>III</td>
<td>Marked limitation in activity due to symptoms, even during less-than-ordinary activity, e.g. walking short distances (20–100 m). Comfortable only at rest.</td>
</tr>
<tr>
<td>IV</td>
<td>Severe limitations. Experiences symptoms even while at rest. Mostly bedbound patients</td>
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**Abnormal blood pressure response to exercise:** Flat response/failure to augment; rise then fall during exercise; vasoactive cardiovascular drugs may result in an abnormal blood pressure response to exercise

**Non-Sustained Ventricular Tachycardia (NSVT):** Three or more consecutive ventricular beats at a rate of greater than 120 beats/min with a duration of less than 30 seconds

**Incessant VT:** Frequent recurrences of ongoing hemodynamically stable VT

**Long QT Syndrome (LQTS):** A congenital disorder characterized by a prolongation of the QT interval on ECG and a propensity to ventricular tachyarrhythmias, which may lead to syncope, cardiac arrest, or sudden death.

The QT interval on the ECG, measured from the beginning of the QRS complex to the end of the T wave, represents the duration of activation and recovery of the ventricular myocardium. QT intervals corrected for heart rate (QTc) longer than 0.44 seconds are generally considered abnormal, though a normal QTc can be more prolonged in females (up to 0.46 sec). The Bazett formula is the formula most commonly used to calculate the QTc, as follows: QTc = AT/square root of the R-R interval (in seconds).

**Optimal Medical Therapy:** Three months of heart failure medications in maximally titrated doses as tolerated. These include beta blockers, ACE inhibitors or angiotensin II receptor blocker, and diuretics.

**Structural Heart Disease:** A structural or functional abnormality of the heart, or of the blood vessels supplying the heart, that impairs its normal functioning.

**Non-Compaction Cardiomyopathy:** A rare congenital cardiomyopathy that affects children and adults. It results from the failure of myocardial development during embryogenesis. It is also called spongiform cardiomyopathy. Symptoms are often a result of a poor pumping performance by the heart. The disease can be associated with other problems with the heart and the body.
## Preface to the eviCore CRID Guidelines

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CRID Preface-1: Guideline Development

- The eviCore evidence-based, proprietary clinical guidelines evaluate a range of advanced imaging and procedures, including CT, MRI, PET, and Radiation Oncology, Sleep Studies, and Cardiac and Spine interventions.

- eviCore healthcare reserves the right to change and update the guidelines. The guidelines undergo a formal review annually. eviCore’s guidelines are based upon major national and international association and society guidelines and criteria, peer-reviewed literature, major treatises, and input from health plans, practicing academic and community-based physicians.

- These guidelines are not intended to supersede or replace sound medical judgment, but instead should facilitate the identification of the most appropriate imaging procedure, given the patient’s clinical condition. These guidelines are written to cover medical conditions as experienced by the majority of patients. However, these guidelines may not be applicable in certain clinical circumstances, and physician judgment can override the guidelines.

- Clinical decisions, including treatment decisions, are the responsibility of the patient and his/her provider. Clinicians are expected to use independent medical judgment which takes into account the clinical circumstances to determine patient management decisions.

- eviCore supports the Choosing Wisely® initiative (www.choosingwisely.org) by the American Board of Internal Medicine (ABIM) Foundation and many national physician organizations, to reduce the overuse of diagnostic tests that are low value, no value, or whose risks are greater than the benefits.

- eviCore’s guidelines are based upon expert consensus and analysis reported by the following specialty societies, publications, studies and trials:
  - The American College of Cardiology (ACC)
  - The American Heart Association (AHA)
  - The Heart Rhythm Society (HRS)
  - The Multicenter Automatic Defibrillator Implantation Trial (MADIT/MADIT-2)
  - The Multicenter Unsustained Tachycardia Trial (MUSTT)
  - The Defibrillator in Acute Myocardial Infarction Trial (DINAMIT)
  - The Resynchronization/defibrillation for Ambulatory Heart Failure Trial (RAFT)
  - The Sudden Cardiac Death in Heart Failure Trial (SCD-HeFT)
  - The Resynchronization Reverses Remodeling in Systolic Left Ventricular Dysfunction trial (REVERSE)
  - Immediate Risk Stratification Improves Survival trial (IRIS)
  - The Comparison of Medical Therapy, Pacing, and Defibrillation in Heart Failure trial (COMPANION)
  - The Antiarrhythmic Versus Implantable Defibrillators trial (AVID)
  - The Canadian Implantable Defibrillator Study (CIDS)
  - The Cardiac Arrest Study Hamburg (CASH)
CRID Preface-2: Benefits, Coverage Policies, and Eligibility Issues

➤ Medicare Coverage Policies
   ◆ For Medicare and Medicare Advantage enrollees, the coverage policies of CMS (Centers for Medicare and Medicaid Services) may take precedence over eviCore’s guidelines

➤ Clinical and Research Trials
   ◆ Similar to investigational and experimental studies, clinical trial imaging requests will be considered to determine whether they meet health plan coverage and eviCore’s evidence-based guidelines

➤ State and federal legislations may need to be considered in the review of advanced imaging requests

CRID Preface-3: Clinical Information

➤ The philosophy behind eviCore guidelines entails using an evidence-based approach to determine the most appropriate procedure for each individual, at the most appropriate time in the diagnostic and treatment cycle

➤ Procedures uld be requested after initial consultation and physician treatment planning, and following full counseling of the individual

➤ Current clinical information, which may include history, physical examination, symptoms, laboratory results, and imaging reports, are necessary for determining the medical necessity of implantable cardioverter defibrillator (ICD) devices and cardiac resynchronization therapy (CRT-D)

➤ The information provided to eviCore should have clinical relevance to the request

➤ If the information provided makes no reference to the potential indication for the request, then the medical necessity for the procedure(s) cannot be supported

CRID Preface-4: References

➤ References are available at the end of the guidelines

CRID Preface-5: Copyright Information

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<td><strong>CRID-1.2: Removal and replacement</strong></td>
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**CRID 1.1: Procedure Code**

The CPT® code set 33202-33249 includes the various Pacemaker and Defibrillator procedures including the insertion, replacement and removal of the leads. Some of the codes apply to both the pacemaker and the defibrillator. Codes are included for informational purposes only and any given code’s inclusion on this list does not necessarily indicate prior authorization is required.

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<th>CPT®</th>
<th>DESCRIPTION</th>
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<tr>
<td>33206</td>
<td>Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial</td>
</tr>
<tr>
<td>33207</td>
<td>Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); ventricular</td>
</tr>
<tr>
<td>33208</td>
<td>Insertion of new or replacement of permanent pacemaker with transvenous electrode(s); atrial and ventricular</td>
</tr>
<tr>
<td>33212</td>
<td>Insertion of pacemaker pulse generator only; single existing single lead</td>
</tr>
<tr>
<td>33213</td>
<td>Insertion of pacemaker pulse generator only; with existing dual leads</td>
</tr>
<tr>
<td>33214</td>
<td>Upgrade of implanted pacemaker system, conversion of single chamber system to dual chamber system (includes removal of previously placed pulse generator, testing of existing lead, insertion of new lead, insertion of new pulse generator)</td>
</tr>
<tr>
<td>33217</td>
<td>Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; single lead system</td>
</tr>
<tr>
<td>33221</td>
<td>Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; dual lead system</td>
</tr>
<tr>
<td>33222</td>
<td>Insertion of pacemaker pulse generator only; with existing multiple leads</td>
</tr>
<tr>
<td>33224</td>
<td>Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, with attachment to previously placed pacemaker or pacing cardioverter-defibrillator pulse generator</td>
</tr>
<tr>
<td>33225</td>
<td>Insertion of pacing electrode, cardiac venous system, for left ventricular pacing, at time of insertion of pacing cardioverter-defibrillator pulse generator (including upgrade to dual chamber system and pocket revision)</td>
</tr>
<tr>
<td>33229</td>
<td>Removal of permanent pacemaker pulse generator with replacement of pacemaker pulse generator; multiple lead system</td>
</tr>
<tr>
<td>33230</td>
<td>Insertion of pacing cardioverter-defibrillator pulse generator only; with existing dual leads</td>
</tr>
<tr>
<td>33231</td>
<td>Insertion of pacing cardioverter-defibrillator pulse generator only; with existing multiple leads</td>
</tr>
<tr>
<td>33240</td>
<td>Insertion of pacing cardioverter-defibrillator pulse generator only; with existing single leads</td>
</tr>
<tr>
<td>33249</td>
<td>Insertion or replacement of permanent pacing cardioverter-defibrillator system with transvenous lead(s), single or dual chamber</td>
</tr>
<tr>
<td>Code</td>
<td>Description</td>
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</tr>
<tr>
<td>33262</td>
<td>Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; single lead system</td>
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<td>33263</td>
<td>Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; dual lead system</td>
</tr>
<tr>
<td>33264</td>
<td>Removal of pacing cardioverter-defibrillator pulse generator with replacement of pacing cardioverter-defibrillator pulse generator; multiple lead system</td>
</tr>
<tr>
<td>33270</td>
<td>Insertion or replacement of permanent subcutaneous implantable defibrillator system, with subcutaneous electrode, including defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters when performed</td>
</tr>
<tr>
<td>33271</td>
<td>Insertion of subcutaneous implantable defibrillator electrode</td>
</tr>
<tr>
<td>33274</td>
<td>Transcatheter insertion or replacement of permanent leadless pacemaker, right ventricular, including imaging guidance (e.g., fluoroscopy, venous ultrasound, ventriculography, femoral venography) and device evaluation (e.g., interrogation or programming), when performed</td>
</tr>
<tr>
<td>33275</td>
<td>Transcatheter removal of permanent leadless pacemaker, right ventricular</td>
</tr>
<tr>
<td>33289</td>
<td>Transcatheter implantation of wireless pulmonary artery pressure sensor for long-term hemodynamic monitoring, including deployment and calibration of the sensor, right heart catheterization, selective pulmonary catheterization, radiological supervision and interpretation, and pulmonary artery angiography, when performed</td>
</tr>
<tr>
<td>0515T</td>
<td>Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; complete system (includes electrode and generator [transmitter and battery])</td>
</tr>
<tr>
<td>0516T</td>
<td>Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; electrode only</td>
</tr>
<tr>
<td>0517T</td>
<td>Insertion of wireless cardiac stimulator for left ventricular pacing, including device interrogation and programming, and imaging supervision and interpretation, when performed; pulse generator component(s) (battery and/or transmitter) only</td>
</tr>
<tr>
<td>0519T</td>
<td>Removal and replacement of wireless cardiac stimulator for left ventricular pacing; pulse generator component(s) (battery and/or transmitter)</td>
</tr>
<tr>
<td>0520T</td>
<td>Removal and replacement of wireless cardiac stimulator for left ventricular pacing; pulse generator component(s) (battery and/or transmitter), including placement of a new electrode</td>
</tr>
<tr>
<td>0571T</td>
<td>Insertion or replacement of implantable cardioverter-defibrillator system with substernal electrode(s), including all imaging guidance and electrophysiological evaluation (includes defibrillation threshold evaluation, induction of arrhythmia, evaluation of sensing for arrhythmia termination, and programming or reprogramming of sensing or therapeutic parameters), when performed</td>
</tr>
<tr>
<td>0572T</td>
<td>Insertion of substernal implantable defibrillator electrode</td>
</tr>
</tbody>
</table>
CRID-1.2: Removal and replacement

- Generator replacement (CPT® 33227, 33228, 33229, 33262, 33263, 33264) with a same or similar device is indicated when:
  - Interrogation shows device is nearing Elective Replacement Indicator (ERI) or End of Life (EOL).
  - Interrogation report documents the device is not functioning correctly and requires replacement.
## CRID-2: Definite Indications for ICD Implantation

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| CRID-2.2: Structural Heart Disease with Sustained VT | 14 |
| CRID-2.3: Syncope of Undetermined Origin and Positive EP Study | 14 |
| CRID-2.4: Unexplained Syncope | 14 |
| CRID-2.5: Ischemic Cardiomyopathy | 14 |
| CRID-2.6: Nonischemic Dilated Cardiomyopathy (DCM) | 15 |
**CRID-2.1: Survivors of Cardiac Arrest**
- ICD implantation is indicated in individuals who are survivors of cardiac arrest due to ventricular tachycardia (VT) or ventricular fibrillation (VF) after evaluation has excluded any completely reversible causes.

**CRID-2.2: Structural Heart Disease with Sustained VT**
- ICD implantation is indicated in individuals with structural heart disease (such as prior myocardial infarction (MI), congenital heart disease, and/or ventricular dysfunction) and spontaneous, sustained VT (greater than 30 seconds), whether hemodynamically stable or unstable.

**CRID-2.3: Syncope of Undetermined Origin and Positive EP Study**
- ICD implantation is indicated in individuals with syncope of undetermined origin who have clinically relevant, hemodynamically significant sustained VT or VF induced at electrophysiology (EP) study.

**CRID-2.4: Unexplained Syncope**
- ICD implantation is indicated in individuals with unexplained syncope, significant left ventricular (LV) dysfunction (LV ejection fraction less than 50%), and structural heart disease such as prior myocardial infarction (MI), congenital heart disease, and/or ventricular dysfunction.

**CRID-2.5: Ischemic Cardiomyopathy**
- ICD implantation is indicated in individuals with any of the following:
  - LV dysfunction due to prior myocardial infarction (MI) and all of the following:
    - LV ejection fraction less than or equal to 35%  
    - At least 40 days post-MI  
    - Are NYHA functional Class II or III  
    - Are on optimal medical therapy, defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic.
  - LV dysfunction due to prior MI and all of the following:
    - LV ejection fraction less than or equal to 30%  
    - At least 40 days post-MI  
    - Are NYHA functional Class I.
  - Have non-sustained VT due to prior MI and all of the following:
    - LV ejection fraction less than or equal to 40%  
    - Have inducible VF or sustained VT at EP study performed at least 96 hours after revascularization or MI.
      - If the ejection fraction was less than 35% prior to the most recent MI then the 40 day waiting period can be waived.

CRID-2.6: Nonischemic Dilated Cardiomyopathy (DCM)

- ICD implantation is indicated in individuals with nonischemic dilated cardiomyopathy who have all of the following:
  - LV ejection fraction less than or equal to 35%
  - NYHA Class II or III CHF
  - Are on optimal medical therapy
    - Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and, if needed, a diuretic

- Trials assessing ICD therapy in primary prophylaxis in DCM have not generally included asymptomatic, NYHA functional Class I patients.
## CRID-3: Reasonable Indications for ICD Implantation

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<td>CRID-3.6</td>
<td>Catecholaminergic Polymorphic Ventricular Tachycardia</td>
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<td>CRID-3.7</td>
<td>Other Indications</td>
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CRID-3.1: General Considerations

For the "reasonable" or "considered" indications listed in this CRID-3 guideline, consensus opinion is less clear about the use of ICD implantation in these settings. Limited evidence suggests that ICD placement may be reasonable or may be considered; this category includes VF or hypotensive VT events where pharmaceutical or ablative techniques are indicated but the results of treatment are too unpredictable to withhold ICD implantation.

CRID-3.2: Sustained Ventricular Tachycardia with Normal LV Function

ICD implantation is reasonable for individuals with sustained VT and normal or near-normal ventricular function.

CRID-3.3: Cardiomyopathy

- Cardiomyopathy due to Hypertrophic Cardiomyopathy:
  - ICD implantation is reasonable for individuals with hypertrophic cardiomyopathy who have one or more risk factors for sudden cardiac death
    - Risk factors for sudden cardiac death include the following:
      - Unheralded syncope
      - Family history of sudden death
      - Septal wall thickness of greater than or equal to 30 mm
      - Abnormal blood pressure response to exercise
      - Nonsustained VT (< 30 seconds)

- Cardiomyopathy due to Arrhythmogenic Right Ventricular Cardiomyopathy (ARVC):
  - ICD implantation is reasonable for individuals with ARVC who have one or more risk factors for sudden cardiac death
    - Risk factors for sudden cardiac death include the following:
      - Unheralded syncope
      - Family history of sudden death
      - Nonsustained VT(< 30 seconds)
      - Clinical signs of RV failure

CRID-3.4: Long QT Syndrome

- ICD implantation is reasonable in Long-QT Syndrome in the following settings:
  - Syncope and/or VT while receiving beta-blockers or if beta-blockers are contraindicated
  - Asymptomatic with other risk factors for sudden cardiac death
    - Risk factors for sudden cardiac death include the following:
      - QTc greater than 500 msec or
      - LQT 2 or 3
      - Family history of sudden death
CRID-3.5: Brugada Syndrome
- ICD implantation is reasonable for individuals with Brugada Syndrome who have had the following:
  - Syncope or
  - Documented or inducible VT or VF

CRID-3.6: Catecholaminergic Polymorphic Ventricular Tachycardia
- ICD implantation is reasonable for individuals with catecholaminergic polymorphic VT who have syncope and/or documented sustained VT while receiving beta-blockers

CRID-3.7: Other Indications
- ICD implantation is reasonable, regardless of LV ejection fraction measurement, for individuals with:
  - Cardiac sarcoidosis
  - Giant cell myocarditis
  - Chagas disease
- LV non compaction
  - ICD implantation should be considered for the primary prevention of sudden cardiac death due to malignant ventricular arrhythmias in individuals with non-compaction cardiomyopathy and impaired LV function (LV ejection fraction less than 50%)
    - ICD implantation is also indicated for normal LV function (LVEF greater than 50%) primary prevention cases with positive family history of sudden cardiac death. This exception is due to the presence of sarcomeric gene mutations reported in non-compaction cardiomyopathy
- ICD implantation may be considered in affected individuals with a familial cardiomyopathy associated with sudden death
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CRID-4.1: Ischemic Cardiomyopathy
- ICD implantation is **not** indicated in individuals who have had a myocardial infarction within the past 40 days or who have had coronary revascularization within the past 90 days **unless** the following applies:
  - A separate indication for permanent pacemaker implantation exists (thus preventing a likely repeat procedure for an upgraded device in the near future)

CRID-4.2: NYHA Class IV CHF
- ICD implantation is **not** indicated for individuals with NYHA functional class IV symptoms **unless** one of the following applies:
  - It is a CRT-D device meeting the indications for CRT-D implantation listed in CRID-5.1: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)
  - The individual is awaiting heart transplantation
  - Left ventricular assist device (LVAD) is being used as destination therapy

CRID-4.3: Limited Life Expectancy
- ICD implantation is **not** indicated for individuals who do not have a reasonable expectation of survival with an acceptable functional status for at least one year, even if they meet ICD implantation criteria listed in:
  - CRID-2: Definite Indications for ICD Implantation
  - CRID-3: Reasonable Indications for ICD Implantation

CRID-4.4: Incessant VT or VF
- ICD implantation is **not** indicated for individuals with incessant VT or VF
  - Incessant VT or VF is defined as hemodynamically stable VT or VF continuing for hours

CRID-4.5: Psychiatric Conditions
- ICD implantation is **not** indicated in individuals with significant psychiatric illnesses that may be aggravated by device implantation or that may preclude systematic follow-up

CRID-4.6: Reversible Cause of VT/VF
- ICD implantation is **not** indicated when VF or VT is due to a reversible cause such as:
  - Severe electrolyte disturbance
  - Drug-induced torsades de pointes
  - Acute, reperfused myocardial infarction with preserved ejection fraction
CRID-4.7: Ablation Candidate, No Structural Heart Disease

- ICD implantation is not indicated if the individual has no structural heart disease and is a candidate for ablation. Surgical or catheter ablation can be curative in this setting.

CRID-4.8: Substernal implantable cardioverter-defibrillator

- Substernal implantable cardioverter-defibrillator systems involve inserting a defibrillator lead directly beneath the sternum anterior to the heart, and is intended provide anti-tachycardia pacing as well as post-shock pacing without intravenous leads.

- At this time substernal implantable cardioverter-defibrillator systems are considered experimental and investigational.
### CRID-5: Indications for Cardiac Resynchronization Therapy (CRT)-D Implantation

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| CRID-5.2: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF) and QRS duration 120-149 ms | 23 |
| CRID-5.3: Sinus Rhythm, Dilated Cardiomyopathy with non-LBBB and NYHA Class III or IV Congestive Heart Failure (CHF) | 23 |
| CRID-5.4: Atrial Fibrillation and NYHA Class I, II, or III Congestive Heart Failure | 23 |
| CRID-5.5: Cardiac Resynchronization Therapy (CRT)-P | 24 |
**CRID-5.1: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF)**

- CRT-D implantation is indicated in individuals with ischemic or nonischemic dilated cardiomyopathy who have all of the following:
  - Left bundle branch block with QRS greater than or equal to 150 msec
  - LV ejection fraction less than or equal to 35%
  - Are NYHA functional Class II, III, or ambulatory class IV on stable optimal medical therapy
    - Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic

**CRID-5.2: Sinus Rhythm, Dilated Cardiomyopathy with NYHA Class II, III, or IV Congestive Heart Failure (CHF) and QRS duration 120-149 ms**

- CRT-D implantation is indicated in individuals with ischemic or nonischemic dilated cardiomyopathy who have all of the following:
  - Left bundle branch block with QRS duration 120 to 149 msec
  - LV ejection fraction less than or equal to 35%
  - NYHA functional Class II, III, or ambulatory class IV on stable optimal medical therapy
    - Optimal medical therapy is defined as 3 months of maximally titrated doses as tolerated of an ACE inhibitor/angiotensin II receptor blocker, beta-blocker, and diuretic

**CRID-5.3: Sinus Rhythm, Dilated Cardiomyopathy with non-LBBB and NYHA Class III or IV Congestive Heart Failure (CHF)**

- CRT-D Implantation is indicated in individuals who have all of the following:
  - NYHA Class III, or IV Congestive Heart Failure
  - Non-LBBB with QRS duration greater or equal to 150 ms
  - LV ejection fraction less than or equal to 35%

**CRID-5.4: Atrial Fibrillation and NYHA Class I, II, or III Congestive Heart Failure**

- CRT is indicated in patients with AF and the following:
  - A left ventricular ejection fraction (LVEF) ≤35 percent on guideline-directed medical therapy and all of the following:
    - The patient requires ventricular pacing or otherwise meets CRT criteria
      - “Meets CRT criteria” means either:
        - Has left bundle branch block (LBBB) and a QRS duration ≥ 120 ms and New York Heart Association (NYHA) functional class II, III, or ambulatory class IV HF symptoms on stable optimal medical therapy; or
        - Has a non-LBBB pattern with a QRS duration ≥150 and NYHA class III or ambulatory class IV HF symptoms
Atrioventricular nodal ablation or pharmacologic rate control will allow near 100 percent ventricular pacing with CRT

**CRID-5.5: Cardiac Resynchronization Therapy (CRT)-P**

- See: **CRID-10: Cardiac Resynchronization Therapy (CRT)-P**
## CRID-6: Cardiac Resynchronization Therapy (CRT)-D Implantation—Non-Indications

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CRID-6.1: Ischemic Cardiomyopathy

» CRT-D or CRT-P implantation is **not** indicated in individuals who have had a myocardial infarction within the past 40 days or who have had coronary revascularization within the past 90 days **unless** the following applies:
  ♦ A separate indication for permanent pacemaker implantation exists (thus preventing a likely repeat procedure for an upgraded device in the near future)

CRID-6.2: Reversible Causes of Cardiomyopathy

» CRT-D implantation is not indicated in the setting of a reversible cardiomyopathy such as: toxic, metabolic, or tachycardia induced cardiomyopathy
  ♦ Once the reversible aberration is corrected, clinical reassessment is indicated
CRID-7: Definite Indications for Permanent Pacemaker Implantation

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**CRID-7.1: Symptomatic Bradycardia**

- Permanent pacemaker implantation is indicated for symptomatic bradycardia, including frequent sinus pauses that produce symptoms and any degree of AV block producing symptoms.
- Permanent pacemaker implantation is indicated for third-degree and advanced second-degree AV block at any anatomic level associated with ventricular arrhythmias presumed due to AV block, or any other medical conditions requiring drug therapy that results in symptomatic bradycardia (for example, beta blocker therapy in patients with prior myocardial infarction, or tachy-brady syndrome in atrial fibrillation).

**CRID-7.2: Symptomatic Chronotropic Incompetence**

- Permanent pacemaker implantation is indicated for symptomatic chronotropic incompetence defined as limitations due to the inability to achieve 80% of maximum predicted heart rate (220-age).

**CRID-7.3: Indications for Asymptomatic Patients**

- Permanent pacemaker implantation is indicated for asymptomatic patients with third degree AV block.
- Permanent pacemaker implantation is indicated for asymptomatic patients with advanced second degree AV block (Mobitz type II) and intermittent third degree AV block.
- Permanent pacemaker implantation is indicated for asymptomatic patients with second degree AV block and documented periods of asystole greater than or equal to 3.0 seconds.
- Permanent pacemaker implantation is indicated for second degree AV block in awake, symptom-free patients with atrial fibrillation and a documented pause of 5 seconds or longer.
- Permanent pacemaker implantation is indicated for alternating bundle branch block in asymptomatic patients.
- Permanent pacemaker implantation is indicated for asymptomatic patients with second degree AV block at any anatomic level associated with neuromuscular diseases known to involve the heart.

**CRID-7.4: Prior to Planned Catheter Ablation**

- Permanent pacemaker implantation is indicated prior to a planned catheter ablation of the AV junction intended for a rate control strategy for management of atrial fibrillation.
CRID-7.5: Persistent Second Degree AV Block

- Permanent pacemaker implantation is indicated for persistent second degree AV block in the His-Purkinje system with alternating bundle branch block or third degree AV block within or below the His-Purkinje system after myocardial infarction.

CRID-7.6: Syncope

- Permanent pacemaker implantation is indicated for syncope caused by spontaneously occurring carotid sinus stimulation and carotid sinus pressure that induces ventricular asystole of more than 3 seconds.
## CRID-8: Reasonable Indications for Permanent Pacemaker Implantation

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**CRID-8.1: General Considerations**

- For the “reasonable” or “considered” indications listed in this CRID-8 guideline, consensus opinion is less clear about permanent pacing in these settings, with evidence suggesting that device placement may be reasonable or may be considered.

**CRID-8.2: Sinus Node Dysfunction**

- Permanent pacemaker implantation is reasonable for individuals with sinus node dysfunction with a resting heart rate of less than 40 bpm when periodic symptomatic bradycardia is suspected.

**CRID-8.3: Syncope**

- Permanent pacemaker implantation may be reasonable or may be considered for individuals with syncope in the following settings:
  - Syncope of unexplained origin when clinically significant abnormalities of sinus node function are discovered or provoked in electrophysiological studies.
  - Syncope without clear, provocative events and with a hypersensitive cardioinhibitory response of 3 seconds or longer.
  - Significantly symptomatic neurocardiogenic syncope associated with Bradycardia documented spontaneously or at the time of tilt table testing.
  - Syncope after cardiac transplantation even when bradyarrhythmia has not been documented.

**CRID-8.4: Asymptomatic Second Degree AV Block**

- Permanent pacemaker implantation is reasonable for individuals with asymptomatic second degree AV block at intra- or infra- His levels found at electrophysiological study.

**CRID-8.5: First or Second AV Block**

- Permanent pacemaker implantation is reasonable for individuals with first or second degree AV block with symptoms similar to those of pacemaker syndrome.

**CRID-8.6: Symptomatic Recurrent SVT**

- Permanent pacemaker implantation is reasonable for individuals with symptomatic, recurrent SVT that is reproducibly terminated by pacing when catheter ablation and/or drugs fail to control the arrhythmia or produce intolerable side effects.
CRID-8.7: Relative Bradycardia – Postoperative Cardiac Transplant

- Permanent pacemaker implantation may be considered for individuals when relative bradycardia is prolonged or recurrent, which limits rehabilitation or discharge after postoperative recovery from cardiac transplantation or in post-transplant syncope even if bradyarrhythmia has not been documented.

CRID-8.8: Incidental Finding at Electrophysiology (EP) Study

- Permanent pacemaker implantation may be reasonable for an incidental finding at electrophysiology study of a markedly prolonged HV interval (greater than or equal to 100 milliseconds) or non-physiological intra- or infra- Hisian block in asymptomatic patients.

CRID-8.9: Neuromuscular Diseases Known to Involve the Heart

- Permanent pacemaker implantation may be considered for progressive neuromuscular diseases known to involve the heart with any degree of AV block (including first degree AV block) or any fascicular block, with or without symptoms, because there may be unpredictable progression of AV conduction disease. Progressive neuromuscular diseases known to involve the heart include:
  - Myotonic muscular dystrophy
  - Kearns-Sayre syndrome
  - Erb dystrophy (limb-girdle muscular dystrophy)
  - Peroneal muscular atrophy

CRID-8.10: Cardiomyopathy with a history of heart failure and an LV Ejection Fraction less than 50% on optimal medical therapy

See: CRID-10: Cardiac Resynchronization Therapy (CRT)-P
CRID 9.1: Non-Indications

- Permanent pacemaker implantation is **not** indicated in any of the following settings:
  - Sinus node dysfunction in asymptomatic patients
  - Sinus node dysfunction in patients for whom the symptoms, suggestive of bradycardia, have been clearly documented to occur in the absence of bradycardia
  - Sinus node dysfunction in symptomatic patients due to nonessential drug therapy
  - Fascicular block without AV block or symptoms concerning for AV block
  - Incidentally noted hypersensitive cardioinhibitory response to carotid sinus stimulation without symptoms or with vague symptoms
  - Asymptomatic first degree AV block
  - Asymptomatic type I second degree AV block at the supra-His (AV node) level or that which is not known to be intra- or infra-Hisian
  - Permanent ventricular pacing not indicated for asymptomatic transient AV block in the absence of intraventricular conduction defects or in isolated single fascicular block
  - Permanent pacing not indicated for situational vasovagal syncope in which avoidance behavior is effective
CRID-10: Cardiac Resynchronization Therapy (CRT)-P

CRID-10.1: Indications for CRT-P
**CRID-10.1: Indications for CRT-P**

- High grade AV block and NYHA Class I, II or III Congestive Heart Failure:
  - CRT-P implantation is indicated in individuals who have **all** of the following:
    - LV ejection fraction less than 50%
    - NYHA Class I, II, or III heart failure
    - High grade AV block, including AV nodal ablation, requiring more than 40% pacing (CRT)-P
CRID-11: Leadless Implantable Devices

| CRID-11.1: Leadless Pacemaker | 38 |
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| CRID-11.3: Wireless Pulmonary Artery Pressure Sensor | 38 |
CRID-11.1: Leadless Pacemaker

CRID-11.1.1: Leadless Pacemaker-general information

- Permanent RV leadless pacemakers (CPT® 33274) are implanted directly into the right ventricle and are capable only of VVI and VVIR pacing. They cannot be used for dual-chamber pacing, and the estimated battery life is about 10 years.

CRID-11.1.2: Leadless Pacemaker-Indications

- Indications for leadless pacer implant (BOTH):
  - Meets pacing indications per [CRID-7: Definite Indications for Permanent Pacemaker Implantation](#) or [CRID-8: Reasonable Indications for Permanent Pacemaker Implantation](#)
  - None of the following apply:
    - Patients with pacemaker syndrome or need for dual chamber pacing
    - Current implantation of neurostimulator or any other chronically implanted device which uses electrical current (includes ICDs)
    - Mechanical tricuspid valve, implanted vena cava filter, or left ventricular assist device
    - Elevated pulmonary pressures due to theoretical risk of embolization

CRID-11.2: Wireless Cardiac Resynchronization

- Permanent LV leadless pacemakers (CPT® 0515T) are implanted directly in the left ventricle for synchronization with RV leads in the setting of cardiac resynchronization therapy. At this time they are considered experimental and investigational.

CRID-11.3: Wireless Pulmonary Artery Pressure Sensor

- (CPT® 33289) Wireless Pulmonary Artery Pressure Sensor devices (CardioMEMS™ HF System) are implanted into a branch of the pulmonary artery during right heart catheterization and require a specialized delivery system. These devices monitor constant pulmonary artery pressures over time, utilizing the concept that as pulmonary artery pressures increase, outpatient medical therapy can be adjusted. This can potentially reduce inpatient admissions and treatment. Although FDA approved, these devices have yet to be incorporated into the standard of care and remain investigational and experimental at this time.
References


18. Daubert J-C, Saxon L, Adamson PB, et al. 2012 EHRA/HRS expert consensus statement on cardiac resynchronization therapy in heart failure: implant and follow-up recommendations and management: A registered branch of the European Society of Cardiology (ESC), and the Heart Rhythm Society; and in collaboration with the Heart Failure Society of America (HFSA), the American Society of Echocardiography (ASE), the American Heart Association (AHA), the European Association of Echocardiography (EAE) of the ESC and the Heart Failure Association of the ESC (HFA). * Endorsed by the governing bodies of AHA, ASE, EAE, HFSA, HFA, EHRA, and HRS. Europace. 2012;14(9):1236-1286. doi:10.1093/europace/eus222.


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<tr>
<td>AAA</td>
<td>abdominal aortic aneurysm</td>
</tr>
<tr>
<td>ACE</td>
<td>angiotensin-converting enzyme</td>
</tr>
<tr>
<td>AVM</td>
<td>arteriovenous malformation</td>
</tr>
<tr>
<td>BI-RADS</td>
<td>Breast Imaging Reporting and Database System</td>
</tr>
<tr>
<td>BP</td>
<td>blood pressure</td>
</tr>
<tr>
<td>BRCA</td>
<td>tumor suppressor gene</td>
</tr>
<tr>
<td>CAD</td>
<td>computer-aided detection</td>
</tr>
<tr>
<td>CBC</td>
<td>Complete blood count</td>
</tr>
<tr>
<td>COPD</td>
<td>chronic obstructive pulmonary disease</td>
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<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>CTV</td>
<td>computed tomography venography</td>
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<tr>
<td>DCIS</td>
<td>ductal carcinoma in situ</td>
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<tr>
<td>DVT</td>
<td>deep venous thrombosis</td>
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<tr>
<td>ECG</td>
<td>electrocardiogram</td>
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<td>electromagnetic</td>
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<td>EMG</td>
<td>electromyogram</td>
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<tr>
<td>FDA</td>
<td>Food and Drug Administration</td>
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<tr>
<td>FDG</td>
<td>fluorodeoxyglucose</td>
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<tr>
<td>FNA</td>
<td>fine needle aspiration</td>
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<tr>
<td>GERD</td>
<td>gastroesophageal reflux disease</td>
</tr>
<tr>
<td>GI</td>
<td>gastrointestinal</td>
</tr>
<tr>
<td>HRCT</td>
<td>high resolution computed tomography</td>
</tr>
<tr>
<td>IPF</td>
<td>idiopathic pulmonary fibrosis</td>
</tr>
<tr>
<td>LCIS</td>
<td>lobular carcinoma in situ</td>
</tr>
<tr>
<td>LFTP</td>
<td>localized fibrous tumor of the pleura</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
<tr>
<td>MRV</td>
<td>magnetic resonance venography</td>
</tr>
<tr>
<td>NCV</td>
<td>nerve conduction velocity</td>
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<tr>
<td>PE</td>
<td>pulmonary embolus</td>
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<tr>
<td>PEM</td>
<td>positron-emission mammography</td>
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<td>PET</td>
<td>positron emission tomography</td>
</tr>
<tr>
<td>PFT</td>
<td>pulmonary function tests</td>
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<tr>
<td>PPD</td>
<td>purified protein derivative of tuberculin</td>
</tr>
<tr>
<td>Acronym</td>
<td>Definition</td>
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<tr>
<td>RODEO</td>
<td>Rotating Delivery of Excitation Off-resonance MRI</td>
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<tr>
<td>SPN</td>
<td>solitary pulmonary nodule</td>
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<tr>
<td>SVC</td>
<td>superior vena cava</td>
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CH-1.0: General Guidelines

- A current clinical evaluation (within 60 days) is required prior to considering advanced imaging.
  - A clinical evaluation should include the following:
    - A relevant history and physical examination.
    - Appropriate laboratory studies and non-advanced imaging modalities, such as plain x-ray or ultrasound.
  - Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.

CH-1.1: General Guidelines – Chest X-Ray

- A recent chest x-ray (generally within the last 60 days) that has been over read by a radiologist would be performed in many of these cases prior to considering advanced imaging.\(^1,2\)
  - Identify and compare with previous chest films to determine presence and stability.
  - Chest x-ray can help identify previously unidentified disease and may direct proper advanced imaging for such conditions as:
    - Pneumothorax, (See CH-19: Pneumothorax/Hemothorax).
    - Pneumomediastinum, (See CH-19: Pneumothorax/Hemothorax).
    - Fractured ribs, (See CH-22: Chest Wall Mass).
    - Acute and chronic infections, and (See CH-13: Pneumonia and CH-14: Other Chest Infections).
  - Malignancies.
  - Exceptions to preliminary chest x-ray may include such conditions as:
    - Supraclavicular lymphadenopathy (See CH-2.1: Supraclavicular Region).
    - Known Bronchiectasis (See CH-7: Bronchiectasis).
    - Suspected Interstitial lung disease (See CH-11: Interstitial Disease).
    - Positive PPD or tuberculosis (See CH-14: Other Chest Infections).
    - Suspected Pulmonary AVM (See CH-26: Pulmonary Hypertension).

CH-1.2: General Guidelines – Chest Ultrasound

- Chest ultrasound (CPT® 76604) includes transverse, longitudinal, and oblique images of the chest wall with measurements of chest wall thickness, and also includes imaging of the mediastinum.
  - Chest ultrasound: CPT® 76604.
  - Breast ultrasound.
    - CPT® 76641: unilateral, complete.
    - CPT® 76642: unilateral, limited.
  - CPT® 76641 and CPT® 76642 should be reported only once per breast, per imaging session.
  - Axillary ultrasound: CPT® 76882 (unilateral); if bilateral, can be reported as CPT® 76882 x 2.
CH-1.3: General Guidelines – CT Chest

- Intrathoracic abnormalities found on chest x-ray, fluoroscopy, CT Abdomen, or other imaging modalities may be further evaluated with CT Chest with contrast (CPT® 71260).
  - Abnormalities not addressed in these guidelines should be sent for Medical Director Review

- CT Chest without contrast (CPT® 71250) can be used for the following:
  - Patient has contraindication to contrast.
  - Follow-up of pulmonary nodule(s).
  - High Resolution CT (HRCT).
  - Low-dose CT Chest (CPT® G0297) See CH-33: Lung Cancer Screening.

- CT Chest without and with contrast (CPT® 71270) does not add significant diagnostic information above and beyond that provided by CT Chest with contrast, unless a question regarding calcification, most often within a lung nodule, needs to be resolved.1

CT Chest Coding Notes:

- High resolution CT Chest should be reported only with an appropriate code from the set CPT® 71250-CPT® 71270.
  - No additional CPT® codes should be reported for the “high resolution” portion of the scan. The “high resolution” involves additional slices which are not separately billable.

CH-1.4: General Guidelines – CTA Chest (CPT® 71275)

- CTA Chest (CPT® 71275) can be considered for suspected Pulmonary Embolism and Thoracic Aortic disease.
  - CTA prior to minimally invasive or robotic surgery (See CD-4.8: Transcatheter Aortic Valve Replacement (TAVR) in the Cardiac Imaging Guidelines).

CH-1.5: General Guidelines – MRI Chest without and with Contrast (CPT® 71552)

- Indications for MRI Chest are infrequent and may relate to concerns about CT contrast such as renal insufficiency or contrast allergy. MRI may be indicated:
  - Clarification of some equivocal findings on previous imaging studies, which are often in the thymic mediastinal region or determining margin (vascular/soft tissue) involvement with tumor and determined on a case-by-case basis.
    - Certain conditions include:
      - Brachial plexopathy (PN-4: Brachial Plexus in the Peripheral Nerve Disorders Imaging Guidelines).
      - Thymoma (ONC-10.5: Thymoma and Thymic Carcinoma - Suspected/Diagnosis in the Oncology Imaging Guidelines).
CH-1.6: General Guidelines – Nuclear Medicine

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<tr>
<td>78598</td>
<td>Quantitative differential pulmonary perfusion and ventilation (e.g., aerosol or gas), including imaging when performed</td>
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<td>CH-2.3: Mediastinal Lymphadenopathy⁴,⁵</td>
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CH-2.1: Supraclavicular Region

- Ultrasound (CPT® 76536) is the initial study for palpable or suspected lymphadenopathy.
  - Allows simultaneous ultrasound-guided core needle biopsy (CPT® 76942).
  - CT Neck with contrast (CPT® 70491) or CT Chest with contrast (CPT® 71260) if ultrasound is indeterminate.
    - See Neck-1: General in the Neck Imaging Guidelines.

CH-2.2: Axillary Lymphadenopathy (and Mass)

- There is no evidence-based support for advanced imaging of clinically evidenced axillary lymphadenopathy without biopsy.²⁻³ Most axillary adenopathy is infectious in primary care settings. Metastatic axillary involvement from a lung or chest primary is highly unusual (CT Chest not often warranted).

- Localized axillary lymphadenopathy should prompt:
  - Ultrasound directed core needle biopsy or surgical excisional biopsy of the most abnormal lymph node if condition persists or malignancy suspected.
  - Search for adjacent hand or arm injury or infection, and
  - 3-4 week observation if benign clinical picture, and
  - Excisional or ultrasound directed core needle biopsy of most abnormal lymph node if condition persists or malignancy suspected.
  - No advanced imaging indicated.

- Generalized axillary lymphadenopathy should prompt:
  - Ultrasound directed core needle biopsy or surgical excisional biopsy of the most abnormal lymph node if condition persists or malignancy suspected.
  - Diagnostic work-up, including serological tests, for systemic diseases, and
  - Excisional biopsy of most abnormal lymph node if uncertainty persists.

- Occult Primary Cancer in axillary lymph node(s):
  - See ONC-31: Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer in the Oncology Imaging Guidelines.

Axillary Lymphadenopathy – Practice Notes
Adenocarcinoma is the most common histology, with breast cancer seen most often; non-palpable breast cancer and axillary metastases accounts for less than 0.5% of all breast cancers. Carcinomas of the lung, thyroid, stomach, colon, rectum, and pancreas have the potential to spread to axillary lymph nodes, but these metastases are rarely the first manifestations of disease.
**CH-2.3: Mediastinal Lymphadenopathy**\(^4,5\)

- CT Chest with contrast (CPT\(^\circledR\) 71260) if mediastinal abnormalities are detected on a chest x-ray (over read by a radiologist) or other non-dedicated advanced chest imaging.
  - Follow-up CT Chest (CPT\(^\circledR\) 71260) after 4 weeks if:
    - Enlarged lymph nodes are in the mediastinum with no other thoracic abnormalities; and
    - Low risk or no clinical suspicion for malignancy.
    - Thereafter, stability does not require further advanced imaging.
  - Further evaluations
    - Lymph node biopsy (see methods below) should be considered for:
      - Persistent lymphadenopathy on follow-up CT Chest; or
      - Suspected malignancy.

**Practice Notes**

- Lymphadenopathy from neoplasms as well as from benign sources of inflammation can result in a positive PET scan. Therefore, the use of PET may not be helpful prior to histologic diagnosis.
- Less invasive methods of mediastinal biopsies are CT or ultrasound directed percutaneous biopsy, transbronchial biopsy, transbronchial biopsy using endobronchial ultrasound, and endoscopic ultrasound-guided FNA.
- More invasive and traditional methods are mediastinoscopy or thoracoscopy/thoracotomy.

**References**

CH-3.1: Cough

- Initial evaluation should include a recent chest x-ray after the current episode of cough started or changed.\textsuperscript{1,2}
  - In addition all medications known to cause coughing (e.g. ACE inhibitors, Sitagliptin) should be discontinued.\textsuperscript{1,2,3}

- CT Chest (either with contrast [CPT® 71260] or without contrast [CPT® 71250]), if the initial chest x-ray is without abnormalities and all medications known to cause coughing have been discontinued, for the following:
  - Non-Smoker cough after the following sequence for a total 3 week trial and investigation after ALL of the following:\textsuperscript{4}
    - Antihistamine and decongestant treatment.\textsuperscript{1,2}
    - Bronchoprovocation challenge (e.g. methacholine challenge, exhaled nitric oxide test) and spirometry should be performed to rule out asthma.\textsuperscript{1}
    - Empirc trial of corticosteroids.\textsuperscript{1,2}
    - Treatment of gastroesophageal reflux disease (GERD).\textsuperscript{1,2}
      - See HD-29: Sinusitis in the Head Imaging Guidelines.
  - Current or past cigarette smokers with either:\textsuperscript{4}
    - New cough lasting greater than 2 weeks.
    - Changed chronic cough in worsening frequency or character
      - See CH-6: Hemoptysis.
  - CT Maxillofacial without contrast (CPT® 70486) or CT Sinus, limited without contrast (CPT® 76380) can be considered in those with suspicion of Upper Airway Cough Syndrome (UACS) secondary to rhinosinus disease.\textsuperscript{4}
  - For any abnormalities present on the initial chest x-ray, advanced chest imaging can be performed according to the relevant Chest Imaging Guidelines section.\textsuperscript{1}

Practice Notes

- The resolution of cough usually will occur at a median time of 26 days of stopping use of the angiotensin-converting enzyme (ACE) inhibitor drug.\textsuperscript{2} Smoking cessation is "almost always effective" in resolving cough in smoker.\textsuperscript{2}

- It should be realized that cough after URI (Upper Respiratory Infection) can typically last beyond 2-3 weeks.\textsuperscript{3}

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CH-4.0: Non-Cardiac Chest Pain

See the following guidelines:
- CH-25: Pulmonary Embolism (PE).
- CH-29.1: Aortic Dissection.
- CD-1: General Guidelines in the Cardiac Imaging Guidelines.

“Evidence is not conclusive whether Triple-rule-out CT (CAD, PE, and AD) will improve efficiency of patient management” with acute chest pain.1

MRI is not supported in the evaluation of chest pain.

CH-4.1: Non-Cardiac Chest Pain – Imaging

Initial evaluation should include a chest x-ray.1,2
- CT Chest with contrast (CPT® 71260) or CTA Chest with contrast (CPT® 71275) if x-ray is abnormal.1,2,3
- If x-ray is normal, patient should undergo evaluation of other possible causes of pain prior to advanced imaging (CT Chest with contrast or CTA Chest with contrast) including:1,2,3
  - Cardiac evaluation1,2 (See CD-1: General Guidelines in the Cardiac Imaging Guidelines)
  - GI any ONE of the following:
    - Trial of anti-reflux medication, or pH probe, or esophageal manometry1 or
    - Barium swallow or endoscopy
  - Either a barium swallow, esophageal pH monitoring, manometry, or endoscopy should be done in all after cardiac causes have been ruled out since GERD is the cause in almost 60%
  - Pulmonary Function Test (PFT’s)1,2
- CT Chest with contrast (CPT® 71260) if persistent:
  - The initial chest x-ray reveals no abnormalities; and either
    - Sickle cell disease2, or
    - Suspected lung mass in a patient with chest pain, cough, and weight loss.2

CH-4.2: Costochondritis/Other Musculoskeletal Chest Wall Syndrome

Costochondritis or other suggested musculoskeletal chest wall syndrome does not require advanced imaging (CT or MRI) unless it meets other criteria in these guidelines.

Costochondritis can be readily diagnosed with palpation tenderness and/or hooking maneuver and imaging is non-specific.3

Practice Notes
Differential diagnosis of non-cardiac nonspecific chest pain includes aortic, pulmonary, gastrointestinal (GI), or musculoskeletal pathologies. Chest x-ray could identify pneumothorax, pneumomediastinum, fractured ribs, acute and chronic infections, and malignancies.1
References
## CH-5: Dyspnea/Shortness of Breath

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**CH-5.1: Dyspnea/Shortness of Breath**

Dyspnea is the subjective experience of breathing discomfort. Initial evaluation should include a recent chest x-ray.\(^1, 2\)
- CT Chest without contrast (CPT® 71250) if x-ray is abnormal.\(^1, 2\)
- CT Chest without contrast (CPT® 71250, including HRCT), or CT Chest with contrast (CPT® 71260) if the initial chest x-ray is indeterminate and the following evaluations have been conducted and are indeterminate:\(^2\)
  - ECG, echocardiogram or stress testing,\(^2\) and
  - Pulse oximetry and pulmonary function studies (PFT's)\(^2\)

**CH-5.2: Pre-Operative Assessment**

- “Split Function Studies” (CPT® 78597-Quantitative Differential Pulmonary Perfusion, Including Imaging When Performed or CPT® 78598-Quantitative Differential Pulmonary Perfusion and Ventilation (e.g., Aerosol or Gas), Including Imaging When Performed) can be considered for pre-operative assessment prior to planned segmental, lobar or lung removal.\(^3, 4\)
- If pulmonary embolus (PE) is suspected, See **CH-25: Pulmonary Embolism (PE)**.

**References**

1. ACR Appropriateness Criteria® Chronic Dyspnea - Noncardiovascular Origin. American College of Radiology (ACR); 2018
CH-6.1: Hemoptysis

CTA Chest (CPT® 71275) may be performed after:
- Abnormal chest x-ray, or
- No chest x-ray needed if ANY of the following:
  - High risk for malignancy with >40 years of age and >30 pack-year smoking history, or
  - Persistent/recurrent with >40 years of age or >30 pack year smoking history, or
  - Massive hemoptysis (≥30 cc per episode or unable protect airway).¹

CT Chest with contrast (CPT® 71260) OR without contrast (CPT® 71250) can be considered if meets above guidelines but there is a contraindication to iodinated contrast or in place of CTA.¹

Reference
CH-7.1: Bronchiectasis

- High resolution CT Chest (HRCT) without contrast (CPT® 71250) for ANY of the following:4, 5
  - To confirm suspected diagnosis of bronchiectasis after an initial x-ray.1,2
  - For known bronchiectasis with worsening symptoms or worsening PFT's.2
  - For hemoptysis with known or suspected bronchiectasis.3

References
CH-8.1: Bronchitis

- Advanced imaging is not needed for bronchitis.\textsuperscript{1,2}
- Chest x-ray to determine if any abnormality is present.

References

## CH-9: Asbestos Exposure

### CH-9.1: Asbestos Exposure
**CH-9.1: Asbestos Exposure**

- Chest x-ray as radiographic screening for asbestos exposure.\(^1,2\)
  - Stable calcified pleural plaques on chest x-ray do not require advanced imaging of the chest.\(^2\)

- CT Chest should not be used to screen populations at risk for asbestos-related diseases.\(^2\)

- High resolution CT Chest (HRCT) (CPT® 71250) for ANY of the following:\(^2\)
  - Any change seen on chest x-ray.
  - Progressive respiratory symptoms that may indicate the development or progression of asbestos related interstitial fibrosis.
  - Send requests for additional follow-up imaging to Medical Director Review.

**Practice Notes**

- Asbestosis and asbestos-related diseases include: pleural effusion, pleural plaques, lung cancer, and malignant mesothelioma. The risk of developing mesothelioma increases with increasing intensity and duration of exposure.

**References**


CH-10: Chronic Obstructive Pulmonary Disease (COPD)

CH-10.1: COPD
CH-10.1: COPD

➢ Chest x-ray should be performed initially.
  ❖ CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260)\(^1\,\,2\) can be performed if:
    ▪ Emphysema is known or suspected and a pre-operative study for Lung Volume Reduction Surgery (LVRS) is being requested.\(^1\) OR
    ▪ Definitive diagnosis is not yet determined by laboratory studies and chest x-ray and ONE on the following is suspected:
      ▪ Bronchiectasis
      ▪ Sarcoidosis
      ▪ Emphysema
      ▪ Pneumoconiosis
      ▪ Idiopathic pulmonary fibrosis
      ▪ Langerhans cell histiocytosis
      ▪ Hypersensitivity pneumonitis
      ▪ Bronchiolitis obliterans
      ▪ Lipoid pneumonia
      ▪ Drug toxicity
      ▪ Lymphangitic cancer\(^2\)

➢ Lung cancer screening is discussed in the following guideline:
  ❖ See “Screening Indications” in CH-33: Lung Cancer Screening

Practice Notes

➢ COPD includes asthmatic bronchitis, chronic bronchitis, and emphysema. COPD is airflow reduction (FEV1/FVC ratio <0.7 or FEV1 <80% predicted) in the presence of respiratory symptoms, such as dyspnea. Advanced chest imaging is not typically indicated in COPD exacerbation, which is an acute change in baseline dyspnea, cough, and/or sputum beyond normal day-to-day variations.\(^2\)

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CH-11.1: Interstitial Disease

- High resolution CT Chest (HRCT) without contrast (CPT® 71250) is the diagnostic modality of choice to evaluate for:
  - Interstitial changes identified on other imaging (including chest x-ray) in patients with pulmonary symptoms and abnormal pulmonary function studies (PFT’s) (See CH-5: Dyspnea/Shortness of Breath)¹-⁶
  - Initial request to identify interstitial disease with a connective tissue disease diagnosis, including (chest x-ray not required):
    - Rheumatoid arthritis
    - Scleroderma
    - Idiopathic inflammatory myopathies (polymyositis, dermatomyositis, inclusion body myositis)
    - Asbestosis
    - Silicosis
    - Coal miner’s lung disease¹-⁶
  - New or worsening pulmonary symptoms or worsening PFT’s in any type of interstitial disease, including connective tissue diseases¹-⁶
  - Once a year in patients with known idiopathic pulmonary fibrosis (IPF) if showing progression or regression of disease will change patient management³

CH-11.2: E-cigarette, or Vaping, Product Use–Associated Lung Injury (EVALI)

- CT Chest with or without contrast (CPT® 71250 or CPT® 71260) if EVALI is suspected.⁷

References
7. https://www.cdc.gov/mmwr/volumes/68/wr/mm6846e2.htm?s_cid=mm6846e2_w.
CH-12.1: Multiple Pulmonary Nodules

See CH-16: Solitary Pulmonary Nodule (SPN)\(^1\)

**Practice Notes**

- Increased risk of primary cancer as the total nodule count increased from 1 to 4 but decreased risk in patients with 5 or more nodules, most of which likely resulted from prior granulomatous infection.\(^1\)

**Reference**

## CH-13: Pneumonia and Coronavirus Disease 2019

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CH-13.1: Pneumonia

- Chest x-ray would be performed initially in all patients with suspected pneumonia, prior to considering advanced imaging.\textsuperscript{1,2}
  - CT Chest with contrast (CPT\textsuperscript{®} 71260) if initial or repeat chest x-ray findings reveal:
    - Complication of pneumonia (e.g. abscess, effusion, hypoxemia, respiratory distress, necrotizing pneumonia, pneumothorax).\textsuperscript{1,2}
    - Possible lung mass associated with the infiltrate.\textsuperscript{2}

CH-13.2: Coronavirus Disease 2019 (COVID-19)

- CT Chest without contrast (CPT\textsuperscript{®} 71250), or with contrast (CPT\textsuperscript{®} 71260) may be appropriate in the following clinical situations:
  - Symptomatic COVID-19 positive patients with underlying comorbidities (including but not limited to age >65 years, asthma, COPD, cystic fibrosis, cardiovascular disease, malignancy, bronchopulmonary dysplasia, chronic infections, or immunocompromised state).
  - Moderate to severe symptomatic patients with evidence of significant pulmonary dysfunction or damage (e.g., hypoxemia, moderate-to-severe dyspnea), suspected of having COVID-19, regardless of COVID-19 test results or when viral testing is not available.
  - Other systemic complications are being recognized as medical knowledge about this condition evolves. Requested imaging for possible COVID-19 complications should be managed by the appropriate condition based guidelines.
  - Repeat imaging may be appropriate in the following clinical circumstances:
    - If there is significant worsening of symptoms in a COVID-19 positive patient and imaging will be used to modify patient management.
    - A recovered COVID-19 positive patient with significant residual functional impairment and/or persistence hypoxemia.
  - Current literature does not support preoperative screening with advanced imaging in asymptomatic patients.
**Practice Notes**

- The role of advanced imaging in the diagnosis and management of COVID-19 is very dynamic in this rapidly evolving condition.

- Findings on both Chest X-ray and CT Chest are non-specific. Chest X-rays may show patchy opacities with lower lung predominance. CT may show peripheral multifocal ground glass opacities with lower lung predominance. However, a significant portion of cases have opacities without a clear or specific distribution.3,4,6
  - Pediatric patients may have less pronounced imaging findings than adults.

- Major professional society guidelines to date:
  - The American College of Radiology (ACR) recommends that CT Chest should not be used for screening or as a first-line test to diagnose COVID-19.3
  - The Centers for Disease Control and Prevention (CDC) recommends viral testing as the only specific method of diagnosis.4
  - The CDC has stated that symptoms may appear 2-14 days after exposure to the virus. These symptoms may include:5
    - Fever or chills
    - Cough
    - Shortness of breath or difficulty breathing
    - Fatigue
    - Muscle or body aches
    - Headache
    - New loss of taste or smell
    - Sore throat
    - Congestion or runny nose
    - Nausea or vomiting
    - Diarrhea
  - The Fleischner Society consensus statement published on April 7, 2020, recommends against the use of imaging in patients with suspected COVID-19 who are either asymptomatic or have only mild symptoms without evidence of significant pulmonary dysfunction or damage (e.g., absence of hypoxemia, no or mild dyspnea).6
  - According to The American Society of Transplantation, screening donors is based on methods below. Screening donors encompasses three different methods.7
    - Epidemiologic screening for travel and potential exposures
    - Screening for symptoms suggestive of COVID-19
    - Viral testing (Nucleic acid testing of specimens)
  - There is no current indication for screening asymptomatic donors with advanced imaging.
References


2. ACR Appropriateness Criteria® acute respiratory illness in immunocompetent patients. [online publication]. Reston (VA): American College of Radiology (ACR); 2018.


### CH-14: Other Chest Infections

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**CH-14.1: PPD or TB\textsuperscript{1,2} (Mycobacterium tuberculosis and Mycobacterium avium complex (MAC))**

- CT Chest with contrast (CPT\textsuperscript{®} 71260) or CT Chest without contrast (CPT\textsuperscript{®} 71250) with ANY of the following:
  - Positive PPD skin test or other positive tuberculin skin tests or suspected active (or reactivated) tuberculosis and a normal or equivocal chest x-ray\textsuperscript{1}
  - Suspected complications or progression of tuberculosis (e.g. pleural tuberculosis, empyema, and mediastinitis).\textsuperscript{2}

- If CT Chest is unremarkable, there is insufficient data to support performing subsequent CT Chest unless symptoms develop or chest x-ray shows a new abnormality.

- Follow-up CT Chest with contrast (CPT\textsuperscript{®} 71260) with frequency at the discretion of the pulmonary specialist (not to exceed 3 studies in 3 months).
  - Re-evaluate individuals undergoing active treatment for tuberculosis who had abnormalities seen only on CT Chest.

**CH-14.2: Fungal Infections (Suspected or Known)**

- CT Chest with contrast (CPT\textsuperscript{®} 71260) or High resolution CT Chest (HRCT) without contrast (CPT\textsuperscript{®} 71250):\textsuperscript{3,4}
  - Initial diagnosis of any fungal pneumonia or chest infection.\textsuperscript{3,4}
  - Suspected complications or progression of the fungal chest infection (e.g. worsening pneumonitis; pleural effusion, empyema, mediastinitis).

- Follow-up CT Chest with contrast (CPT\textsuperscript{®} 71260) or High resolution CT Chest (HRCT) without contrast (CPT\textsuperscript{®} 71250) with frequency at the discretion of the pulmonary specialist.

**CH-14.3: Wegener's Granulomatosis/Granulomatosis with Polyangiitis**

- CT Chest without contrast (CPT\textsuperscript{®} 71250)* should be done in all patients who have pulmonary symptoms and are newly diagnosed or suspected of having Antineutrophil cytoplasmic autoantibody (ANCA)-associated vasculitides (AAV) for a baseline prior to initiating immunosuppressive therapy.\textsuperscript{5,6}

- Selective use of additional imaging is useful in evaluating patients who are suspected or known to have AAV, including CT Head (sinuses, orbits, mastoids) in patients with visual or upper respiratory track symptoms or signs, and CT Neck (subglottic region) in patients with symptoms or signs of subglottic stenosis.\textsuperscript{6}

*In most situations, CT scans in patients with AAV should be performed without an iodinated contrast agent administered.\textsuperscript{6}
CH-14.4: Suspected Sternal Dehiscence

- Sternal wound dehiscence is primarily a clinical determination.
- Chest x-ray is performed prior to advanced imaging to identify abnormalities in the sternal wire integrity and/or a midsternal stripe. Other findings include rotated, shifted or ruptured wires.
- CT Chest without contrast can be considered if there is planned debridement and/or repair.

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**CH-15.1: Sarcoid**

- CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) for ANY of the following:
  - Establish or rule out the diagnosis when suspected,
  - Development of worsening symptoms,
  - New symptoms appear after a period of being asymptomatic,
  - Treatment change is being considered in known sarcoid.

- If CT is equivocal, definitive diagnosis can only be made by biopsy.\(^2,^3,^4\)

- There is currently no evidence-based data to support performing serial PET scans to monitor disease activity while tapering steroid therapy.\(^2,^3,^4\)
  - See [CD-5.2: Cardiac MRI – Indication (excluding Stress MRI)](#) in the Cardiac Imaging Guidelines
  - See [HD-22: Cerebral: Vasculitis](#) in the Head Imaging Guidelines

**References**
## CH-16: Solitary Pulmonary Nodule (SPN)

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CH-16.0: Solitary Pulmonary Nodule

For Lung Cancer Screening (LDCT) including incidental findings from LDCT, See CH-33: Lung Cancer Screening.

CH-16.1: Solitary Pulmonary Nodule – Imaging

CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) can be performed initially for discrete nodule(s) in the following scenarios:1,2,3

- Lung nodule(s) seen on an imaging study other than a “dedicated” CT or MRI Chest. Examples of other studies:
  - Chest x-ray
  - CT Abdomen
  - MRI Spine
  - Coronary CTA

- But NOT in the following which are considered initial dedicated advanced chest imaging:
  - CT Chest without and with contrast (CPT® 71270).
  - CTA Chest without and with contrast (CPT® 71275).
  - MRI Chest without contrast (CPT® 71550).
  - MRI Chest without and with contrast (CPT® 71552).
  - MRA Chest without and with contrast (CPT® 71555).

Comparisons should include the earliest available study and the more recent previous CT Chest scans to determine if nodule was present and stable.¹ Using largest measurement of multiple lung nodules.¹

- Similar-sized pleural nodule(s) is treated as a pulmonary nodule(s)

The size of the lung or pleural nodule(s) is crucial information for decisions making regarding follow-up. The largest of multiple lung and/or pleural nodules will guide the surveillance interval. (See CH-16.2: Incidental Pulmonary Nodules Detected on CT Images, and CH-17.1: Pleural-Based Nodules and Other Abnormalities) Yet, multiple nodules may also change this interval. (See CH-16.2: Incidental Pulmonary Nodules Detected on CT Images).

Practice Notes

Abnormality examples include: mass, opacity, lesion, density, nodule, and calcification.
## CH-16.2: Incidental Pulmonary Nodules Detected on CT Images

### Incidentally Detected Solid Pulmonary Nodules Follow-up Recommendations*

<table>
<thead>
<tr>
<th>Nodule Type</th>
<th>&lt;6 mm (&lt;100 mm³)</th>
<th>6–8 mm</th>
<th>&gt;8 mm</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Nodule</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Follow-up (optional)</td>
<td>CT at 12 months. No routine follow-up if stable at 12 months</td>
<td>CT at 6–12 months, then CT at 18–24 months if stable</td>
<td>CT at 3 months, then CT at 6-12 and then at 18-24 months if stable. Consider PET/CT** or biopsy</td>
<td>Certain patients at high risk with suspicious nodule morphology, upper lobe location, or both may warrant 12-month follow-up</td>
</tr>
</tbody>
</table>

| **Multiple Nodules** | Follow-up (optional) | CT at 3–6 months, then at 18–24 months if stable | CT at 3–6 months, then at 18–24 months if stable. Consider PET/CT** or biopsy | Use most suspicious nodule as a guide to management. Follow-up intervals may vary according to size and risk. |

### Incidentally Detected Sub-Solid Pulmonary Nodules Follow-up Recommendations

<table>
<thead>
<tr>
<th>Nodule Type</th>
<th>&lt;6 mm (&lt;100 mm³)</th>
<th>≥6 mm (≥100 mm³)</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Single Ground glass opacity (GGO)</strong></td>
<td>Consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection.</td>
<td>CT at 6–12 months to confirm persistence, then follow-up with CT every 2 years until 5 years</td>
<td>In certain suspicious nodules, 6 mm, consider follow-up at 2 and 4 years. If solid component(s) or growth develops, consider resection.</td>
</tr>
</tbody>
</table>

| **Single Part-solid** | Consider follow-up at 2 and 4 years. If growth develops, consider resection. | CT at 3–6 months to confirm persistence. If unchanged and solid component remains <6 mm, then annual CT should be performed for 5 years. If the solid component has suspicious morphology (i.e., lobulated margins or cystic components), is >8 mm or is growing: Consider PET/CT** or biopsy | In practice, part-solid nodules cannot be defined as such until ≥6 mm. Persistent part-solid nodules with solid components >6 mm should be considered highly suspicious. |

| **Multiple Part-Solid** | CT at 3–6 months. If stable, consider CT at 2 and 4 years. | CT at 3–6 months. Subsequent management based on the most suspicious nodule(s). | Multiple <6 mm pure ground-glass nodules are usually benign. |

(*Following the Fleischner Society Guidelines for high risk which include American College of Chest Physicians intermediate and high risk categories.¹ ²)

**PET/CT consider for ≥8 mm lung nodule

If a PET/CT was found to be negative, follow-up with CT at 6–12 months, then CT at 18–24 months if stable.
CH-16.3: Interval Imaging Outcomes

No further advanced imaging is necessary if a nodule has been:
- Stable for 2 years
  - Nodules(s) stable on chest x-ray.
  - Nodule(s) \( \geq 6 \text{mm} \) stable on CT Chest.\(^1\)
- Stable for 1 year
  - Nodule(s) <6mm.\(^1\)
- At any time, if:
  - Classically benign characteristics by chest x-ray or previous CT (e.g. benign calcification pattern typical for a granuloma or hamartoma).
  - Decreasing or disappearing nodule(s).\(^3\)

Lung nodule(s) which increases in size or number should no longer be considered for CT screening or surveillance.\(^1,2,3,7\)
- With an increase in nodule(s) size or number, PET (See CH-16.4: PET) as well as tissue sampling or other further diagnostic investigations should be considered.

CH-16.4: PET

PET/CT (CPT\(^\circledR\) 78815) is appropriate for a distinct lung nodule \( \geq 8 \text{ mm} \) on dedicated advanced chest imaging, as described in CH-16.1: Solitary Pulmonary Nodule – Imaging.
- If there is a history of malignancy, refer to the appropriate Oncology restaging/recurrence guideline for indications for PET imaging.
- Pleural nodule See CH-17.1: Pleural-Based Nodules and Other Abnormalities.
- Serial PET studies are not considered appropriate.
- Not appropriate for infiltrate, ground glass opacity, or hilar enlargement.

Practice Notes

A nodule is any pulmonary or pleural lesion that is a discrete, spherical opacity 2-30 mm in diameter surrounded by normal lung tissue. A larger nodule is called a mass. Entities that are not nodules, and are considered benign, include non-spherical linear, sheet-like, two-dimensional or scarring opacities.\(^3\)

Malignant nodule features can include spiculation, abnormal calcification, size greater than 7-10 mm, interval growth, history of a cancer that tends to metastasize to the lung or mediastinum, and/or smoking history.\(^1,3\)
- A nodule that grows at a rate consistent with cancer (doubling time 100 to 400 days) may be sampled for biopsy or resected.\(^1\)
- Less than 1% of <6 mm lung nodules are malignant.\(^1\)
- Three per cent of all 8 mm lung nodules are malignant.\(^1\)
- Only one follow-up at 6-12 months is sufficient for 6-8 mm nodules and not all require traditional 2 year follow-up.\(^1\)
- The larger the solid component of a subsolid nodule, the greater the risk of invasiveness and metastases.\(^1\)
Increased risk of primary cancer as the total nodule count increased from 1 to 4 but decreased risk in patients with 5 or more nodules, most of which likely resulted from prior granulomatous infection.¹

A nodule that does not grow in 6 months has a risk of malignancy at <10%.

Benign features can include benign calcification (80% granuloma, 10% hamartoma), multiple areas of calcification, small size, multiple nodules, negative PET, and stability of size over 2 years.³

Ground glass or subsolid opacities, which can harbor indolent adenocarcinoma with average doubling times of 3–5 years.¹

Repeat PET is discouraged, since if the original PET is positive, biopsy may be performed. If the original PET is negative but subsequent CT Chest shows increase in size of the nodule, biopsy may be performed.

False positive PET can occur with infection or inflammation; false negatives can occur with small size nodule, ground glass lesions and indolent cancers such as bronchoalveolar or carcinoid.

False negative PET can be seen in patients with adenocarcinoma in situ, carcinoid tumors, and mucinous adenocarcinomas. High pre-test likelihood of malignancy negative findings on the PET scan only reduce the likelihood of malignancy to 14%; while in a patient with a low pre-test likelihood (20%), a negative FDG PET scan reduces the likelihood of malignancy to 1%.⁶
References
CH-17.1: Pleural-Based Nodules and Other Abnormalities

- CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) (with contrast is preferred for initial evaluation) for pleural nodule(s).¹
  - Pleural nodule(s) seen on an imaging study other than a “dedicated” CT or MRI Chest.¹
  - Pleural nodule(s) identified incidentally on any of the following dedicated chest studies can replace CT Chest as the initial dedicated study.¹
    - CT Chest without and with contrast (CPT® 71270).
    - CTA Chest without and with contrast (CPT® 71275).
    - MRI Chest without contrast (CPT® 71550).
    - MRI Chest without and with contrast (CPT® 71552).
    - MRA Chest without and with contrast (CPT® 71555).
  - After preliminary comparison with any available previous chest films to determine presence and stability.
  - Using largest measurement of multiple nodule(s). (See CH-16.1: Solitary Pulmonary Nodule – Imaging).
  - Following the Fleischner Society Guidelines for high risk. (See CH-16.2: Incidental Pulmonary Nodules Detected on CT Images).¹

- PET/CT (CPT® 78815) can be considered if dedicated CT or MRI Chest identifies a pleural nodule/mass or defined area of pleural thickening that is ≥8 mm when there is a likelihood of malignancy including current or previous malignancy, pleural effusion, bone erosion, chest pain.¹

Practice Notes

- Pleural nodule/mass or thickening without suggestion of malignancy would undergo surveillance or biopsy.

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CH-18.1: Pleural Effusion

- CT Chest with contrast (CPT® 71260) after both:¹,²
  - Chest x-ray including lateral decubitus films; and
  - Thoracentesis to determine if fluid is exudative or transudative and remove as much as possible (this fluid can obscure the underlying lung parenchyma and possibly a mass).

- Chest ultrasound (CPT® 76604) can be used as an alternative to chest x-ray to evaluate for the presence of fluid within the pleural spaces and guide thoracentesis.

Practice Notes

- Bilateral effusions are more often systemic related transudates (congestive heart failure, renal failure, liver insufficiency, etc.), and advanced imaging is rarely needed. Large unilateral effusions can be malignant. Analysis of fluid may include: cytology, culture, cell count, and biochemical studies.

References

# CH-19: Pneumothorax/Hemothorax

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CH-19.1: Pneumothorax/Hemothorax

Chest x-ray initially.
- CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) if:
  - Diagnosis of a small pneumothorax is in doubt, and the presence of a pneumothorax will affect patient treatment decisions.¹
  - Preoperative study for treatment of pneumothorax.¹
  - Pneumothorax associated with hemothorax.²
  - Suspected complications from hemothorax (e.g. empyema).²
  - Suspected Alpha-1-Antitrypsin Deficiency (even without pneumothorax).³

CH-19.2: Pneumomediastinum; Subcutaneous Emphysema

Chest x-ray initially.
- CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) if:
  - Recent vomiting and/or suspected esophageal perforation.⁴,⁵
  - Associated pneumopericardium.⁴,⁵
  - Associated pneumothorax.⁴,⁵
  - Preoperative study for treatment.⁴,⁵

Practice Notes

An expiration chest x-ray can enhance the evaluation of equivocal plain x-ray. There is no data supporting the use of serial CT Chest to follow patients with a known pneumothorax or hemothorax who are asymptomatic or have stable symptoms. With the exception of the indications above, advanced imaging of the chest is rarely indicated in the diagnosis or management of pneumothorax. Inspiratory/expiratory chest x-rays are helpful in defining whether a pneumothorax is present.

References
CH-20.1: Mediastinal Mass

CT Chest with contrast (CPT® 71260) to evaluate mediastinal abnormalities seen on chest x-ray or other non-dedicated chest imaging and can be done once initially if there is a concern for:\(^1,2,3\)

- Mediastinal cyst including bronchogenic, thymic, pericardial or esophageal in nature.
  - CT Chest with contrast (CPT® 71260) or MRI Chest without and with contrast (CPT® 71552) for subsequent evaluations if:
    - New signs or symptoms, or
    - Preoperative assessment.

- For Adenopathy; See CH-2: Lymphadenopathy.
- For Goiter; See NECK-8.1: Thyroid Nodule in the Neck Imaging Guidelines.
- For Myasthenia Gravis; See PN-6.1: Neuromuscular Disease in the Peripheral Nerve Disorders Imaging Guidelines.

References

CH-21.1: Chest Trauma

- Chest X-ray initially.
  - CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) for the following situations:¹
    - Rib¹ or Sternal² Fracture:
      - With associated complications identified clinically or by other imaging, including pneumothorax, hemothorax, pulmonary contusion, atelectasis, flail chest, cardiovascular injury and/or injuries to solid or hollow abdominal organs.¹
      - Uncomplicated, single fractures, multiple fractures, non-acute fractures, or occult rib fractures are NOT an indication for CT Chest unless malignancy is suspected as the etiology.¹
    - Routine follow-up advanced imaging of rib or sternal fractures is not indicated.¹
  - CT Chest without contrast (CPT® 71250) or Tc-99m bone scan whole body (CPT® 78306) for suspected pathological rib fractures, with or without a history of trauma.¹

- Clavicle Fractures:
  - CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) or MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) for proximal (medial) 1/3 fractures or sternoclavicular dislocations.³
    - X-ray is adequate for evaluation of middle and distal 1/3 fractures.³

- No advanced imaging of the abdomen or pelvis is indicated when there is chest trauma and no physical examination or laboratory evidence of abdominal and/or pelvic injury.

References
1. ACR Appropriateness Criteria® Rib Fractures: American College of Radiology (ACR); 2018.
**CH-22.1: Chest Wall Mass**

➤ Chest x-ray is useful in the workup of a soft-tissue mass and are almost always indicated as the initial imaging study.¹

✧ Chest ultrasound (CPT® 76604) may be useful as an initial imaging study in the setting of a suspected superficial or subcutaneous lipoma. This modality may also be valuable in differentiating cystic from solid lesions and has also been used to assess the vascularity of lesions.¹

✧ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) or MRI Chest without and with contrast (CPT® 71552) or MRI Chest without contrast (CPT® 71550) can be considered unless chest x-ray or ultrasound demonstrate ONE of the following:¹,²
  - Obvious lipomas¹ (See **MS-10: Soft Tissue Mass or Lesion of Bone** in the Musculoskeletal Imaging Guidelines).
  - Clearly benign entity¹ (See **MS-10: Soft Tissue Mass or Lesion of Bone** in the Musculoskeletal Imaging Guidelines).

**Practice Notes**

➤ Chest x-rays of chest wall masses can detect calcification, ossification, or bone destruction as well as location and size.³

**References**

2. ACR Appropriateness Criteria® Primary Bone Tumors. *American College of Radiology (ACR)*; 2013.
CH-23.1: Pectus Excavatum and Carinatum

- CT Chest without contrast (CPT® 71250) or MRI Chest without and with contrast (CPT® 71552) and 3-D reconstruction (CPT® 76377 or CPT® 76376) if:
  - Candidates for surgical correction.¹ ²
  - Cardiac or pulmonary dysfunction has been identified¹ ²
    - ECG and echocardiography if cardiac symptoms or evidence of cardiac function abnormalities.
    - Chest x-ray and PFT’s if increasing shortness of breath.¹
- Chest measurements derived from CT Chest, such as the Haller Index, are helpful to the thoracic surgeon in pre-operative assessment of chest wall deformities to assess for the appropriateness of operative repair prior to the development of symptomatic pectus deformities.
- See PEDCH-11: Pectus Deformities in the Pediatric Chest Imaging Guidelines.

References
CH-24.1: Pulmonary AVM

- CT Chest with contrast (CPT® 71260), CTA Chest (preferred modality) (CPT® 71275), or MRA Chest (CPT® 71555) for evaluation of:¹²³
  - Suspected pulmonary AVM.
  - First degree relatives of a patient with a primary pulmonary AVM.
  - Evaluation of patients with paradoxical embolus/stroke and no evidence of patent foreman ovale on echocardiogram.

Practice Notes

- Pulmonary AVMs are abnormal connections between pulmonary arteries and veins, usually found in the lower lobes, that can be either primary or acquired (such as trauma, bronchiectasis). They can be identified in up to 98% of chest x-rays by a peripheral, circumscribed, non-calcified lesion connected by blood vessels to the hilum of the lung. Treatment is often by surgery or embolization of the feeding artery using platinum coils or detachable balloons.

References

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<tbody>
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<td>CH-25.1: Pulmonary Embolism</td>
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</tbody>
</table>
CH-25.1: Pulmonary Embolism

CT Chest with contrast with PE protocol (CPT® 71260) or CTA Chest (CPT® 71275) if at least one symptom, clinical/laboratory finding or risk factor from each of the lists below are present.

- With any ONE of the 3:6,7,8
  - Dyspnea, new onset and otherwise unexplained;
  - Chest Pain, pleuritic;
  - Tachypnea
- AND, with any ONE of the 3:6,7,8
  - Abnormal **D-dimer** test;
  - Wells Criteria score* higher than 4 points;
  - One Risk Factor** or Symptom** of new onset demonstrating high clinical probability of PE

<table>
<thead>
<tr>
<th>RISK FACTORS**6,7,8</th>
<th>SYMPTOMS ATTRIBUTED TO PE**6,7,8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Immobilization at least 3 days or surgery in last 4 weeks or recent trauma</td>
<td>Signs or symptoms of DVT</td>
</tr>
<tr>
<td>Previous history of DVT or PE</td>
<td>Hemoptyis</td>
</tr>
<tr>
<td>Cancer actively treated in last 6 months or receiving palliative treatment</td>
<td>Right heart strain or failure</td>
</tr>
<tr>
<td>Recent history of a long airplane flight</td>
<td>Systolic BP &lt;90</td>
</tr>
<tr>
<td>Use of estrogen-based contraceptives (birth control pills, the patch, and vaginal ring)/Oral estrogen1</td>
<td>Syncope</td>
</tr>
<tr>
<td>Advanced age (≥70)</td>
<td>Cough</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>Heart Rate &gt;100</td>
</tr>
<tr>
<td>Obesity (BMI ≥35)</td>
<td>Palpitations</td>
</tr>
<tr>
<td>Suspicion of COVID-19</td>
<td></td>
</tr>
<tr>
<td>Clinical signs/symptoms of DVT (at minimum: leg swelling and pain with palpation of the deep veins)</td>
<td>3</td>
</tr>
<tr>
<td>PE is likely or equally likely diagnosis</td>
<td>3</td>
</tr>
<tr>
<td>Heart rate &gt;100</td>
<td>1.5</td>
</tr>
<tr>
<td>Immobilization at least 3 days or surgery in last 4 weeks</td>
<td>1.5</td>
</tr>
<tr>
<td>Previous history of DVT or PE</td>
<td>1.5</td>
</tr>
<tr>
<td>Hemoptysis</td>
<td>1</td>
</tr>
<tr>
<td>Cancer actively treated in last 6 months or receiving palliative treatment</td>
<td>1</td>
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</tbody>
</table>

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<thead>
<tr>
<th>Calculate Probability:</th>
<th>Low &lt;2</th>
<th>Moderate 2 to 6</th>
<th>High &gt;6</th>
</tr>
</thead>
</table>

Using the above criteria, only 3% of patients with a low pretest probability had PE versus 63% of those with a high pretest probability.

- Non-urgent cases which do not meet above 2-step criteria, should undergo prior to advanced imaging:
  - Chest x-ray (to rule out other causes of acute chest pain).
  - Primary cardiac and pulmonary etiologies should be eliminated.
- Pregnant women with suspected PE are suggested to proceed with:
  - D-dimer and/or;
  - Doppler studies of the lower extremities;
  - V/Q preferred if Doppler negative; CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) can be performed if V/Q scanning is not available.
- Ventilation-perfusion scans, also called V/Q, scans (CPT® 78580-Pulmonary Perfusion Imaging; CPT® 78582-Pulmonary Ventilation (e.g., Aerosol or Gas) and Perfusion Imaging).
  - Is not a replacement for CTA Chest
  - Can be considered in any of the following:
    - Suspected pulmonary embolism if there is a contraindication to CT or CTA Chest (ventilation-perfusion scans CPT® 78582).
    - Suspected pulmonary embolism when a chest x-ray is negative and CTA Chest is not diagnostic (CPT®78580 or CPT® 78582).
    - Follow-up of an equivocal or positive recent ventilation-perfusion lung scan to evaluate for interval change (CPT® 78580).
- Follow-up Imaging in Stable or Asymptomatic Patients with Known PE is not warranted
- CT Chest with contrast with PE protocol (CPT® 71260) or CTA Chest (CPT® 71275) for ANY of the following indications:
  - Recurrent signs or symptoms such as dyspnea, or
  - Elevated d-dimer which is persistent or recurrently elevated, or
  - Right heart strain or failure identified by EKG, ECHO or Heart catheterization.
Practice Notes

- Pulmonary embolism is found in approximately 10% of all those that present with suspicion of PE. Dyspnea, pleuritic chest pain and tachypnea occur with about 50% incidence with leg swelling or pain just over 50%.
- D-dimer level has a high sensitivity and low specificity for diagnosing PE.
  - A negative D-dimer in combination with low or moderate PE risk classification has a negative predictive value approaching 100%.
  - D-dimer can be falsely elevated with recent surgery, injury, malignancy, sepsis, diabetes, pregnancy, or other conditions where fibrin products are likely to be present.
- CT imaging has supplanted V/Q scanning since the latter is difficult to obtain quickly, does not provide a substantial cost savings, and does not diagnose other pulmonary pathology.
- The decision to terminate anticoagulation treatment after previous pulmonary embolism (PE) with absent or stable symptoms is based on clinical evaluation and risk factors.
- Repeat studies do not allow one the ability to distinguish new from residual clot, with luminal diameter and clot character poorly correlated to symptoms and ECHO findings.
- Two thirds after primary thromboembolism have residual pulmonary artery clot at 6 months and 50% remains at one year.
- Subsequent persistence or elevation of D-dimer is associated with increased risk of recurrent PE. ECHO and Right Heart Catheterization (RHC) can identify those with pulmonary hypertension. Yet, 1/2 of all have persistent or new pulmonary hypertension after primary thromboembolism and only half of this latter group has dyspnea at rest or exercise intolerance.
References


CH-26: Pulmonary Hypertension

- See PVD-5: Pulmonary Artery Hypertension in the Peripheral Vascular Disease Imaging Guidelines.
CH-27.0: Subclavian Steal Syndrome – General

- Occurs from blood flowing up the contralateral vertebral artery to the basilar artery and retrograde down the ipsilateral vertebral artery (reversal of flow) to supply collateral circulation to the arm on the side and past the stenotic or occluded proximal subclavian or innominate artery to perfuse that arm.

CH-27.1: Subclavian Steal Syndrome

- Initial evaluation should include clinical findings satisfying the symptom complex and initial imaging with Carotid duplex study (CPT® 93882).
  - Satisfying the symptom complex.
    - Physical examination findings suggestive of subclavian stenosis include a discrepancy of >15 mmHg in blood pressure readings taken in both upper extremities, delayed or decreased amplified pulses in the affected side, and a bruit in the supraclavicular area on the affected side.
    - Symptoms include vertebral basilar artery insufficiency, vertigo, limb paresis, and paresthesias. Bilateral cortical visual disturbances, ataxia, syncope, and dysarthria occur less frequently.
    - Symptoms of cerebral ischemia may be produced by exercise of the affected arm.
  - Carotid duplex study (CPT® 93882) is the initial and definitive imaging study
    - Reversal of flow in the ipsilateral vertebral artery.
    - If the carotid duplex is not diagnostic for reversal of flow in the ipsilateral vertebral artery, then neurological symptoms should be evaluated according to the Head guidelines.

- MRA Neck and Chest (CPT® 70548 and CPT® 71555) or CTA Neck and Chest (CPT® 70498 and CPT® 71275) can be performed for diagnosis in patients with symptoms of vertebrobasilar ischemia if the clinical exam and duplex study are positive, indeterminate, or as preoperative studies if they will substitute for invasive angiography.

- MRA Upper extremity (CPT® 73225) or CTA Upper extremity (CPT® 73206) can be performed in symptomatic patients if needed to exclude pathology distal to the subclavian artery and if they will substitute for invasive angiography.


- Treatment options include ligation of the ipsilateral vertebral artery, aorta-subclavian artery bypass graft, or subclavian endarterectomy.

Practice Note

- While MRA does not expose the patient to radiation, CTA should be considered the test of choice for subclavian steal syndrome given its superior spatial and temporal resolution.
References
**CH-28.1: SVC Syndrome**

- CT Chest with contrast (CPT® 71260) for the evaluation of suspected SVC syndrome based on the facial cyanosis and upper extremity swelling without anasarca.\(^1\,^2\)

- MRV (CPT® 71555) or CTV (CPT® 71275) Chest may be indicated when stenting of the SVC is being considered.\(^1\,^2\)

**Practice Notes**

- SVC syndrome is caused by acute or subacute, intrinsic or extrinsic obstruction of the SVC, most commonly from lung cancer (80-85%) and less often benign (fibrosis, mediastinitis, indwelling devices). Other symptoms include dyspnea, headache and dizziness.

**References**


## CH-29: Thoracic Aorta

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<td>CH-29.5: Calcified Ascending Aorta</td>
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</table>
**CH-29.0: Thoracic Aorta**

See **PVD-6.2: Thoracic Aortic Aneurysm (TAA)** and **PVD-6.7: Aortic Dissection and Other Aortic Conditions** in the Peripheral Vascular Disease Imaging Guidelines

**CH-29.1: Aortic Dissection**

- See **PVD-6.7: Aortic Dissection and Other Aortic Conditions** in the Peripheral Vascular Disease Imaging Guidelines

**CH-29.2: Thoracic Aortic Aneurysm (TAA)**

- See **PVD-6.2: Thoracic Aortic Aneurysm (TAA)** in the Peripheral Vascular Disease Imaging Guidelines

**CH-29.3: Screening Guidelines for Familial Syndromes**

- See **PVD-2.2: Screening for Vascular related genetic connective tissue Disorders (Familial Aneurysm Syndromes/Spontaneous Coronary Artery Dissection (SCAD)/Ehlers-Danlos/Marfan/Loeys-Dietz)** in the Peripheral Vascular Disease Imaging Guidelines

**CH-29.4: Thoracic Aorta in Individuals with Bicuspid Aortic Valve**

- See **PVD-2.3: Screening for TAA in patients with bicuspid aortic valves** in the Peripheral Vascular Disease Imaging Guidelines

**CH-29.5: Calcified Ascending Aorta**

- Prior to open-heart operations.
  - See **CD-13.1: Pre-Surgical Cardiac testing-General Information** in the Cardiac Imaging Guidelines
- Prior to TAVR/I (Transcatheter Aortic Valve Replacement/Implantation).
  - See CT and CTA in **CD-4.8: Transcatheter Aortic Valve Replacement (TAVR)** in the Cardiac Imaging Guidelines.
<table>
<thead>
<tr>
<th>CH-30: Elevated Hemidiaphragm</th>
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</thead>
<tbody>
<tr>
<td>CH-30.1: Elevated Hemidiaphragm</td>
</tr>
</tbody>
</table>

| 78 |
CH-30.1: Elevated Hemidiaphragm

- CT Chest with contrast (CPT® 71260) and CT Neck with contrast (CPT® 70491) (if requested) with new diaphragmatic paralysis after:¹ ²
  - Previous chest x-rays are available and reviewed to determine if the diaphragmatic elevation is a new finding, and/or
  - Fluoroscopic examination ("sniff test") to differentiate true paralysis from weakness.

- CT Abdomen with contrast (CPT® 74160) to rule out liver or abdominal process if CT Chest is negative.¹ ²

- Repeat advanced imaging studies in the absence of new signs or symptoms are not indicated.

Practice Notes

- The right hemidiaphragm sits about 2 cm higher than the left.
- "Eventration" is thin membranous replacement of muscle, usually on the right, as the most common cause of elevation.
- Any injury to the phrenic nerve from neck to diaphragm can lead to paralysis.
- Common phrenic causes are traumatic or surgical injury or malignancy involving the mediastinum.
- Any loss of lung volume or increased abdominal pressure can lead to diaphragm elevation.

References

**CH-31.1: Thoracic Outlet Syndrome**

- Chest x-ray should be performed initially in all cases, after the onset of symptoms or if there has been a change in symptoms, since it can identify boney abnormalities or other causes of right upper extremity pain.\(^1\)\(^2\)

- MR imaging is the preferred imaging modality in patients with suspected TOS.\(^1\)\(^2\)
  - MRI Chest (CPT® 71550) or MRI Upper Extremity Other than Joint (CPT® 73218).
  - MRA Neck and Chest (CPT® 70548 and CPT® 71555) can be used in place of MRI with suspected arterial or venous TOS.
  - CT Chest with contrast (CPT® 71260) or CT Neck with contrast (CPT® 70491) can be used in place of MRI for:
    - Suspected anomalous ribs or fractures, as bone anatomy is more easily definable with CT.
    - Postoperative patients in whom there is a question regarding a remnant first rib.
    - Dialysis-dependent renal failure, claustrophobia, or implanted device incompatibility.

- See **PN-4: Brachial Plexus** in the Peripheral Nerve Disorders Imaging Guidelines.

**Practice Notes**

- TOS refers to compression of the subclavian vessels and/or brachial plexus at the thoracic outlet of the chest (the area bounded by the two scalene muscles and the first rib).
- There are 3 types, with neurogenic causes seen in 80%, venous causes (also called effort thrombosis) found in 15% and the remaining 5% being arterial in etiology.
- Since this is such a rare entity and diagnosis is difficult, specialist evaluation by a vascular surgeon or thoracic surgeon is helpful in determining the appropriate imaging pathway.

**References**

2. ACR Appropriateness Criteria® imaging in the diagnosis of thoracic outlet syndrome: American College of Radiology (ACR); 2014.
CH-32.1: Pre-Transplant Imaging Studies

- Individuals on the waiting list or being considered for the lung transplant can undergo advanced imaging per that institution’s protocol as long as the studies do not exceed the following:
  - CT Chest with and without contrast (CPT® 71270), CT Chest with (CPT® 71260), or CT Chest without contrast (CPT® 71250)
  - ECHO
  - Imaging Stress Test (MPI, SE, MRI) or Heart Catheterization (Right and Left); Heart catheterization can also be done after a positive stress test.

- Other studies that will be considered include V/Q scan, Six Minute Walk Test.

- CT Chest with and without contrast (CPT® 71270), CT Chest with contrast (CPT® 71260), or CT Chest without contrast (CPT® 71250) for initial post-transplant follow-up.
  - Requests for subsequent follow-up imaging will go to Medical Director Review.

- See CD-1.6: Transplant Patients in the Cardiac Imaging Guidelines.

Reference
## CH-33: Lung Cancer Screening

| CH-33.1: U.S. Preventative Services Task Force: Lung Cancer Screening (Commercial and Medicaid) | 84 |
| CH-33.2: National Coverage Determination (NCD) for Lung Cancer Screening with Low Dose Computed Tomography (LDCT) (210.14) (Medicare) | 85 |
| CH-33.3: Incidental Pulmonary Nodules Detected on Low Dose CT Chest (LDCT) Images | 86 |
**CH-33.1: U.S. Preventative Services Task Force: Lung Cancer Screening (Commercial and Medicaid)**

- Low-dose chest CT CPT® G0297 may be approved for lung cancer screening annually if all of the following criteria are met:

<table>
<thead>
<tr>
<th>Screening Indications – Commercial and Medicaid</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ All criteria below must be met for approval:</td>
<td>Low-Dose Chest CT without contrast CPT® G0297</td>
</tr>
<tr>
<td>◦ Patient has not received a low-dose CT lung screening in less than 12 months; and</td>
<td></td>
</tr>
<tr>
<td>◦ Patient has NO health problems that substantially limit life expectancy or the ability or willingness to have curative lung surgery*; and</td>
<td></td>
</tr>
<tr>
<td>◦ Patient is between 55 and 80 years of age; and</td>
<td></td>
</tr>
<tr>
<td>◦ Patient has at least a 30 pack-year history of cigarette smoking; and</td>
<td></td>
</tr>
<tr>
<td>◦ Currently smokes or quit within the past ≤15 years</td>
<td></td>
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</tbody>
</table>

*This is based on a range of chest or other organ signs, symptoms or conditions which would question the member’s ability to undergo surgical or non-surgical treatment if a lung cancer was discovered. For example, congestive heart failure, advanced cancer from another site or a member with COPD who uses oxygen when ambulating, would be examples of conditions that would “substantially limit life expectancy.” Conversely, stable COPD and its symptoms, including cough, shortness of breath would not “substantially limit life expectancy.”*
CH-33.2: National Coverage Determination (NCD) for Lung Cancer Screening with Low Dose Computed Tomography (LDCT) (210.14) (Medicare)\(^2\)

Low-dose CT Chest CPT® G0297 may be approved for lung cancer screening annually if all the following criteria are met:

<table>
<thead>
<tr>
<th>Screening Indications - Medicare</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All criteria below must be met for approval:</td>
<td>Low-Dose Chest CT without contrast CPT® G0297</td>
</tr>
<tr>
<td>- Patient has not received a low-dose CT lung screening in less than 12 months; and</td>
<td></td>
</tr>
<tr>
<td>- Patient has NO signs or symptoms suggestive of underlying lung cancer*; and</td>
<td></td>
</tr>
<tr>
<td>- Patient is between 55 and 77 years of age; and</td>
<td></td>
</tr>
<tr>
<td>- Patient has at least a 30 pack-year history of cigarette smoking; and</td>
<td></td>
</tr>
<tr>
<td>- Currently smokes or quit within the past ≤ 15 years</td>
<td></td>
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<tr>
<td>- A written order for LDCT lung cancer screening that includes counseling and shared decision making</td>
<td></td>
</tr>
</tbody>
</table>

The Medicare Decision Memo and NCD 210.14

*Patients that present with the following symptoms are not eligible for screening, rather, they should be considered symptomatic for lung cancer: unexplained cough, hemoptysis, or unexplained weight loss of more than 15 pounds in the past year.
CH-33.3: Incidental Pulmonary Nodules Detected on Low Dose CT Chest (LDCT) Images

- Any Lung-RADS less than 1 year interval follow-up is coded as Low-Dose CT Chest CPT® 71250 (Not CPT® G0297 which is ONLY the annual screen)
- For lung nodules, including incidental findings from studies other than screening LDCT, See CH-16.2: Incidental Pulmonary Nodules Detected on CT Images

<table>
<thead>
<tr>
<th>Primary Category/Category Descriptor*</th>
<th>Management</th>
</tr>
</thead>
<tbody>
<tr>
<td>3: Probably benign finding(s) - short term follow-up suggested; includes nodules with a low likelihood of becoming a clinically active cancer</td>
<td>6 month LDCT with a return to annual LDCT screening if unchanged.</td>
</tr>
<tr>
<td>4A: Suspicious - Findings for which additional diagnostic testing and/or tissue sampling is recommended</td>
<td>PET/CT may be used when there is a ≥8 mm solid component Follow-up with LDCT in 3 months with another LDCT in 6 months and a return to annual screening if stable and there is low suspicion of lung cancer.</td>
</tr>
<tr>
<td>4B or 4X: Suspicious - Findings for which additional diagnostic testing and/or tissue sampling is recommended</td>
<td>CT Chest with or without contrast, PET/CT and/or tissue sampling depending on the probability of malignancy and comorbidities. PET/CT may be used when there is a ≥8 mm solid component. If there is low suspicion of lung cancer, follow-up with LDCT in 3 months with another LDCT in 6 months and a return to annual screening if stable.</td>
</tr>
</tbody>
</table>


References
2. CMS Decision Memo for Lung Cancer Screening with Low Dose Computed Tomography (LDCT) (210.14) Effective Date of this Version 2/5/2015.
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# Abbreviations for Head Imaging Guidelines

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>ACTH</td>
<td>adrenocorticotropic hormone</td>
</tr>
<tr>
<td>AD</td>
<td>Alzheimer’s Disease</td>
</tr>
<tr>
<td>ADH</td>
<td>antidiuretic hormone</td>
</tr>
<tr>
<td>AION</td>
<td>arteritic ischemic optic neuritis</td>
</tr>
<tr>
<td>AVM</td>
<td>arteriovenous malformation</td>
</tr>
<tr>
<td>CBCT</td>
<td>Cone-beam computerized tomography</td>
</tr>
<tr>
<td>CMV</td>
<td>cytomegalovirus</td>
</tr>
<tr>
<td>CSF</td>
<td>cerebrospinal fluid</td>
</tr>
<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>DNA</td>
<td>deoxyribonucleic acid</td>
</tr>
<tr>
<td>DWI</td>
<td>diffusion weighted imaging (for MRI)</td>
</tr>
<tr>
<td>EEG</td>
<td>electroencephalogram</td>
</tr>
<tr>
<td>ENT</td>
<td>Ear, Nose, Throat</td>
</tr>
<tr>
<td>ESR</td>
<td>erythrocyte sedimentation rate</td>
</tr>
<tr>
<td>FDG</td>
<td>fluorodeoxyglucose</td>
</tr>
<tr>
<td>FSH</td>
<td>follicle-stimulating hormone</td>
</tr>
<tr>
<td>FTD</td>
<td>Frontotemporal Dementia</td>
</tr>
<tr>
<td>GCA</td>
<td>giant cell arteritis</td>
</tr>
<tr>
<td>GCS</td>
<td>Glasgow Coma Scale</td>
</tr>
<tr>
<td>HIV</td>
<td>human immunodeficiency virus</td>
</tr>
<tr>
<td>LH</td>
<td>luteinizing hormone</td>
</tr>
<tr>
<td>MMSE</td>
<td>mini mental status examination</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
<tr>
<td>MRN</td>
<td>magnetic resonance neurography</td>
</tr>
<tr>
<td>MS</td>
<td>multiple sclerosis</td>
</tr>
<tr>
<td>MSI</td>
<td>magnetic source imaging</td>
</tr>
<tr>
<td>NAION</td>
<td>non-arteritic ischemic optic neuritis</td>
</tr>
<tr>
<td>NPH</td>
<td>normal pressure hydrocephalus</td>
</tr>
<tr>
<td>PET</td>
<td>positron emission tomography</td>
</tr>
<tr>
<td>PML</td>
<td>progressive multifocal leukoencephalopathy</td>
</tr>
<tr>
<td>PNET</td>
<td>primitive neuro ectodermal tumor</td>
</tr>
<tr>
<td>PWI</td>
<td>perfusion weighted imaging (for MRI)</td>
</tr>
<tr>
<td>SAH</td>
<td>subarachnoid hemorrhage</td>
</tr>
<tr>
<td>SIADH</td>
<td>Syndrome of Inappropriate Antidiuretic Hormone Secretion</td>
</tr>
<tr>
<td>SLE</td>
<td>systemic lupus erythematosus</td>
</tr>
<tr>
<td>TIA</td>
<td>transient ischemic attack</td>
</tr>
<tr>
<td>TMJ</td>
<td>temporomandibular joint disease</td>
</tr>
<tr>
<td>TSH</td>
<td>thyroid-stimulating hormone</td>
</tr>
<tr>
<td>VBI</td>
<td>vertebrobasilar insufficiency</td>
</tr>
<tr>
<td>VP</td>
<td>ventriculoperitoneal</td>
</tr>
<tr>
<td>XRT</td>
<td>radiation therapy</td>
</tr>
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**HD-1.0: General Guidelines**

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination and appropriate laboratory studies should be performed prior to considering the use of an advanced imaging (CT, MR, Nuclear Medicine) procedure. An exception can be made if the patient is undergoing a guideline-supported, scheduled follow-up imaging evaluation.
  - The clinical evaluation should include a relevant history and physical examination, including a neurological examination (unless the request is for a scheduled follow-up of known problems such as MS, tumors, or hydrocephalus, scheduled surveillance with no new symptoms, screening asymptomatic patient due to family history or otherwise meet criteria for repeat imaging), as well as appropriate laboratory studies and non-advanced imaging modalities
    - A detailed neurological exam is required prior to advanced imaging except in the following scenarios:
      - Tinnitus, TMJ, Sinus or mastoid disease, ear pain, hearing loss, eye disease, and epistaxis. (A relevant physical exam is still required.)
      - The request is from a neurologist or neurosurgeon who has seen the patient since onset of symptoms
  - Other meaningful contact (telephone call, electronic mail or messaging) with an established patient can substitute for a face-to-face clinical evaluation

**HD-1.1: General Guidelines – Anatomic Issues**

- If two studies using the same modality both cover the anatomic region of clinical interest, only one is generally needed, with the exception of the following scenarios:
  - CT Maxillofacial (CPT® 70486, CPT® 70487, or CPT® 70488) or CT Orbital/Temporal bone (CPT® 70480, CPT® 70481, or CPT® 70482): both cover the structures of the orbits, sinuses, and face. Two separate imaging studies are only supported if there is suspicion of simultaneous involvement of more posterior lesions, especially of the region involving the middle or inner ear.
  - Pituitary Gland: one study (either MRI Brain [CPT® 70553] or MRI Orbit, Face, Neck [CPT® 70543]) is adequate to report the imaging of the pituitary. If a previous routine MRI Brain was reported to show a possible pituitary tumor, a repeat MRI with dedicated pituitary protocol may be performed.
  - Internal Auditory Canal (IAC) MRI can be reported as a limited study with one code from the set (CPT® 70540, CPT® 70542, or CPT® 70543), but should not be used in conjunction with MRI Brain codes (CPT® 70551, CPT® 70552, or CPT® 70553) if IAC views are performed as part of the brain.
  - Mandible (jaw): CT Maxillofacial (CPT® 70486, CPT® 70487, or CPT® 70488) or CT Neck (CPT® 70490, CPT® 70491, or CPT® 70492) can be used to report imaging of the mandible. CT Neck will also image the submandibular space.
    - If MRI is indicated, MRI Orbit, Face, Neck (CPT® 70540, CPT® 70542, or CPT® 70543) can be used to report imaging of the mandible and submandibular space.
MRI Temporomandibular Joint(s) (TMJ) is reported as CPT® 70336. This code is inherently bilateral and should not be reported twice on the same date of service.

**HD-1.2: General Guidelines – Modality**

- MRI is preferable to CT for most indications. For exceptions, see **HD-1.4: General Guidelines – CT Head**.

- MRI may be performed for these indications following an initial CT:
  - MRI Brain without and with contrast (CPT® 70553) may be performed to follow-up abnormalities seen on CT Head without contrast (CPT® 70450) when a mass, lesion, or infection is found.
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) (preferred) may be performed to follow-up abnormalities seen on CT Head without contrast (CPT® 70450) when there is suspected Multiple Sclerosis or other demyelinating disease.
  - MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) may be performed to follow up on stroke or TIA when initial CT Head was done on emergent basis.
  - MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) for evaluation of new onset seizures.

**HD-1.3: General Guidelines – MRI Brain**

- MRI Brain with contrast (CPT® 70552) should not be ordered except to follow-up on a very recent non-contrast study (within two weeks).

The AMA CPT manual does not describe nor assign any minimum or maximum number of sequences for any CT or MRI study. Both MRI and CT imaging protocols are often influenced by the individual clinical situation of the patient and additional sequences are not uncommon. There are numerous MRI sequences that may be performed to evaluate specific clinical questions, and this technology is constantly undergoing development. Additional sequences, however, are still performed and coded under the routine MRI Brain CPT® 70551, CPT® 70552, or CPT® 70553.

**HD-1.4: General Guidelines – CT Head**

- Scenarios in which MRI is contraindicated (i.e. pacemakers, ICDs, cochlear implants, aneurysm clips, orbital metallic fragments, etc.)
- CT Head without contrast (CPT® 70450) in nearly all cases, to show:
  - Mass effect
  - Blood/blood products
  - Urgent/emergent settings due to availability and speed of CT
  - Trauma
  - Recent hemorrhage, whether traumatic or spontaneous
  - Bony structures of the head evaluations
- Hydrocephalus evaluation and follow-up (some centers use limited non-contrast “fast or rapid MRI” (CPT® 70551) to minimize radiation exposure in children - these requests may be approved).
- Prior to lumbar puncture in patients with cranial complaints (without contrast) (CPT® 70450)

**HD-1.5: General Guidelines – CT and MR Angiography (CTA and MRA)**

- MRA Head may be performed without contrast (CPT® 70544), with contrast (CPT® 70545), or without and with contrast (CPT® 70546).
- CTA Head without and with contrast (CPT® 70496)
- MRA Neck may be done either without contrast (CPT® 70547), with contrast (CPT® 70548), or without and with contrast (CPT® 70549), depending on facility preference and protocols and type of scanner
- MRA Head or CTA Head may be considered with suspected intracranial vascular disease, for example:
  - Pulsatile tinnitus
  - Hemifacial spasm if consideration for surgical decompression
  - Evaluation of stroke or TIA (See **HD-21: Stroke/TIA**)
  - Trigeminal neuralgia failed medical therapy
  - Cerebral sinus thrombosis suspected with increased intracranial pressure (refractory headaches, papilledema, diagnosis of pseudotumor cerebri)
  - Aneurysm suspected with acute “thunderclap” headache syndrome and appropriate screening or evaluation of known subarachnoid hemorrhage
  - Intra-cranial pre-operative planning if there is concern of possible vascular involvement or risk for vascular complication from procedure
  - Suspicion of vasculitis based on supporting clinical evidence
- NOTE: Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebral-basilar system.
- MRA Head without, with, or without and with contrast or CTA Head for follow up of aneurysm clipping or coiling procedures (See **HD-12.1: Intracranial Aneurysms**)

- CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart (there is no specific code for CT/MR venography):
  - If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures
  - MRA without and with contrast with venous sinus thrombosis to differentiate total from subtotal occlusion

**HD-1.6: General Guidelines – PET Coding Notes**

- Metabolic Brain PET should be reported as Metabolic Brain PET (CPT® 78608)
- Amyloid Brain PET should be reported as limited PET (CPT® 78811) or limited PET/CT (CPT® 78814)
HD-1.7: General Guidelines – Other Imaging Situations

- Nausea and vomiting, persistent, unexplained and a negative GI evaluation: can undergo MRI Brain without contrast (CPT® 70551). See **AB-1.10: Special Considerations** in the Abdomen Imaging Guidelines.

- ECT treatment to screen for intracranial disease: can undergo either MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450).

- Screening for metallic fragments before MRI should be done initially with Plain x-ray.
  - The use of CT Orbital to rule out orbital metallic fragments prior to MRI is rarely necessary.
  - Plain x-rays are generally sufficient; x-ray detects fragments of 0.12 mm or more, and CT detects those of 0.07 mm or more.

- Plain x-ray is generally sufficient to screen for aneurism clips.

- CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) can be considered when performed in conjunction with conventional angiography (i.e.: conventional 4 vessel cerebral angiography).

References

<table>
<thead>
<tr>
<th>HD-2: Taste and Smell Disorders</th>
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<tbody>
<tr>
<td>HD-2.1: Taste and Smell Disorders</td>
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</table>
**HD-2.1: Taste and Smell Disorders**

- MRI Brain without and with contrast (CPT® 70553) or without contrast (CPT® 70551) is considered with unexplained unilateral or bilateral anosmia (inability to perceive odor) or dysgeusia (complete or partial loss of taste)\(^1,2\).
- CT Maxillofacial without contrast (CPT® 70486)\(^2\) consider initially if sinus or facial bone disorders is suspected.

**References**

**HD-3.1: Ataxia**

- MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) is considered in all patients with ataxia:¹
  - MRI Cervical, Thoracic and/or Lumbar Spine without contrast (CPT® 72141, CPT® 72146, CPT® 72148)¹ if spinal disease is suspected
  - If these symptoms are acute and stroke is suspected, See **HD-21: Stroke/TIA**
  - If MS is suspected, See **HD-16: Multiple Sclerosis (MS) and Related Conditions**
  - CT Head without contrast (CPT® 70450) and/or CT Temporal Bone without contrast (CPT® 70480) can be added¹ if these symptoms are acute following head trauma

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**HD-4.0: Behavioral Disorders – General Information**

Autism: See **PEDHD-17: Autism Spectrum Disorders** in the Pediatric Head Imaging Guidelines

**HD-4.1: Behavioral Disorders**

- Neuroses and psychoses do not routinely need advanced imaging

- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553), or CT Head without contrast (CPT® 70450)

- Bipolar disorder, schizophrenia, and related disorders may require advanced imaging in the following clinical circumstances:
  - Atypical clinical presentation
    - Acute onset
    - Late onset over age 40
    - Presents in setting of general medical illness or intensive care setting
    - Non-auditory hallucinations (e.g., visual, tactile, olfactory)
    - Patients who fail to respond to treatment in the expected manner and who manifest features suggestive of an organic brain disorder (for example, focal deficits, severe headache, or seizures)

**References**

**HD-5: Chiari and Skull-Base Malformation**

See **PEDHD-9: Chiari and Skull Base Malformations** in the Pediatric Head Imaging Guidelines
### HD-6: Facial Palsy (Bell’s Palsy)

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**HD-6.1: Facial Palsy**

Typical features of Bell’s palsy include spontaneous onset over 72 hours, otherwise normal neurological and systemic examination, variable initial ipsilateral temporal and auricular pain, and slow improvement over several months. Unless “red flags” are present, imaging is not necessary.

- MRI Brain without and with contrast (CPT® 70553) (with attention to posterior fossa and IACs) is considered with the following “red flags” of unexplained facial paresis/paralysis in clinical scenarios with:¹,²
  - Trauma to the temporal bone²
  - History of tumor², systemic cancer, HIV or Lyme disease
  - No improvement in 8 weeks¹
  - No full recovery in 3 months²
  - Gradual onset over weeks to months
  - Vertigo or hearing loss
  - Bilateral involvement
  - Other atypical or inconsistent features² including:
    - Second episode of paralysis on the same side²
    - Paralysis of isolated branches of the facial nerve²
    - Paralysis associated with other cranial nerves²

- MRI Brain without and with contrast (CPT® 70553) may be considered for known sarcoidosis with suspected neurosarcoid or CNS involvement

**HD-6.2: Hemifacial Spasm**

- MRI Brain without and with contrast (CPT® 70553)
- May add CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) prior to a vascular decompression surgical procedure to clarify the vascular anatomy in patients who have failed conservative medical management

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**HD-7.1: Recurrent Laryngeal Palsy**

The following can be considered with unilateral vocal cord/fold palsy identified by laryngoscopy:\(^1\)

- MRI Brain without and with contrast (CPT\(^\circledR\) 70553) or MRI Brain without contrast (CPT\(^\circledR\) 70551)
- CT Neck with contrast (CPT\(^\circledR\) 70491) or MRI Neck without and with contrast (CPT\(^\circledR\) 70543)
- CT Chest with contrast (CPT\(^\circledR\) 71260) may be added with left vocal cord palsy\(^1\)

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HD-8.1: Dementia
MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) or CT Head without contrast (CPT® 70450) is considered after an initial clinical diagnosis of dementia has been established based on a detailed history of memory loss with impairment of day-to-day activities confirmed by family members or others with knowledge of the patient’s status and/or abnormal bedside mental status testing such as Mini-Mental Status Exam (MMSE) with score <26, Montreal Cognitive Assessment Survey (MoCA) with score <26, Memory Impairment Screen (MIS) with score <5, or the St. Louis University Mental Status (SLUMS) with score <21. Neuropsychological testing can be performed when history and bedside mental status examination cannot provide a confident diagnosis.

Practice Notes
- 3D Brain imaging in dementia
  - 3D analysis of the temporal lobes and hippocampus (also known as volumetric analysis or Neuro Quant) (CPT® 76376 and CPT® 76377) lacks sufficient specificity and sensitivity to be clinically useful in the evaluation or follow up of patient with dementia. Its use is limited to research studies and it is otherwise considered to be investigational and experimental in routine clinical practice.

HD-8.2: Dementia - PET
Send these requests for Medical Director Review.

CPT® 78608 is used to report FDG PET metabolic brain studies for dementia, seizure disorders, and dedicated PET tumor imaging studies of the brain.

CPT® 78609 is used to report PET Brain perfusion studies that are not performed with FDG. These scans are nationally noncovered by Medicare.

CPT® 78811 (limited PET) or CPT® 78814 (limited PET/CT) are used to report Amyloid Brain PET (these codes are for static images to measure amyloid, as opposed to the FDG PET which is a metabolic study).

- FDG PET for Dementia and Neurodegenerative Diseases
  - FDG Brain PET (CPT® 78608) may be useful in distinguishing between Alzheimer’s disease and Frontotemporal dementia. It is otherwise considered investigational and experimental for the purpose of diagnosis and management of mild cognitive impairment and other forms of dementia including, but not limited to, Lewy Body disease, Parkinson’s disease, Normal Pressure Hydrocephalus and Chronic Traumatic Encephalopathy. Appropriate documentation should support concern for one of the variants of Frontotemporal dementia (Behavioral Variant or Primary Progressive Aphasia type FTD) based on a detailed history and exam findings (which may include neuropsychological testing) and meet the following criteria:
    - Meets diagnostic criteria for AD and FTLD; and
    - Has a documented cognitive decline of at least 6 months; and
    - Evaluation has ruled out specific alternative neurodegenerative disease or causative factors; and
- Cause of clinical symptoms is uncertain; and
- The results are expected to help clarify the diagnosis between FTLD and AD and help guide future treatment.
- Medicare covers FDG PET for individuals with a recent diagnosis of dementia and documented cognitive decline of at least six months who meet diagnostic criteria for both Alzheimer's disease (AD) and Frontotemporal Dementia (FTD).
- The individual must have been evaluated for specific alternate neurodegenerative diseases or other causative factors, but the etiology of the symptoms remains unclear
- Other conditions must also be met. For the complete coverage policy, See the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.13
- Medicare also covers FDG PET for individuals with mild cognitive impairment or early dementia when the study is performed in the context of a CMS-approved clinical trial. Requirements are detailed in Section 220.6.13 of the NCD Manual
- All other uses of FDG PET for patients with a presumptive diagnosis of dementia-causing neurodegenerative disease for which CMS has not specifically indicated coverage continue to be noncovered. Examples of noncovered indications described in the NCD include: possible or probable Alzheimer's disease (AD), clinically typical fronto-temporal dementia (FTD), dementia of Lewy bodies, and Creutzfeld-Jacob disease.


Amyloid Brain PET
- Amyloid Brain PET (CPT® 78811 or CPT® 78814) imaging is considered experimental and investigational in the diagnosis of Alzheimer's disease and in differentiating between Alzheimer's disease and other neurodegenerative/neurologic disorders.3,4,5
- Amyloid PET studies may be approved one time for Medicare patients enrolled in approved clinical trials under Coverage with Evidence Development (CED) program. For CMS, approval with CED is available for patients enrolled in studies approved by CMS. See the link below for a list of the CMS approved clinical trials: https://www.cms.gov/Medicare/Coverage/Coverage-with-Evidence-Development/Amyloid-PET.html
- Medicare will reimburse for Brain PET only through CED
- Only one study will be paid per beneficiary and the radiopharmaceutical must be FDA-approved. As of September 2, 2016, examples of radiopharmaceuticals which met this qualification include Amyvid™ (florbetapir F18), Neuraceq™ (florbetaben F18) and Vizamyl™ (flutemetamol F18)

Practice Notes
The frontotemporal dementias (FTDs) are a group of neurodegenerative disorders that differ from Alzheimer's disease. The basic pathology involves accumulation of tau proteins in the brain rather than amyloid. Onset tends to be younger (less than 65) and
progression usually more rapid than in senile dementia-Alzheimer type (SDAT). There is no treatment, and the medications used to help memory in Alzheimer’s disease are not effective.

There are several subtypes of FTD; most common are the behavioral variant with early loss of executive functions, impaired judgment disinhibition and impulsivity, and the semantic variant with primary and progressive loss of language ability. Other less common subtypes include progressive supranuclear palsy, corticobasal syndrome, and FTD associated with motor neuron disease.

Diagnosis is based on clinical features, neuropsychological testing, and brain imaging (preferably MRI) to rule out other structural disease. Metabolic (FDG) PET Brain may also be helpful by demonstrating patterns of abnormality more consistent with FTD than Alzheimer’s disease.


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HD-9.1: Epilepsy/Seizures

MRI Brain without and with contrast (CPT® 70553) or MRI Brain without contrast (CPT® 70551) may be considered:\(^1,^6\)
- Evaluation of new onset seizures
- Refractory or drug resistant seizures
- Change in the type of seizure
- Preoperative planning
- If CT Head was performed for an initial evaluation, MRI (as described above) may be approved for additional evaluation
- Follow-up studies after a previous routine normal study may be considered if performed with special “Epilepsy Protocol” (typically 3T magnet, thin sections with angled slices through hippocampus and temporal lobes)

FDG PET (CPT® 78608) for surgical planning in patients with refractory seizures who are candidates for epilepsy surgery.\(^1\) (These requests are often accompanied by requests for functional MRI (See HD-24.2: Functional MRI (f-MRI)) for surgical planning).
- Medicare covers FDG PET for pre-surgical evaluation for the purpose of localization of a focus of refractory seizure activity. The complete coverage policy is found in the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.9


References
HD-10.1: Facial Pain/Trigeminal Neuralgia

- MRI Brain without and with contrast (CPT® 70553) (with special attention to the skull base), and/or facial imaging, MRI Orbit without and with contrast (CPT® 70543) may be of value in a given case, including:
  - Suspected tic douloureux or one of its cranial nerve variants such as glossopharyngeal neuralgia (CN IX)
  - Concern about an underlying diagnosis of multiple sclerosis.
  - Trigeminal neuralgia which involves the ophthalmic nerve, (periorbital or forehead pain), once post-herpetic neuralgia (a complication of shingles) has been excluded by history

- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) may be performed for:
  - Failed medical treatment
  - Surgical planning

Practice Notes

The differential diagnosis of facial pain is extensive, complex, and difficult, and there is considerable case-to-case variation in optimal imaging pathway.

References

## HD-11: Headache

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**HD-11.1: Headache Non-Indications**

Neuroimaging is not usually warranted in patients with migraine and a normal neurologic examination.⁴

- Advanced imaging of the head is NOT indicated for any of the following:
  - Primary headache disorder in the absence of focal neurological deficits or “red flags” (headaches that meet criteria for migraine or tension variety) (See **HD-11.2: Headaches with Red Flags**)
  - Chronic headaches or intermittent recurring headaches with a normal exam, no significant recent changes in pattern or character of headache
  - A new, recent onset headache without “red flags” or findings such as focal deficits, papilledema, age over 50, headache that awakens patient from sleep, or “thunderclap” headache

**Practice Notes**

Cervicogenic Headache - Defined as headaches caused by a disorder of the cervical spine, usually accompanied by neck pain or other signs and symptoms of cervical disease. Typical findings include reduced cervical range of motion, side-locked pain, and symptoms exacerbated by provocative maneuvers such as head movement or digital pressure. If suspected clinically, MRI Cervical Spine may be considered.

See **SP-3: Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma** in the Spine Imaging Guidelines

**HD-11.2: Headaches with Red Flags**

- Red Flags:
  - Unusual symptoms or history (cancer history, immunosuppression, sudden onset, headache accompanied by seizures, new onset age >50, history of head trauma, headache awakens patient from sleep, headache precipitated by cough or valsalva); OR
  - Abnormal examination findings (altered mental status, papilledema, focal signs or symptoms (unilateral weakness or sensory loss), loss of coordination, seizures, gait disturbance, cranial nerve palsy, vision loss, nystagmus, dysarthria, dysphagia, fever, meningismus)

- If any of the above unusual symptoms or history are present advanced imaging studies may be considered; see relevant section below.
- If any of the above abnormal examination findings or chronic headache with significant change in character, severity or frequency of headache (For example: rapidly increasing headache intensity or frequency, transformation of established migraine to chronic daily headaches):
  - MRI Brain without and with contrast (preferred study) (CPT® 70553); or
  - MRI Brain without contrast (CPT® 70551); or
  - CT Head without contrast (preferred study) (CPT® 70450)
  - MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA/CTV Head (CPT® 70496) can be added to evaluate the recent onset of a progressive,
severe, daily headache, with or without papilledema and concern for cerebral venous sinus thrombosis.

- For papilledema see **HD-17: Papilledema/Pseudotumor Cerebri**

### HD-11.3: Sudden Onset of Headache

- For sudden onset of headache including:
  - Worst, most severe headache ever experienced or thunderclap-type\(^1,2,6\)
    (example: awakening from sleep)\(^2,4\)
  - Sudden onset unilateral headache, suspected carotid or vertebral dissection or ipsilateral Horner’s syndrome\(^1\)

- If any of these onset of headache features are present, the following advanced imaging studies may be considered:
  - CT Head without contrast (preferred study) (CPT® 70450) or MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) and/or
  - CTA Head (CPT® 70496); or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546)
  - MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) or CTA Neck (CPT® 70496) may also be performed if arterial dissection is suspected

See **HD-12.1: Intracranial Aneurysms** and **HD-21.1: Stroke/TIA**

### HD-11.4: Trigeminal Autonomic Cephalgias

- Trigeminal autonomic cephalgias includes cluster headache short-lasting, unilateral, neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) syndromes; hemicrania continua.
  - May also include one-time pituitary screening\(^1,12\)

- Cluster Headache (may also include pituitary)

- The following advanced imaging studies may be considered for trigeminal autonomic cephalgias and cluster headache:
  - MRI Brain without and with contrast (preferred study) (CPT® 70553); or
  - MRI Brain without contrast (CPT® 70551)

See **HD-10: Facial Pain/Trigeminal Neuralgia**
HD-11.5: Skull Base, Orbit, Periorbital or Oromaxillary

- Skull base, orbital, periorbital or oromaxillary imaging is appropriate for concern of skull base tumors in patients with head and neck cancers, other skull base abnormalities seen on previous imaging, any invasive sinus infections as well as sinus tumors or orbital tumors with intracranial extension. In these clinical scenarios, any one of the following procedures may be considered:
  - MRI Brain and Orbits without and with contrast (preferred study) (CPT® 70553 and CPT® 70543); or
  - MRI Brain and Orbits without contrast (CPT® 70551 and CPT® 70540); or
  - CT Head and Orbits without and with contrast (CPT® 70470 and CPT® 70482); or
  - CT Head and Orbits with contrast (CPT® 70460 and CPT® 70481)

HD-11.6: Suspected Intracranial Extension of Sinusitis or Mastoiditis

- For suspected intracranial extension of sinusitis or mastoiditis, not cervicogenic:
  - MRI Brain without and with contrast (CPT® 70553) may be considered (See PEDHD-16.2: Ear Pain in the Pediatric Head Imaging Guidelines)

HD-11.7: New Headache Onset Older than Age 50

- For new onset headache in patients older than 50 years of age the following may be considered:
  - MRI Brain without and with contrast (preferred study) (CPT® 70553); or
  - MRI Brain without contrast (CPT® 70551);
  - If Giant Cell Arteritis is suspected, MRA Head (CPT® 70544, CPT® 70545 or CPT® 70546) may be added.

HD-11.8: Cancer or Immunosuppression

- For new headache in patients with cancer or who are immunocompromised, the following may be considered:
  - MRI Brain without and with contrast (preferred study) (CPT® 70553); or
  - MRI Brain without contrast (CPT® 70551)

HD-11.9: Abnormal Blood Clotting

- MRI Brain without and with contrast (CPT® 70553); or MRI Brain without (CPT® 70551); or CT Head without contrast (CPT® 70450)
  - New onset headaches in patient with hypercoagulable states
    - MRA/MRV Head (CPT® 70544, CPT® 70545 or CPT® 70546) or CTA/CTV Head (CPT® 70496) may be added if there is concern for venous sinus thrombosis
  - Patients with potential for bleeding diathesis
    - Taking anticoagulants or two or more antiaggregants or having a medical condition that predisposes to bleeding (for example, liver failure).
      - Anticoagulants include warfarin, Arixtra, Xarelto, Eliquis, Savaysa, Heparin, Fragmin, Innohep, Lovenox, Orgaran, Angiomax, Pradaxa, Acova, Iprivask and Refludan.
- Antiaggregants include aspirin, Plavix, Aggrenox, Brilinta, Pravigard, Pletal, Effient, Kengreal, Persantine, and Ticlid.

**HD-11.10: Pregnancy**
- For new onset headache during pregnancy\(^1\) or immediate post-partum period (within 3 months after delivery) the following may be considered:
  - MRI Brain without contrast (Gadolinium relatively contraindicated in pregnancy) (CPT® 70551)
  - MRA/MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA/CTV Head (CPT® 70496) may be added if there is concern for venous sinus thrombosis.

**HD-11.11: Physical Exertion**
- For onset of headache with Valsalva maneuver,\(^2,6\) cough, physical exertion or sexual (post-coital) activity,\(^1,6\) but not merely a worsening of a pre-existing headache with these activities, the following procedures may be considered:
  - MRI Brain without and with contrast (preferred study) (CPT® 70553); or
  - MRI Brain without contrast (CPT® 70551); or
  - CT Head without contrast (CPT® 70450); AND/OR
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or
  - CTA Head without and with contrast (CPT® 70496)

**HD-11.12: Post-Trauma**
- For post-traumatic headaches within 2 weeks of the injury See **HD-13: Head and Facial Trauma**
- For post-traumatic headaches persisting for longer than 2 weeks following the injury, but within one year of the injury, the following may be considered:
  - CT Head without contrast (CPT® 70450); or
  - MRI Brain without contrast (CPT® 70551); or
  - MRI Brain without and with contrast (CPT® 70553)

**HD-11.13: Acute Systemic Infections**
- For acute systemic infections with meningeal neck stiffness\(^1,6\) the following may be considered:
  - MRI Brain without and with contrast (preferred study) (CPT® 70553); or
  - MRI Brain without contrast (CPT® 70551)
- See **HD-14.1: CNS Infection**

**HD-11.14: Hydrocephalus Shunts**
- For Hydrocephalus Shunts See **PEDHD-7.3: Hydrocephalus**
HD-11.15: Low Pressure Headache and CSF Leak

- Evaluation of suspected low pressure headache and CSF leak may include MRI Brain without and with contrast (CPT® 70553) and MRI Cervical, Thoracic and Lumbar Spine, which according to facility protocols may be completed without contrast (CPT® 72141, CPT® 72146, and CPT® 72148), with and without contrast (CPT® 72156, CPT® 72157, and CPT® 72158) or with contrast only (CPT® 72142, CPT® 72147, and CPT® 72149) or CT myelography (CT Cervical, Thoracic, and Lumbar Spine with contrast [CPT® 72126, CPT® 72129, CPT® 72132])
- CT Maxillofacial without contrast (CPT® 70486) if concern for CSF rhinorrhea

References
# HD-12: Aneurysm and AVM

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**HD-12.1: Intracranial Aneurysms**

- **CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546)** can be performed in any of the following clinical scenarios:
  - Symptoms or signs of cerebral aneurysm, including:
    - “Thunderclap headache” See **HD-11.3: Sudden Onset of Headache**
    - Third nerve palsy with pupillary involvement (pupil-sparing third nerve palsies are not caused by external compression)
    - Suspicion of aneurysm bleed [CT Head or MRI Brain or CSF exam showing evidence of subarachnoid hemorrhage (SAH) or intracerebral hemorrhage]
    - Abnormal CT Head or MRI Brain suggesting possible aneurysm
  - Screening for High Risk Populations as defined by the following criteria (screening usually begins at age 20 unless unusual circumstances as aneurysms are uncommon in children and adolescents):
    - Positive Family History: Two or more first degree relatives (parent, sibling, or child) with history of cerebral aneurysm or SAH: screening every 5 years beginning at age 20
      - One first degree relative (parent, sibling, or child) with history of cerebral aneurysm or SAH may also have one screening study but risks and benefits should be discussed with patient
    - Autosomal dominant polycystic kidney disease (screening begins at age 20 to 65 and is repeated at ten-year intervals)
    - Aortic coarctation or bicuspid aortic valve
    - Type 4 (Vascular) Ehlers-Danlos Syndrome
    - Marfan’s Syndrome
    - Loeys-Dietz Syndrome
    - Microcephalic osteodysplastic primordial dwarfism
    - Patients with previous history of SAH or treatment for cerebral aneurysm: continued surveillance and screening every 5 years
    - Presence of an azygos anterior cerebral artery
    - Diagnosis of fibromuscular dysplasia (one screening study after confirmed diagnosis)
  - **CTA Head (CPT® 70496)** may be performed to confirm questionable or equivocal findings on an initial MRA Head.
  - **Follow up of known cerebral aneurysm**
    - Known incidentally discovered aneurysms which have never bled. The optimal interval and duration of recommended follow up in the literature are undefined. The risk of aneurysm rupture is related to size, location (posterior circulation is higher risk), and patient factors including age, sex (higher for female), and history of smoking and hypertension.
    - Follow up at 6 months, 12 months and then annually for up to 5 years or until aneurysm is determined to be stable; and then at decreasing frequency, generally every 5 years unless judged to be at higher risk (see above risk factors).
    - **Follow up of treated aneurysms, clipping or coiling (with or without SAH)**
Follow up at 3 to 6 month intervals for the first year, then 6 to 12 months for up to 2 years, then annually to ensure that aneurysm is not recanalizing. If stable and occluded at last imaging then follow up surveillance every 5 years.
- MRI Brain without contrast (CPT® 70551) or with and without (CPT® 70553) may be added if there are new signs, symptoms or clinical findings, or to evaluate giant aneurysm (>2.5 cm).

MRI Spinal (Cervical, Thoracic, Lumbar (without and with contrast) [CPT® 72156, CPT® 72157, CPT® 72158]) is appropriate to evaluate patients with SAH and negative studies for brain aneurysm in whom spinal abnormalities (i.e. AVM) may be suspected as the cause of hemorrhage.

**HD-12.2: Arteriovenous Malformations (AVMs) and Related Lesions**
- MRI Brain without and with contrast (CPT® 70553) or without contrast (CPT® 70551) may be considered in the following clinical scenarios:
  - AVM is suspected based on a history of SAH.
  - Screening for:
    - Hereditary hemorrhagic telangiectasia syndrome (Osler Weber Rendu) See **PEDHD-10.2: Pediatric Intracranial Arteriovenous Malformations (AVM)** in the Pediatric Head Imaging Guidelines
    - Familial cavernous malformation: Screening should include MRI Brain without or without and with contrast (with gradient echo images).
- CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) can be performed if screening MRI Brain is positive.
- Repeat advanced imaging with MRI Brain without and with contrast (CPT® 70553) or without contrast (CPT® 70551), AND/OR MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) when requested by a specialist.

**Practice Notes**

Trauma is the most common reason for subarachnoid hemorrhage. Ruptured berry aneurysm is the most common reason for non-traumatic subarachnoid hemorrhage in adults.

Small aneurysms are present in about 1% to 2% of adults, but very few ever reach a size for which bleeding is a risk (>5 mm). Small (<3 to 4 mm) unruptured aneurysms in those with no personal history of SAH have a 0.1% to 0.5% a year rate of bleeding. The risk of cerebral aneurysm with family history ranges from 2% with one first degree relative to 30% to 35% for identical twin or two parents. The risks and benefits of screening these populations need to be considered before advanced imaging.

AVMs most often come to clinical notice either by bleeding or by acting as a seizure focus. They are usually congenital, recognized later in life and have an initial risk of bleeding of 2% per year.
References


# HD-13: Head and Facial Trauma

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HD-13.1: Head Trauma

Patients with head trauma are at risk for facial and cervical trauma.

See SP-3: Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma in the Spine Imaging Guidelines

- CT Head without contrast (CPT® 70450) is the primary imaging modality in patients with acute head trauma and any of the following modified Canadian Criteria:
  - Taking one anticoagulant or two antiaggregants, (e.g., aspirin and Plavix)
  - Known platelet or clotting disorder
  - Renal failure (creatinine >6)
  - Glasgow coma scale (GCS) score of less than 15 at 2 hours following injury
  - >30 minutes of amnesia
  - Any “dangerous mechanism of injury”
    - Fall greater than 5 steps down stairs
    - Fall from height greater than 3 feet
    - Any pedestrian motor vehicle accident
    - Ejection from motor vehicle
  - Suspected open skull fracture
  - Signs of basilar skull fracture (Battle’s sign, Raccoon eyes, CSF rhinorrhea, cranial nerve palsy, hemotympanum, acute hearing loss)
  - Two or more episodes of vomiting
  - Patient >64 years old

- MRI Brain without contrast (CPT® 70551) is thereafter used when the clinical findings are not explained by the CT results or to evaluate late effect of brain injury

Follow-up imaging, MRI or CT, for known subdural hematomas, intracerebral hemorrhage, or contusions can be done at the discretion of ordering specialist

Practice Note

Recent studies have shown that Diffusion tensor MRI tractography may be more sensitive in demonstrating abnormalities such as axonal injury in closed head injury than conventional MRI, but these techniques are best described presently as research tools and their use in routine clinical practice is not determined.

Decisions regarding return to normal activities, including sports, are made based on the clinical status of the patient and repeat imaging is unnecessary.
HD-13.2: Facial Trauma

- CT Maxillofacial without contrast (CPT® 70486) indicated for any concern regarding significant injury to facial structures including but not limited to:
  - Concern for orbital, maxillary, or mandibular fractures
  - Trauma with associated symptoms of anosmia, hearing, vision or speech changes, vertigo, facial numbness
  - Physical exam findings of CSF rhinorrhea, malocclusion, severe focal facial tenderness, focal loss of facial sensation

- CT Orbits/Temporal Bone without contrast (CPT® 70480):
  - Concern for orbital injury or orbital wall fracture
  - Symptoms of diplopia, blurred vision, vision loss
  - Physical exam findings of enophthalmos, entrapment of extraocular muscle(s)
  - Suspicion for temporal bone fracture

Note: Initial x-rays are not required before advanced imaging for the above indications

Practice Note

Imaging is not necessary in the evaluation of simple nasal fractures if tenderness and swelling is limited to the nasal bridge, the patient can breathe through each naris, and there is no septal hematoma.

References

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HD-14.1: CNS Infection

- Signs of intracranial infection include: 1) headaches, seizures or new focal deficits in a setting of fever or elevated white blood cell count (WBC); 2) known infection elsewhere; 3) or immunosuppression. The following studies may be considered for suspected intracranial infection if any of these signs of infection are present:
  - MRI Brain without and with contrast (CPT® 70553) (preferred), or
  - CT Head without and with contrast (CPT® 70470)

- FDG Brain PET (CPT® 78608) may be performed to evaluate patients suspected of having encephalitis, including autoimmune encephalitis, if diagnosis remains unclear after evaluation with MRI Brain, CSF analysis, and lab testing including serology, if appropriate.

References
HD-15.1: Movement Disorders

The majority of movement disorders are diagnosed based on a clinical diagnosis and do not require imaging. These include:

- Typical Parkinson’s Disease
- Essential Tremor or tremors of anxiety or weakness
- Restless Leg Syndrome
- Tics or spasms which can be duplicated at will

MRI Brain without contrast (CPT® 70551), or without and with contrast (CPT® 70553) is considered in the following clinical scenarios:

- Atypical Parkinsonism because of unusual clinical features (for example, persistent unilateral signs and symptoms, young onset under age of 50, rapid progression), incomplete or uncertain medication responsiveness, or clinical diagnostic uncertainty. These cases should be forwarded for Medical Director Review.
- Suspected Huntington Disease
- Evaluation for surgical treatment of Essential Tremor or Parkinson’s disease, including Deep Brain Stimulator (DBS) placement.
- CT Head without contrast (CPT® 70450) may be performed in follow up after surgery for DBS placement.

DAT-SPECT Radiopharmaceutical Localization SPECT (ioflupane I-123 SPECT) (CPT® 78803) may be considered:

- To evaluate patients in whom the diagnosis and differentiation between Parkinson’s disease and Essential Tremor remains unclear after evaluation by experts in movement disorders and medication trials.
- DAT Scans are not useful for differentiation of subtypes of Parkinson’s syndromes, to monitor progression of disease or predict risk of development of disease.

Practice Notes

There is little evidence to support the use of MRA/CTA and PET in the evaluation of movement disorders.
References
5. Perlmutter JS and Eidelberg D. To scan or not to scan: DaT is the question. *Neurology.* 2012 Mar 6;78(10):688-689.
**HD-16: Multiple Sclerosis (MS) and Related Conditions**

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</table>
HD-16.1: Multiple Sclerosis (MS)

- MRI Brain without and with contrast (CPT® 70553) and MRI Cervical and Thoracic Spine without and with contrast (CPT® 72156 and CPT® 72157) use in these clinical scenarios requires clinical suspicion based on recurrent episodes of variable neurological signs and symptoms or clinically isolated syndromes and the baseline exclusion of appropriate alternative conditions that can mimic MS.
  - MRI Orbit without and with contrast (CPT® 70543) may be considered if optic neuritis is suspected, in addition to the above scenario.
  - If a non-contrast study shows incidental evidence of possible demyelinating disease, repeat with MRI Brain with contrast (CPT® 70552) may be approved within 2 weeks of previous non-contrast study as the presence of enhancing lesions may be helpful in confirming the diagnosis.
    - If non-contrast study was performed more than 2 weeks prior to the request for repeat imaging, an MRI Brain with and without contrast (CPT® 70553) is appropriate.
  - If the diagnosis is still equivocal after initial screening repeat studies in 3 to 6 months may be performed.
  - Evidence does not support the use of 3T MRI as being more effective than 1.5T units for diagnosis or follow up of MS. Requests for repeat imaging should meet guidelines for timeliness as noted within these guidelines regardless of type of facility requested.

- MRI Lumbar Spine usually is not needed since Cervical and Thoracic studies will usually visualize the entire spinal cord.

- Repeat Brain and/or Spine imaging in an established patient may be considered in the following scenarios:
  - New episode of neurological deficit
  - Annual surveillance in stable patients
  - To re-establish baseline when instituting or changing immune-modulating agents
  - Symptoms suggestive of Progressive Multifocal Leukoencephalopathy (PML) during Tysabri therapy (or other drugs with similar risk).
    - Screening for patients on natalizumab (Tysabri) or other drugs with risk of PML (Progressive Multifocal Leukoencephalopathy)
      - If Anti-JCV antibody negative: MRI Brain annually
      - If Anti-JCV antibody positive: MRI every 6 months
      - If Anti-JCV antibody positive and titer >1.5, and >two years on treatment: MRI Brain may be performed every 3 months.
  - Repeat imaging requests for MRI without contrast for follow up may be approved when requested by a specialist (as long as request otherwise meets criteria above).

- Family members need not be screened, unless they exhibit suspicious signs or symptoms suggestive of MS.
**Practice Notes**

Multiple Sclerosis is common and variable with more women affected and at a younger age than men. MS tends to be relapsing-remitting (improves between episodes), relapsing-progressive (worsens with attacks) and chronic progressive (gradual and steady).

MS is a clinical diagnosis, traditionally recognized by "lesions dispersed in time and space," which means involvement of different areas of the neuraxis at different times.

Screening based on family history of MS is not supported by the peer-reviewed evidence.

Sagittal MRI Spinal Cord with phased array detector coil (CPT® 72156 or CPT® 72157) is an alternative spinal imaging.

3D imaging in the evaluation of Multiple Sclerosis has not been shown to improve diagnostic accuracy, or improve clinical outcomes in the management of multiple sclerosis and is considered to be experimental and investigational.

**HD-16.2: Neuromyelitis Optica and NMO Spectrum Disorders**

- Neuromyelitis optica (NMO, Devic's disease) is an autoimmune disease causing inflammation and demyelination of the optic nerve, spinal cord and brain. Diagnosis is based on the clinical presentation, MRI findings, and presence of auto-antibodies.
- MRI Brain without and with contrast (CPT® 70553), MRI Orbit without and with contrast (CPT® 70543), MRI Cervical and Thoracic Spine without and with contrast (CPT® 72156, CPT® 72157)
  - Suspected Neuromyelitis Optica
  - New symptoms or signs in patient with known Neuromyelitis Optica.

**References**


HD-17.1: Papilledema/Pseudotumor Cerebri

MRI Brain without and with contrast (CPT® 70553) can be considered when there is suspected elevated intracranial pressure, such as with pseudotumor cerebri (benign intracranial hypertension) and papilledema, to exclude cerebral mass lesions, obstructive hydrocephalus, or occult meningeal disease.
- MRI Orbit without and with contrast (CPT® 70543) or CT Orbit without and with contrast (CPT® 70482) may be considered if there is concern for orbital pseudotumor or a primary bilateral orbital disorder.
- Repeat imaging may be considered to evaluate either:
  - Shunt dysfunction in those patients who have had ventriculoperitoneal (VP) or lumboperitoneal (LP) shunts
  - Clinical deterioration
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head without and with contrast (CPT® 70496) can be approved for papilledema with suspected venous sinus thrombosis.
- CT and MR Venography (CTV and MRV) are reported with the same codes as the CTA/MRA counterpart. If arterial and venous CT or MR studies are both performed in the same session, only one CPT® code should be used to report both procedures

Reference
**HD-18.1: Paresthesias**

Requests will be sent for Medical Director Review. Paresthesia(s) (localized numbness and tingling) are symptoms of a local (nerve entrapment for example), regional (Multiple Sclerosis for example) or central (stroke for example) disorder.\textsuperscript{1,2} Advanced imaging can be considered initially, based on the highest suspicion disorder, according to these guidelines.\textsuperscript{1,2}

**References**

2. Paresthesia. ReedGroup\textsuperscript{®} MD Guidelines.
# HD-19: Pituitary

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HD-19.1: Pituitary

- Endocrine laboratory studies should be performed prior to considering advanced imaging, including Prolactin levels; thyroid function levels should also be checked to evaluate for untreated or inadequately treated hypothyroidism as a cause of hyperprolactinemia and pituitary hyperplasia.
  - Lab results should be recent, within 6 weeks of the request.

- Pituitary imaging is primarily performed with MRI Brain without and with contrast (CPT® 70553):
  - MRI Orbit, Face, Neck without and with contrast (CPT® 70543) or CT Head without and with contrast (CPT® 70470) are alternatives
  - CT Head without contrast (CPT® 70450) or without and with contrast (CPT® 70470) and/or CT Maxillofacial without contrast (CPT® 70486) may be used in addition to MRI to visualize perisellar bony structures in the preoperative evaluation of certain sellar tumors and for preoperative planning for transphenoidal approaches.

- Incidentally found lesions on other studies:
  - If a pituitary abnormality is reported incidentally on a MRI Brain or CT Head performed for other reasons, a follow-up dedicated pituitary study may be obtained (MRI Brain without and with contrast [CPT® 70553] or MRI Orbit/Face/Neck without and with contrast [CPT® 70543]). MRI Brain without and with contrast [CPT® 70553] covers both brain and dedicated pituitary if performed at the same time; no additional CPT® codes are needed); further evaluation and subsequent imaging dependent on specific imaging and biochemical laboratory evaluation findings.

- For Amenorrhea See PV-3.1: Amenorrhea in the Pelvic Imaging Guidelines
## Pituitary Imaging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Initial Imaging</th>
<th>Repeat Imaging</th>
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| **Acromegaly**<sup>**m***</sup> *(Elevated IGF-1 confirmed by lack of suppression of growth hormone on glucose suppression testing, with or without acromegaly)* | MRI Brain without and with contrast (CPT® 70553) | MRI Brain without and with contrast (CPT® 70553)  
- At least 12 weeks after surgery to evaluate for residual tumor  
- If treated with Pegvisomant, 6 to 12 months after treatment initiated, then annually if stable  
- If hormone levels increase or neurological findings appear |
| **Microadenoma:** Nonfunctioning, unexplained pituitary asymmetries, or incidentally found small tumors (<10 mm) | MRI Brain without contrast and with contrast (CPT® 70553) | MRI Brain without contrast and with contrast (CPT® 70553) at:  
- 6 and 12 months, then yearly for 3 years if stable. After 3 years, then every other year for the next 6 years, then every 5 years if stable |
| **Macroadenoma** *(≥10 mm) (if not surgically removed and normal hormonal testing)* | MRI Brain without and with contrast (CPT® 70553) | If ≥10 mm but ≤20 mm (normal hormone testing/no surgery):  
- MRI every 6 months for the first year, if stable in size, then annually for 5 years (longer if craniopharyngioma).  
- If >20 mm (normal hormone testing/no surgery):  
  - MRI every 6 months |
<p>| <strong>Rathke’s cleft cyst/Simple cyst</strong> | MRI Brain without and with contrast (CPT® 70553) | MRI Brain without and with contrast (CPT® 70553) in one year; if stable and without mass effect or invasion into surrounding structures, no further imaging is required. |</p>
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging</th>
</tr>
</thead>
</table>
| **Prolactinomas*** | MRI Brain without and with contrast (CPT® 70553) with:  
   - Unexplained elevated prolactin level above normal reference range  
   - After initial start of dopamine agonist therapy, repeat MRI in 1 year (or in 3 months if macroprolactinoma), also repeat if prolactin levels continue to rise while on dopaminergic agents, or if new symptoms emerge (e.g., galactorrhea, visual disturbances, headaches, or other hormonal disorders occur)  
   - Image after 2 years of dopamine agonist treatment for those who are being considered for discontinuation of treatment due to remission  
   - After 2 years of dopamine agonist therapy, for those who have achieved normal Prolactin levels and no visible tumor remnant, and for whom dopamine agonists have been discontinued or tapered, image if prolactin level increases above normal range.  
   - If treatment resistant on standard or maximal dopamine agonist therapy (e.g. visible tumor remnant or persistent elevation of Prolactin levels) and will not be treated with surgery/radiation, imaging periodically as per microadenoma or macroadenoma guidelines  
   - If treatment is discontinued at menopause, imaging periodically as per microadenoma or macroadenoma guidelines  
   - Galactorrhea/nipple discharge with normal prolactin and thyroid function levels: See [BR-6: Nipple Discharge/Galactorrhea](BR-6: Nipple Discharge/Galactorrhea) in the Breast Imaging Guidelines |
| **TSH, FSH, ACTH or LH producing** | MRI Brain without and with contrast (CPT® 70553) when hormone levels are inappropriately elevated. |
| **Male Hypogonadism** | MRI Brain without and with contrast (CPT® 70553) if  
   - Severe secondary hypogonadism (morning serum testosterone level <150 ng/dl and low or normal LH and FSH levels)  
   - Serum, free, or bioavailable morning testosterone level below normal range and low or normal LH and FSH levels accompanied by one of the following:  
   - Panhypopituitarism, hyperprolactinemia, symptoms or signs of tumor mass effect (e.g. headache, visual impairment, or visual field deficit), *****suspected alterations in sex hormone binding globulin (SHBG) |
<p>| <strong>Panhypopituitarism</strong> | MRI Brain without and with contrast (CPT® 70553) |</p>
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<th>Indication</th>
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<th>Repeat Imaging for Non-Operative Care</th>
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<tr>
<td><strong>Diabetes Insipidus (DI)</strong></td>
<td>➢ MRI Brain without and with contrast (CPT® 70553) if:</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>➢ Laboratory testing consistent with DI (serum osmolality should be high and urine osmolality should be low) and etiology uncertain</td>
<td></td>
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<tr>
<td><strong>Syndrome of Inappropriate ADH (SIADH)</strong></td>
<td>➢ MRI Brain without and with contrast (CPT® 70553) if:</td>
<td>NA</td>
</tr>
<tr>
<td></td>
<td>➢ Etiology remains uncertain or is thought to be in the nervous system;</td>
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<tr>
<td></td>
<td>➢ Urine osmolality should be high and serum osmolality low</td>
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<tr>
<td><strong>Other Pituitary Region Tumors</strong></td>
<td>➢ Evaluation may require CT in addition to MRI to evaluate for hyperostosis. Requests will be sent for Medical Director Review.</td>
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**HD-19.2: Additional Imaging**

➢ Post-operatively, follow-up pituitary imaging is generally done at the discretion of the neurosurgeon, usually at 4 months and then at one year if stable

*Practice Notes*

**Prolactinoma Note:** To establish the diagnosis of hyperprolactinemia, a single measurement of serum prolactin is recommended; a level above the upper limit of normal confirms the diagnosis as long as the serum sample was obtained without excessive venipuncture stress. Long-term or inadequately treated primary hypothyroidism can cause pituitary hyperplasia that may mimic a pituitary tumor. Routine imaging surveillance during pregnancy is not recommended due to risk to fetus. Repeat imaging with MRI without gadolinium is performed for new or worsening symptoms, such as headaches or visual symptoms. In women with microprolactinomas, it may be possible to discontinue dopaminergic therapy when menopause occurs. Surveillance for increasing size of the pituitary tumor should continue on a periodic basis.

**Other Pituitary Region Tumor Notes:** Craniopharyngiomas arise in the parasellar area. About 10% of meningiomas arise in this area.

**Enlarged/Empty Sella Turcica Notes:** An enlarged sella turcica without evident tumor is an incidental finding on MRI Brain or CT Head from a defect in the dural diaphragm of the sella (especially if there is elevated intracranial pressure from another cause), pituitary surgery, or as a result of a pituitary tumor which has expanded the sella and then infarcted (pituitary apoplexy).

**Acromegaly:** Rarely, biochemically confirmed acromegaly with a normal pituitary gland on MRI may occur. Somatostatin receptor scintigraphy (Octreoscan) of thorax and
abdomen and growth hormone-releasing hormone (GHRH) level may be considered to evaluate ectopically located disease.

**Male Hypogonadism**: Alterations in sex hormone-binding globulin (SHBG) can impact testosterone levels. Free or bioavailable testosterone concentrations should be measured when total testosterone concentrations are close to the lower limit of the normal range and when altered SHBG levels are suspected (e.g., moderate obesity, nephrotic syndrome, hypo- and hyperthyroidism, use of glucocorticoids, progestins, estrogens, and androgenic steroids, anticonvulsants, acromegaly, diabetes mellitus, aging, HIV disease, liver cirrhosis, hepatitis). LH and FSH should be obtained to evaluate for secondary (central) hypogonadism, once low testosterone level is confirmed.

**HD-19.3: Empty Sella Turcica**

- Enlarged/Empty Sella Turcica: An enlarged sella turcica without evident tumor is an incidental finding on MRI Brain or CT Head from a defect in the dural diaphragm of the sella (especially if there is elevated intracranial pressure from another cause), pituitary surgery, or as a result of a pituitary tumor which has expanded the sella and then infarcted (pituitary apoplexy).

- MRI Brain with and without contrast (pituitary protocol) (CPT® 70553) with thin sections of pituitary – (Preferred modality). CT Head with and without contrast (CPT® 70470) – If MRI is contraindicated

  - Primary Empty Sella:
    - Incidentally found on other studies, asymptomatic and no related abnormalities: follow up at 2 years. No further imaging unless clinical symptoms develop (neuro-/ophthalmological symptoms, intracranial hypertension, or endocrine/hormonal abnormalities).
    - Following medical treatment of related endocrine, neurological, or ophthalmological problems: follow up imaging every 6 months.
    - Following surgical treatment: follow up at 4 months and 1 year, (additional imaging only for clinical progression or at request of neurosurgeon).

  - Secondary Empty Sella:
    - Imaging according to the cause or if clinical disease progression (such as adenomas, infiltrative or malignant disorders, hormonal abnormalities, neuro-/ophthalmological symptoms).
References
HD-20.1: Scalp and Skull Lesions

The majority of these are benign soft tissue or bony lesions easily defined by physical examination or with skull x-rays or ultrasound.

▶ Ultrasound can be performed as initial imaging of scalp or skull lesions
▶ CT Head without or without and with contrast (CPT® 70450 or CPT® 70470) is appropriate for the following scenarios:
  ◆ Any lesion on physician examination and skull x-ray or ultrasound which is not clearly benign.
  ◆ Langerhans’ cell histiocytosis, myeloma, and metastatic cancer, when symptoms suggest bony lesions.
▶ MRI Brain without contrast (CPT® 70551) or with and without contrast (CPT® 70553) may be considered if there is concern for intracranial extension.
▶ See HD-30.2: Dental/Periodontal/Maxillofacial Imaging for mandibular masses and PEDHD-5.6: Other Indications for Sinus Imaging in the Pediatric Head Imaging Guidelines for maxillofacial masses
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**HD-21.1: Stroke/TIA**

- CT Head without contrast (CPT® 70450) for acute stroke (within the first 6 hours), TIA or concern for intracerebral or subdural hemorrhage
- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) to evaluate concern for new stroke or TIA. MRI is preferred for evaluation of late presentation and can be performed after an initial CT Head.
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) AND MRA Neck without contrast (CPT® 70547) or MRA Neck without and with contrast (CPT® 70549) or CTA Neck (CPT® 70498) may be added to CT Head or MRI Brain for evaluation of stroke or TIA. A previously performed Duplex Ultrasound Carotid Arteries (CPT® 93880), should not preclude the approval of these studies. Duplex Ultrasound Carotid Arteries (CPT® 93880) is not sufficient to image the vertebral arteries.
  - Note: Both MRA or CTA Head and Neck are needed to visualize the posterior vertebrobasilar circulation for evaluation of the vertebrobasilar stroke/TIA (vertigo associated with diplopia, dysarthria, bifacial numbness or ataxia)\(^1\)-\(^4\) or concern for arterial dissection (risks may include premature stroke [under age 50], head or neck trauma, fibromuscular dysplasia, Ehlers-Danlos syndrome, and chiropractic neck manipulation)
- MR or CT Venography (MRA Head [CPT® 70544, CPT® 70545, or CPT® 70546] or CTA Head [CPT® 70496]) may be performed to evaluate venous infarcts after diagnosis on MRI Brain or CT Head.
- Transcranial Doppler Studies may also be performed for patients with documented stroke or TIA (See **HD-24.8: Transcranial Doppler (CPT® 93886)**). Requests require Medical Record Review
- Repeat imaging for follow up and resolution of stroke or hemorrhage as determined by a specialist.
References
HD-22: Cerebral Vasculitis

HD-22.1: Cerebral Vasculitis

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**HD-22.1: Cerebral Vasculitis**

- MRI Brain without and with contrast (CPT® 70553) is considered when CNS vasculitis is suspected
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) and MRA Neck without and with contrast (CPT® 70549); OR CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) may be considered in addition to MRI Brain

**Practice Notes**

Classification of vasculitides based on vessel size adapted from Joseph.1 MRA and CTA are useful for the evaluation of the large proximal arteries; evaluation of a possible small vessel vasculitis may be beyond the resolution of routine MRA and CTA Head. However, other abnormalities, such as atherosclerotic disease, arterial dissection, Moyamoya disease, or reversible cerebral vasoconstriction may be demonstrated. Conventional angiogram is superior to MRA and CTA in demonstrating abnormalities in smaller vessels and is considered the “gold standard” in the evaluation of primary small vessel CNS vasculitis.

<table>
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<tr>
<th>Dominant Vessel Involved</th>
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<th>Secondary</th>
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<tr>
<td>Large arteries</td>
<td>Giant cell arteritis, Takayasu’s arteritis</td>
<td>Aortitis with rheumatoid disease; Infection (e.g. syphilis)</td>
</tr>
<tr>
<td>Medium Arteries</td>
<td>Classical polyarteritis nodosa, Kawasaki disease</td>
<td>Infection (e.g. hepatitis B)</td>
</tr>
<tr>
<td>Small vessels and medium arteries</td>
<td>Wegener’s granulomatosis, Churg–Strauss syndrome, Microscopic polyangiitis</td>
<td>Vasculitis with rheumatoid disease, systemic lupus erythematosus, Sjögren’s syndrome, drugs, infection (e.g. HIV)</td>
</tr>
<tr>
<td>Small vessels</td>
<td>Henoch-Schönlein purpura, Essential cryoglobulinemia, Cutaneous leukocytoclastic vasculitis</td>
<td>Drugs (e.g. sulphonamides, etc.) Infection (e.g. hepatitis C)</td>
</tr>
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**References**

**HD-23.1: Dizziness, Vertigo, and Syncope**

- Evaluation of vertigo or dizziness should include a detailed history and neurological exam including orthostatic blood pressure measurements, vestibular testing (tests for nystagmus, head thrust sign, Dix-Hallpike maneuver or other positional testing), gait, and hearing tests.
- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553) when history and exam suggest a central cause of vertigo.
  - Abnormal exam findings suggesting a central cause including nystagmus, hearing loss, absent head thrust sign, ataxia, positive Rhomberg test, or focal deficits.
  - Associated asymmetric hearing loss (See **HD-27: Hearing Loss and Tinnitus**) and concern for vestibular schwannoma. (Note: MRI Brain should be performed with thin sections of IACs). Limited MRI Brain with attention to internal auditory canals (CPT® 70540, CPT® 70542, or CPT® 70543) can be approved when requested by the provider in place of a complete MRI Brain. Note: Limited MRI codes should not be used in addition to MRI Brain codes; IAC views are performed as additional sequences as part of the brain study. (See **HD-1.1: General Guidelines – Anatomic Issues**).
  - Diagnosis of benign positional vertigo and failure to respond to treatment.
- CTA Head (CPT® 70496) and CTA Neck (CPT® 70498) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) and MRA Neck contrast as requested (CPT® 70547, CPT® 70548, or CPT® 70549) may be added if concern for vertebrobasilar disease (acute onset vertigo and associated symptoms or signs of weakness, gait difficulty, ataxia, drop attacks, visual loss, diplopia, dysarthria).
- CT Temporal bone without contrast (CPT® 70480) may be added if history of head trauma or concern for superior canal dehiscence (see Practice Note below).
- CT Head without contrast (CPT® 70450) or without and with contrast (CPT® 70470) if concern for acute stroke (See **HD-21: Stroke/TIA**) if MRI is contraindicated.

**Practice Notes**

Advance imaging is not indicated in patients with syncope, transient loss of consciousness or lightheadedness in the absence of symptoms or signs indicating an intracranial disorder.

Superior canal dehiscence is a rare syndrome caused by dehiscence in the boney covering of the superior semicircular canal, and may cause vertigo associated with auditory symptoms including oscillopsia evoked by noise and conductive hearing loss.
References
# HD-24: Other Imaging Studies

| HD-24.1: | Treatment Planning | 73 |
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| HD-24.7: | Cone Beam Computed Tomography (CBCT) | 74 |
| HD-24.8: | Transcranial Doppler (CPT® 93886) | 75 |
HD-24.1: Treatment Planning

- Advanced imaging (CT and MRI) performed for the purpose of surgical planning and navigation should be coded as Unlisted CT (CPT® 76497) or Unlisted MRI (CPT® 76498)
  - All requests for imaging to be performed for the purpose of surgical planning and navigation should be forwarded to Medical Director Review
- Requests may refer to proprietary brand systems such as Brainlab or Stealth imaging procedures
- This includes requests for intraoperative studies (inpatient studies do not require preauthorization)
- See **HD-29: Sinusitis** for coding for sinus surgery

HD-24.2: Functional MRI (f-MRI)

- f-MRI is useful in pre-operative scenarios to define the “eloquent” areas of brain
- The ordering physician must be a neurologist, neurosurgeon or radiation oncologist. All other requests should be sent for Medical Director Review. It must be evident that brain surgery is planned, and that f-MRI is being performed to map the language centers, or other “eloquent centers” of the brain
- f-MRI can be approved with PET Brain in epilepsy surgery planning
- Procedure codes for functional MRI:
  - CPT® 70554 MRI Brain, functional MRI, including test selection and administration of repetitive body part movement and/or visual stimulation, not requiring physician or psychologist administration
  - CPT® 70555 MRI Brain, functional MRI; requiring physician or psychologist administration of entire neurofunctional testing

HD-24.3: Magnetic Resonance Spectroscopy (MRS)

- All requests for MRS (CPT® 76390) will be forwarded for Medical Director Review
- MRS involves analysis of the levels of certain chemicals in a pre-selected voxels (small regions) on an MRI scan done at the same time
- MRS is evaluated on a case-by-case basis, and may be considered:
  - Distinguish recurrent brain tumor from radiation necrosis as an alternative to PET (CPT® 78608)
  - Diagnosis of certain rare inborn errors of metabolism affecting the CNS (primarily pediatric patients)
- Evaluation of certain primary brain tumors where diagnostic accuracy has been established in peer-reviewed literature. See **ONC-2.1: Primary Central Nervous System Tumors – General Considerations**, **ONC-2.2: Low Grade Gliomas** and **ONC-2.3: High Grade Gliomas**
**HD-24.4: CSF Flow Imaging**

- This is generally performed as a part of a MRI Brain study. It is not coded separately for preoperative evaluation of hydrocephalus and Chiari syndrome, with either features of hydrocephalus or syrinx.
- There is no specific or unique procedure code for this study; it is done as a special sequence of a routine MRI Brain without contrast (CPT® 70551).
- If not previously performed as part of recent study, a second study for the purpose of evaluating CSF flow may be performed.

**HD-24.5: CT or MRI Perfusion**

- Performed as part of a CT Head or MRI Brain examination in the evaluation of patients with very new strokes or brain tumors.
- Category III 0042T - “cerebral perfusion analysis using CT”. The study is generally limited to evaluation of acute stroke (<6 hours). Other indications are usually regarded as investigational and experimental.
- There is no specific CPT® code for MRI Perfusion. Perfusion weighted images are obtained with contrast and are not coded separately from a contrasted MRI Brain examination. If MRI Brain without and with contrast is approved, no additional CPT® codes are necessary or appropriate to perform MRI perfusion.

**HD-24.6: Magnetic Resonance Neurography (MRN)**

- MRN is currently considered investigational.
- See PN-7: Magnetic Resonance Neurography (MRN) in the Peripheral Nerve Disorders (PND) Imaging Guidelines.

**HD-24.7: Cone Beam Computed Tomography (CBCT)**

- Medical Director Review is required
- CPT® Codes: CPT® 70486, CPT® 70487, CPT® 70488, CPT® 70480, CPT® 70482 (No separate 3-D rendering codes should be reported)

See HD-30: Temporomandibular Joint Disease (TMJ) and Dental/Periodontal/Maxillofacial Imaging
HD-24.8: Transcranial Doppler (CPT® 93886)

- Transcranial Doppler (TCD) is a noninvasive ultrasonic technique that measures local blood flow velocity and direction in the proximal portions of large intracranial arteries
- All requests for Transcranial Doppler require Medical Director Review
- It is used principally in the evaluation and management of patients with cerebrovascular disease
  - Annual screening for patients with Sickle Cell Anemia (Hb-SS) and Sickle Beta Thalassemia (Sβ) (CPT® 93886)
  - Evaluation of right to left cardiac shunts: Detection of microemboli in patients with stroke or TIA. (CPT® 93892 or CPT® 93893 added to CPT® 93886)
  - Evaluation of intracranial occlusive disease in patients with documented stroke or TIA (CPT® 93890 added to CPT® 93886)
  - Evaluation of hemodynamic effects of known severe extra-cranial occlusive disease (CPT® 93890 added to CPT® 93886)
  - Other indications and uses of TCD generally involve in-patient settings: Evaluation of vasospasm in SAH, determination of brain death, evaluation of acute stroke and need for thrombolytics or other intervention, and intraoperative monitoring
- Screening for moyamoya disease for patient with known disease in other immediate family members. (CPT® 93886)
- Evaluation of Stroke/TIA usually includes CPT® 93886 and CPT® 93890 (Vasoreactivity study) and either CPT® 93892 or CPT® 93893 (Emboli detection).

**Note:** TCD studies are not indicated for evaluation of brain tumors, degenerative disease, psychiatric disorders, epilepsy, migraine or other headache disorders.

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<td>93890</td>
<td>Vasoreactivity study</td>
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<tr>
<td>93892</td>
<td>Emboli detection without intravenous microbubble injection</td>
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<td>93893</td>
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**Note:** CPT® 93890, CPT® 93892, CPT® 93893 represent add on services that require additional expertise, lab time, and equipment not included in the complete and limited codes. These additional codes would be relevant in evaluation of vascular disease, stroke/TIA, anterior or posterior circulation.

CPT® 93890 Vasoreactivity Study: Measures response of cerebral blood flow to increased CO2 levels (following breath holding or administration of acetazolamide); It is used to evaluate risk of stroke and significance of carotid stenosis; patients with loss of normal reactive changes are likely to be at increased risk of stroke.

CPT® 93892/CPT® 93893: Identification of right to left shunts (microembolic signals may be detected during TCD monitoring) and may indicate source of emboli in patients with stroke or TIA. TCD bubble test is very sensitive and may be superior to transthoracic and transesophageal echocardiography in detection of right to left shunts.
References

HD-25.1: Epistaxis

- All cases should go to Medical Director Review.
- CT Maxillofacial without or with contrast (CPT® 70486 or CPT® 70487) and/or MRI Orbit, Face, and/or Neck without and with contrast (CPT® 70543) is appropriate based on endoscopic findings of mass lesion during ENT examination.

References
HD-26.1: Mastoid Disease or Ear Pain

- See PEDHD-16.2: Ear Pain in the Pediatric Head Imaging Guidelines
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HD-27.1: Hearing Loss and Tinnitus

- An initial evaluation including hearing tests, by bedside testing or by formal audiometry, is necessary to determine whether a patient’s hearing loss is conductive (external or middle ear structures) or sensorineural (inner ear structures, such as cochlea or auditory nerve) hearing loss.\(^1,2\)

- The history in patients with tinnitus should include a description of the tinnitus (episodic or constant, pulsatile or non-pulsatile, rhythmicity, pitch, quality of the sound), as well as inciting or alleviating factors. Continuous and pulsatile tinnitus are more concerning for an underlying and significant disorder.\(^2\) Audiometric assessment can be used as initial diagnostic testing\(^1,2,3\) particularly in patients with tinnitus that is unilateral, persistent (>6 months) or associated with hearing difficulties.

- CT Temporal Bone without (CPT® 70480) or MRI Brain without and with contrast (with IAC views) (CPT® 70553) or without contrast (CPT® 70551):
  - Conductive hearing loss
  - Mixed conductive/sensorineural hearing loss or any sudden sensorineural hearing loss
    - Note: MRI is preferred modality for sensorineural hearing loss.
  - Cholesteatoma
  - Congenital hearing loss
  - Surgical planning, including cochlear implants (both CT Temporal Bone and MRI Brain may be approved for surgical planning if requested by surgeon)
  - Hearing loss with vertigo (See HD-23.1: Dizziness, Vertigo, and Syncope)
  - Asymmetric hearing loss
  - Tinnitus localized to a single ear or pulsatile tinnitus

- CT Temporal Bone with contrast (CPT® 70481):
  - Glomus tumors or other vascular tumors of the middle ear, and/or surgical planning
  - Acquired sensorineural hearing loss if MRI unavailable or contraindicated

- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) AND/OR MRA Neck (CPT® 70547 or CPT® 70548) or CTA Neck (CPT® 70498)
  - Pulsatile tinnitus or suspicion for vascular lesions

- Limited MRI Brain with attention to internal auditory canals (CPT® 70540, CPT® 70542, or CPT® 70543) can be approved when requested by the provider in place of a complete MRI Brain. Note: Limited MRI codes should not be used in addition to MRI Brain codes; IAC views are performed as additional sequences as part of the brain study. (See HD-1.1: General Guidelines – Anatomic Issues)

- Both modalities (CT and MRI) may be approved simultaneously for evaluation and surgical planning if ordered by ENT or Neurosurgical specialist.

References
**HD-28: Ear Pain (Otalgia)**

| HD-28.1: Ear Pain (Otalgia) | 84 |
HD-28.1: Ear Pain (Otalgia)

See HD-26.1: Mastoid Disease or Ear Pain
HD-29.1: Sinus Imaging in Adults

- CT Maxillofacial without contrast (CPT® 70486) or limited CT Sinus without contrast (CPT® 76380) is considered for ANY of the following:
  - Acute sinusitis with no improvement in symptoms after a minimum of 4 weeks of treatment; or concern for complicated sinusitis (See Practice Note below)
  - Recurrent sinusitis (4 or more episodes of acute sinusitis within the past 12 months without symptoms or signs between episodes)^1^2^3^.
  - Chronic sinusitis (>12 weeks sinusitis) with at least two of the following signs and symptoms:
    - Mucopurulent drainage
    - Nasal obstruction
    - Facial pain – pressure, fullness
    - Decreased sense of smell
    (Note: A trial of antibiotic therapy is not required prior to imaging if patient meets criteria for chronic sinusitis)
  - Sinus surgery is being considered (including Balloon Sinus Ostial Dilation or Functional Endoscopic Sinus Surgery)

- For unexplained cough See CH-3.1: Cough in the Chest Imaging Guidelines

- CT Maxillofacial without contrast (CPT® 70486) or CT Maxillofacial with contrast (CPT® 70487):
  - Sinonasal obstruction, polyp, or suspected mass

- CT Orbit without contrast (CPT® 70480) or CT Orbit without and with contrast (CPT® 70482) may be performed alone or added to CT Maxillofacial for:
  - Suspected orbital complications

- MRI Maxillofacial without contrast (CPT® 70540) or without and with contrast (CPT® 70543) as option instead of CT for:
  - Sinonasal obstruction or suspected mass
  - Suspected orbital complication
  - Suspected invasive fungal sinusitis

- MRI Brain without and with contrast (CPT® 70553) may be performed alone or added to CT Maxillofacial for:
  - Suspected intracranial complication

- Studies requested for the purpose of navigation for sinus surgery should be coded CPT® 77011 (CT guidance for stereotactic localization). It is not appropriate to report both CPT® 70486 and CPT® 77011 for the same CT stereotactic localization imaging session. See Preface 4.2: CT-, MR-, or Ultrasound-Guided Procedures in the Preface Imaging Guidelines

- Repeat imaging may be approved for ANY of the following scenarios:
  - An ENT specialist requests the imaging and
    - There is no improvement after an additional 3 weeks of conservative treatment after initial imaging was completed; and
      - There has been a follow-up visit since the previous imaging; or
      - If there is a new abnormality on exam such as obstructing mass
Planned sinus surgery (Balloon Sinus Ostial Dilation or Functional Endoscopic Sinus Surgery)

**Practice Notes**

- Rhinosinusitis is defined as inflammation of the nasal cavity and adjacent paranasal sinuses. Acute sinusitis refers to symptom duration <4 weeks, subacute 4 to 12 weeks, and chronic >12 weeks. Complicated sinusitis refers to symptoms suggesting spread of disease into adjacent structures, including orbital or intracranial complications.\(^1,2,3\)
- There is no evidence to support advanced imaging of acute (<4 weeks) and subacute (4 to 12 weeks) uncomplicated rhinosinusitis\(^1\)
- There is no evidence to support routine follow-up advanced imaging after treatment with clinical improvement of sinusitis\(^1\)

**References**

HD-30: Temporomandibular Joint Disease (TMJ) and Dental/Periodontal/Maxillofacial Imaging

| HD-30.1: Temporomandibular Joint Disease (TMJ) | 89 |
| HD-30.2: Dental/Periodontal/Maxillofacial Imaging | 89 |
**HD-30.1: Temporomandibular Joint Disease (TMJ)**

- MRI TMJ (CPT® 70336) is the diagnostic study of choice and should be reserved for those who fail a minimum of 6 weeks of non-surgical treatment and who are actively being considered for TMJ surgery.
- CT Maxillofacial without contrast (CPT® 70486) or without and with contrast (CPT® 70488) may be performed when there is suspicion of bony involvement from the MRI and if primary bony pathologies are suspected clinically.
- Ultrasound (CPT® 76536) can be used to look for the presence of a joint effusion and to evaluate cartilage and disk displacement with open and closed mouth imaging and to guide injections.

**HD-30.2: Dental/Periodontal/Maxillofacial Imaging**

- All requests will be forwarded to Medical Director Review.
- Cone beam CT may be supported for surgical planning when plain x-rays alone are insufficient. Potential indications include but are not limited to:
  - Impacted teeth
  - Supernumerary teeth
  - Dentoalveolar trauma
  - Root resorption
  - Foreign body
  - Odontogenic cysts, tumors, or other jaw pathology
  - Cleft pathology
  - Orthognathic surgery for dentofacial anomalies
  - Osteomyelitis and odontogenic infections
  - Bisphosphonate-related osteonecrosis of the jaw
  - Salivary gland stones
  - Maxillofacial bone graft planning
  - Dental implants related to tooth loss from injury, trauma, or jaw pathology such as cysts, tumors, or cancer.
- Cone Beam CT: Report with CPT® Codes: CPT® 70486, CPT® 70487, CPT® 70488, CPT® 70480, CPT® 70482
- 3-D rendering (CPT® 76376 or CPT® 76377) should NOT be reported separately.
- Cone beam CT (CBCT) may also be called i-CAT scanner or mini-CAT scanner.
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HD-31.1: Tinnitus

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HD-32.1: Eye Disorders and Visual Loss

- Examination of ocular complaints and visual loss should include evaluation of pupillary responses, extraocular muscles, visual acuity, and fundoscopic exam of retinae.
- MRI Orbits without contrast (CPT® 70540) or MRI Orbits without and with contrast (CPT® 70543) or CT Orbits with contrast (CPT® 70481):
  - Exophthalmos or enophthalmos
  - Suspected orbital cellulitis
  - Suspected orbital mass
  - Suspected optic neuritis
  - Diplopia
  - Ophthalmpoplegia
- MRI Orbits without contrast (CPT® 70540) or MRI Orbits without and with contrast (CPT® 70543):
  - Unexplained visual loss (imaging is not necessary if visual loss is due to known intrinsic eye disease, refractive errors, cataracts, retinal disease etc.)
- MRI Brain without contrast (CPT® 70551) or MRI Brain without and with contrast (CPT® 70553):
  - Ophthalmpoplegia
  - Binocular Diplopia
  - Suspected demyelinating disease with optic neuritis (Multiple Sclerosis, Neuromyelitis optica).
  - Unexplained Visual loss (imaging is not necessary if visual loss is due to known intrinsic eye disease, refractive errors, cataracts, retinal disease etc.)
- CT Orbit without contrast (CPT® 70480)
  - Orbital trauma
- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546)
  - Third nerve oculomotor palsy with pupillary involvement
  - Suspected aneurysm
  - Suspected temporal arteritis
  - Amaurosis with suspected stroke (MRA Neck contrast as requested [CPT® 70547, CPT® 70548, or CPT® 70549] may be added)

Practice Notes
Advanced imaging of the brain and orbit are not routinely paired. Medical necessity for each region is needed to image both regions, based on suspicion of these disorders.

Orbital imaging alone may be sufficient unless other signs or symptoms suggest brain involvement. Signs or symptoms strongly suggestive and localizing to orbital disease include proptosis, conjunctival injection, chemosis, eye pain, enophthalmos, gaze-evoked amaurosis, eyelid retraction, unilateral optic disc swelling, choroidal and retinal folds, optociliary shunt vessels, and numb cheek syndrome.
Non-localizing symptoms and signs, for which both brain and orbit imaging may be indicated, include bilateral optic disc swelling, papilledema, diplopia, headache, relative afferent pupillary defect, visual field defects.

**HD-32.2: Horner’s Syndrome**

- Horner’s Syndrome (anisocoria, ptosis, and ipsilateral anhidrosis) is caused by disruption of sympathetic innervation to the eye and face. Definitive diagnosis may be established by pharmacologic testing of the pupillary response with eye drops. Evaluation and imaging depends on determining whether the cause is a central lesion (brainstem or cervical spinal cord), preganglionic lesion (spinal cord or sympathetic chain in the chest), or postganglionic lesion (neck or carotid artery).
- MRI Brain without contrast (CPT® 70551) or MRI Brain without or with contrast (CPT® 70553) for suspected intracranial or brainstem lesions
- MRI Cervical Spine without contrast (CPT® 72141) or MRI Cervical Spine without and with contrast (CPT® 72156) for suspected spinal cord abnormality
- CT Chest with contrast (CPT® 71260) for suspected chest mass
- CT Neck with contrast (CPT® 70491) for suspected neck mass
- CTA Neck without and with contrast (CPT® 70498) or MRA Neck (CPT® 70547, CPT® 70548, or CPT® 70549) for suspected carotid injury or dissection
- MRI Orbits without contrast (CPT® 70540), MRI Orbits without or with contrast (CPT® 70543) or CT Orbit with contrast (CPT® 70481) for suspected orbit lesion or mass

**References**

HD-33: Acoustic Neuroma and Other Cerebellopontine Angle Tumors

HD-33.1: Acoustic Neuroma and Other Cerebellopontine Angle Tumors
HD-33.1: Acoustic Neuroma and Other Cerebellopontine Angle Tumors

- Initial diagnosis is usually made during evaluation for asymmetric hearing loss and/or vertigo. See HD-23: Dizziness, Vertigo and Syncope and HD-27: Hearing Loss and Tinnitus for evaluation of those problems.
- Initial diagnosis can be accomplished with MRI Brain without and with contrast (CPT® 70553) which should be done with attention to the internal auditory canals.
- MRI Brain without contrast (CPT® 70551) may be approved if performed with FIESTA protocol.
- MRI Orbits, Neck, or Face without and with contrast (CPT® 70543) may be considered with audiologic or clinical features of retrocochlear hearing loss and a negative MRI Brain and in the rare patient in whom a detailed search is indicated for both a lesion of the cerebellopontine angle and lesions of the cerebral hemispheres.
- After surgical resection, MRI Brain without and with contrast with attention to the internal auditory canals (CPT® 70553) is performed at 6 to 12 months to document the completeness of tumor removal and to serve as a baseline for further follow-up. Assuming complete tumor removal, additional follow up is done at 5 and 10 years. If the findings at 10 years are normal, no further imaging should be performed unless new clinical symptoms occur.
- Following stereotactic radiation therapy or continued observation without treatment: MRI Brain without and with contrast with attention to the internal auditory canals (CPT® 70553) is performed at 6 months and then annually.

References

HD-34: Pineal Cysts

See PEDHD-13.2: Pineal Cysts in the Pediatric Head Imaging Guidelines
HD-35: Arachnoid Cysts

See PEDHD-13.1: Arachnoid Cysts in the Pediatric Head Imaging Guidelines
Nuclear Medicine

- Nuclear medicine studies may be used in the evaluation of some head/brain disorders, and other rare indications as well:
  - Brain Scintigraphy with or without vascular flow (any one of CPT® 78600, CPT® 78601, CPT® 78605, or CPT® 78606)
    - Establish brain death (rarely done in outpatient setting)
  - Brain Imaging Radiopharmaceutical Localization SPECT (CPT® 78803)¹
    - Immunocompromised patients with mass lesion detected on CT or MRI for differentiation between lymphoma and infection
    - In distinguishing recurrent brain tumor from radiation necrosis
    - Can be performed with vasodilating agent acetazolamide (Diamox) to assess functional reserve capacity to predict critically reduced perfusion in patients with chronic cerebrovascular disease (for example, in Moya-Moya disease) and identify patients who might benefit from an extracranial-to-intracranial (EC-IC) bypass to augment Cerebral Blood Flow, and to assess preoperatively the potential for ischemia following carotid artery sacrifice.
  - Brain Imaging Vascular Flow (CPT® 78610)
    - Cerebral ischemia
    - Establish brain death
  - CSF Leakage Detection (CPT® 78650)
    - Evaluation of CSF rhinorrhea, otorrhea, or refractory post-lumbar puncture headache
    - Suspected normal pressure hydrocephalus with gait disturbance and either dementia or urinary incontinence
  - Radiopharmaceutical Dacryocystography (CPT® 78660)
    - Suspected obstruction of nasolacrimal duct due to excessive tearing
  - Cisternogram (CPT® 78630) can be approved for the following:
    - Known hydrocephalus with worsening symptoms
    - Suspected obstructive hydrocephalus
  - Cerebrospinal Ventriculography (CPT® 78635) can be approved for the following:
    - Evaluation of internal shunt, porencephalic cyst, or posterior fossa cyst
  - Nuclear Medicine Shunt Evaluation (CPT® 78645) and CSF Flow SPECT (CPT® 78803) can be approved for the following:
    - Suspected malfunction of ventriculoperitoneal, ventriculopleural, or ventriculoovenous shunts.
  - Imaging Radiopharmaceutical Localization SPECT with Ioflupane I-23 (CPT® 78803) can be approved for differentiation of Parkinsonian syndrome (PS) and non-neurodegenerative disorders, such as essential tremor (ET) or drug-induced tremor, due to the overlap of clinical symptoms.² DAT-SPECT has significant impact on clinical diagnosis and management of diagnostic uncertainty in cases of PS.³ See HD-15: Movement Disorders
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HD-37.1: General Guidelines Sleep-Related Requests

- Oral Appliance: There is a lack of published case-controlled clinical studies in Sleep literature validating the use of advanced imaging with respect to oral appliance therapy (pretreatment assessment). Previous literature has demonstrated support for cephalometric studies (x-ray)\(^1\) in predicting treatment success. Nasoendoscopy (sedated and non-sedated with provocative maneuvers such as Mueller maneuver) has been helpful as well in this regard.\(^2\) Routine use of advanced is not supported at this time.

- Hypersomnolence: MRI Brain with and without contrast (CPT® 70553) may be indicated when there are focal neurologic signs or suspicion for an inflammatory neurologic process as the etiology. Recognition and treatment of a comorbid sleep disorders is paramount, and a complete neurologic history and examination should precede any request for advanced imaging\(^3\).

- Central Sleep Apnea: MRI Brain with and without contrast (CPT® 70553) may be indicated for unexplained central sleep apnea syndrome when a primary CNS etiology is suspected; i.e., unassociated with CHF, COPD or other potential etiology. Specific etiologies should be stated for imaging requests, including but not limited to, suspected Chiari malformation, stroke, CNS demyelinating disease, posterior fossa lesion, anoxia or infection\(^4\).

References

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<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days</td>
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<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days</td>
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<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, minimum 2 areas (eg, pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days</td>
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MS-1: General Guidelines

- Before advanced diagnostic imaging can be considered, there must be an initial face-to-face clinical evaluation as well as a clinical re-evaluation after a trial of failed conservative treatment; the clinical re-evaluation may consist of a face-to-face evaluation or other meaningful contact with the provider’s office such as email, web or telephone communications.

- A face-to-face clinical evaluation is required to have been performed within the last 60 days before advanced imaging can be considered. This may have been either the initial clinical evaluation or the clinical re-evaluation.

- The initial face-to-face clinical evaluation should include a relevant history and physical examination, appropriate laboratory studies, and non-advanced imaging modalities. Other forms of meaningful contact (e.g., telephone call, electronic mail or messaging) are not acceptable as an initial evaluation.

- Prior to advanced imaging consideration, the results of plain X-rays performed after the current episode of symptoms started or changed is required for all musculoskeletal conditions, unless otherwise noted in the guidelines.

- Clinical re-evaluation is required prior to consideration of advanced diagnostic imaging to document failure of significant clinical improvement following a recent (within 3 months) six week trial of provider-directed conservative treatment. Clinical re-evaluation can include documentation of a face-to-face encounter or documentation of other meaningful contact with the requesting provider’s office by the patient (e.g. telephone call, electronic mail or messaging).

- Provider-directed conservative treatment may include rest, ice, compression, and elevation (R.I.C.E.), non-steroidal anti-inflammatories (NSAIDs), narcotic and non-narcotic analgesic medications, oral or injectable corticosteroids, viscosupplementation injections, a provider-directed home exercise program, cross-training, and/or physical/occupational therapy or immobilization by splinting/casting/bracing.

- Orthopedic specialist evaluation can be helpful in determining the need for advanced imaging.
  - The need for repeat advanced imaging should be carefully considered and may not be indicated if prior imaging has been performed.
  - Serial advanced imaging, whether CT or MRI, for surveillance of healing or recovery from musculoskeletal disease is not supported by the medical evidence in the majority of musculoskeletal conditions.
References
2. Visconti AJ, Biddle J, and Solomon M. Follow-up imaging for vertebral osteomyelitis a teachable 
3. Fabiano V, Franchino G, Napolitano M, et. al. Utility of magnetic resonance imaging in the follow-up 
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**MS-2.1: Plain X-Ray**

- The results of an initial plain X-ray are required prior to advanced imaging in all musculoskeletal conditions/disorders, unless otherwise noted in the guidelines, to rule out those situations that do not often require advanced imaging, such as osteoarthritis, acute/healing fracture, dislocation, osteomyelitis, acquired/congenital deformities, and tumors of bone amenable to biopsy or radiation therapy (in known metastatic disease), etc.

**MS-2.2: MRI or CT**

- Magnetic Resonance Imaging (MRI) is often the preferred advanced imaging modality in musculoskeletal conditions because it is superior in imaging the soft tissues and can also define physiological processes in some instances [e.g. edema, loss of circulation (AVN), and increased vascularity (tumors)].

- Computed Tomography (CT) is preferred for imaging cortical bone anatomy; thus, it is useful for studying complex fractures (particularly of the joints), dislocations, and assessing delayed union or non-union of fractures, if plain X-rays are equivocal. CT may be the procedure of choice in patients who cannot undergo an MRI, such as those with pacemakers.

**Positional MRI:**

Positional MRI is also referred to as dynamic, weight-bearing or kinetic MRI. Currently, there is inadequate scientific evidence to support the medical necessity of this study. As such, it should be considered experimental or investigational.

**dGEMRIC Evaluation of Cartilage**

Delayed gadolinium enhanced Magnetic Resonance Imaging of Cartilage (dGEMRIC) is a technique where an MRI estimates joint cartilage glycosaminoglycan content after penetration of the contrast agent in order to detect cartilage breakdown. Currently, there is inadequate scientific evidence to support the medical necessity of this study. As such, it should be considered experimental or investigational for the diagnosis and surveillance of, or preoperative planning related to chondral pathology.

**MS-2.3: Ultrasound**

- Ultrasound (US) uses sound waves to produce images that can be used to evaluate a variety of musculoskeletal disorders. As with US in general, musculoskeletal US is highly operator-dependent, and proper training and experience are required to perform consistent, high quality evaluations.
MS-2.4: Contrast Issues

Most musculoskeletal imaging (MRI or CT) is without contrast; however, the following examples may be considered with contrast:

- Tumors, osteomyelitis, and soft tissue infection (without and with contrast)
- MRI arthrography (with contrast only)
- MRI for rheumatoid arthritis and inflammatory arthritis (contrast as requested)
- For patients with a contrast contraindication, if the advanced imaging recommendation specifically includes contrast, the corresponding advanced imaging study without contrast may be approved as an alternative, although the non-contrast study may not provide an adequate evaluation of the condition of concern.

MS-2.5: Positron Emission Tomography (PET)

At the present time, there is inadequate evidence to support the medical necessity of PET for the routine assessment of musculoskeletal disorders. It should be considered experimental or investigational and will be forwarded to Medical Director Review.

See MS-16: Post-Operative Joint Replacement Surgery

References


Indications for musculoskeletal 3-D image post-processing for preoperative planning when conventional imaging is insufficient for:
- Complex fractures/dislocations (comminuted or displaced) of any joint.
- Spine fractures, pelvic/acetabulum fractures, intra-articular fractures.
- Preoperative planning for other complex surgical cases.

The code assignment for 3-D rendering depends upon whether the 3-D post-processing is performed on the scanner workstation (CPT® 76376) or on an independent workstation (CPT® 76377).
- 2-D reconstruction (i.e. reformatting axial images into the coronal plane) is considered part of the tomography procedure, is not separately reportable, and does not meet the definition of 3-D rendering.
- It is not appropriate to report 3-D rendering in conjunction with CTA and MRA because those procedure codes already include the post-processing.
- In addition to the term “3-D,” the following terms may also be used to describe 3-D post-processing:
  - Maximum intensity projection (MIP)
  - Shaded surface rendering
  - Volume rendering

The 3-D rendering codes require concurrent supervision of image post-processing 3-D manipulation of volumetric data set and image rendering.

References
**MS-4.1: AVN**

Classification systems use a combination of plain radiographs, MRI, and clinical features to stage avascular necrosis. MRI of the area of concern without contrast can be performed when plain X-ray findings are negative or equivocal and clinical symptoms warrant further investigation for suspected avascular necrosis.

Advanced imaging for AVN confirmed by plain X-ray is appropriate in the following situations:
- **Femoral head collapse:**
  - MRI Hip without contrast (CPT® 73721) or CT Hip without contrast (CPT® 73700) for preoperative planning. See MS-24: Hip.
- **Distal Femur:**
  - MRI Knee without contrast (CPT® 73721) if needed for treatment planning. See MS-25: Knee.
- **Talus:**
  - MRI Ankle without contrast (CPT® 73721) if needed for treatment planning. See MS-26: Ankle.
- **Tarsal navicular (Kohler Disease):**
  - MRI Foot without contrast (CPT® 73718) if needed for treatment planning. See MS-27: Foot.
- **Humeral head:**
  - For preoperative planning prior to shoulder replacement: CT Shoulder without contrast (CPT® 73200) and/or MRI Shoulder without contrast (CPT® 73221). See MS-19: Shoulder.
- **Lunate (Kienbock's Disease)/Scaphoid (Preiser's Disease):**
  - CT Wrist without contrast (CPT® 73200) or MRI Wrist without contrast (CPT® 73221). See MS-21: Wrist.

Patients with acute lymphoblastic leukemia and known or suspected osteonecrosis should be imaged according to guidelines in: **PEDONC-3.2: Acute Lymphoblastic Leukemia**

Known or suspected osteonecrosis in long-term cancer survivors should be imaged according to guidelines in: **PEDONC-19.4: Osteonecrosis in Long Term Cancer Survivors**
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**MS-5.1: Acute**

- CT or MRI without contrast if ANY of the following:
  - Complex (comminuted or displaced) fracture with or without dislocation on plain X-ray.
    - CT is preferred unless it is associated with neoplastic disease when MRI without/with contrast is preferred unless MRI contraindicated.
  - Patient presents initially to the requesting provider with a documented history of an acute traumatic event at least two weeks prior with a negative plain X-ray at the time of this face-to-face encounter and a clinical suspicion for an occult/stress/insufficiency fracture. See **MS-5.2: Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints**.

- MRI without contrast, MRI with contrast (arthrogram), or CT with contrast (arthrogram) of the area of interest if:
  - Plain X-rays are negative and an osteochondral fracture is still suspected, OR
  - Plain X-ray and clinical exam suggest an unstable osteochondral injury. See **MS-13.1: Chondral/ Osteochondral Lesions, Including Osteochondritis Dissecans and Fractures**.

**MS-5.2: Suspected Occult/Stress/Insufficiency Fracture/Stress Reaction and Shin Splints**

- MRI without contrast can be performed for suspected hip/femoral neck, tibia, pelvis/sacrum, tarsal navicular, proximal fifth metatarsal, or scaphoid occult/stress/insufficiency fractures, and suspected atypical femoral shaft fractures related to bisphosphonate use if the initial evaluation of history, physical exam and plain X-ray fails to establish a definitive diagnosis.
- CT without contrast can be performed as an alternative to MRI for suspected occult/insufficiency fractures of the pelvis/hip and suspected atypical femoral shaft fractures related to bisphosphonate. See **MS-23: Pelvis and MS-24: Hip**.
- Tc-99m Bone scan whole body (CPT® 78306) with SPECT of the area of interest (CPT® 78803) or three phase bone scan (CPT® 78315) is indicated for suspected fractures if MRI cannot be performed. See **MS-28: Nuclear Medicine**.
- Tc-99m Bone scan Foot (CPT® 78315) is indicated for suspected occult or stress fractures of the tarsal navicular if MRI cannot be performed. See **MS-27: Foot**.

- MRI or CT without contrast can be performed for all other suspected occult/stress/insufficiency fractures with either of the following:
  - Repeat plain X-rays remain non-diagnostic for fracture after a minimum of 10 days of provider-directed conservative treatment, or
  - Initial plain X-rays obtained a minimum of 14 days after the onset of symptoms are non-diagnostic for fracture.
MRI of the lower leg without contrast (CPT® 73718) for suspected shin splints when BOTH of the following are met:
- Initial plain X-ray
- Failure of a 6-week trial of provider-directed conservative treatment.

For stress reaction, advanced imaging is not medically necessary for surveillance or “return to play” decisions regarding a stress reaction identified on an initial imaging study.

MRI without contrast of the area of interest for stress fracture follow-up imaging for "return to play" evaluation at least 3 months after the initial imaging study for stress fracture. Any additional requests for stress fracture advanced imaging will be forwarded for Medical Director Review.


**MS-5.3: Other Indications**

CT or MRI without contrast is appropriate after recent (within 30 days) plain X-ray if ONE of the following is present:
- Concern for delayed union or non-union of fracture or joint fusions.
- As part of preoperative evaluation for a planned surgery of a complex fracture with or without dislocation.

**References**


**MS-6.1: Foreign Body - General**

- Ultrasound (CPT® 76882) or CT without contrast or MRI without and with contrast or MRI without contrast of the area of interest can be approved after plain X-rays rule out the presence of radiopaque foreign bodies.
  - Ultrasound (CPT® 76882) is the preferred imaging modality for radiolucent (non-radiopaque) foreign bodies (e.g. wood, plastic).
  - CT without contrast is recommended when plain X-rays are negative and a radiopaque foreign body is still suspected, as CT is favored over MRI for the identification of foreign bodies.
  - MRI without and with contrast is an alternative to US and CT for assessing the extent of infection associated with a suspected foreign body.

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MS-7.1: Ganglion Cysts – General

- Plain X-ray is the initial imaging study for ganglion cysts.
- MRI without contrast or MRI without and with contrast or US (CPT® 76882) is appropriate for occult ganglions (smaller cysts that remain hidden under the skin; suspected, but not palpable on physical examination) or cysts/masses in atypical anatomic locations.
- Advanced imaging is not indicated for ganglions that can be diagnosed by history and physical examination.

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**MS-8.1: Gout - General**

- CT without contrast, MRI without contrast, or MRI without and with contrast of the area of interest is indicated when **BOTH** of the following are met:
  - Initial plain X-ray has been performed to rule out other potential disease processes
  - Infection or neoplasm is in the differential diagnosis for soft-tissue tophi.

**Practice Notes**

- Early stages of gout can be diagnosed clinically since radiographic findings are not present early in the disease course.

**MS-8.2: CPPD (Pseudogout/Chondrocalcinosis) - General**

- CPPD can often be diagnosed from plain X-rays; advanced diagnostic imaging is generally not medically necessary.

**References**

### MS-9: Infection/Osteomyelitis

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**MS-9.1: Infection – General**

- MRI without and with contrast after plain X-ray(s) and:
  - Plain X-ray(s) are negative or do not suggest alternative diagnoses such as neuropathic arthropathy or fracture, and soft tissue or bone infection (osteomyelitis) is suspected; or
  - Plain X-ray(s) are positive for osteomyelitis, and the extent of infection into the soft tissues and any skip lesions require evaluation.

- CT without and with contrast can replace an MRI:
  - To assess the extent of bony destruction from osteomyelitis; CT can guide treatment decisions.
  - For preoperative planning
  - If MRI is contraindicated

- Patients with suspected spinal infections
  - See **SP-1.2: Red Flag Indications** for advanced imaging guidelines

- Patients with diabetic foot infections after plain X-ray(s)
  - See **MS-27: Foot** for advanced imaging guidelines

**MS-9.2: Septic Joint**

- MRI of the joint, without and with contrast is appropriate when standard or image-guided arthrocentesis is contraindicated, unsuccessful, or non-diagnostic, and the clinical documentation satisfies ALL of the following criteria:
  - History and physical examination findings [One of the following]:
    - Development of an acutely hot and swollen joint (< 2 weeks)
    - Decreased range of motion due to pain
    - Documented fever
  - Laboratory tests [One of the following]:
    - Leukocytosis
    - Elevated ESR or C-reactive protein
    - Analysis of the joint fluid is non-diagnostic
  - Plain X-ray of the joint

- MRI without and with contrast is appropriate after plain X-rays if the arthrocentesis is diagnostic and if there is a confirmed septic joint, to evaluate the extent of infection into the soft tissues and any skip lesions that would require evaluation.

- CT with contrast can replace MRI without and with contrast if MRI is contraindicated.

**Practice Notes**

- Analysis of joint fluid is most often sufficient to diagnose a septic joint.
References


### MS-10: Soft Tissue Mass or Lesion of Bone

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**MS-10.1: Soft Tissue Mass**

- History and physical exam should include documentation of: location, size, duration, growing or stable, solid/cystic, fixed/not fixed to the bone, discrete or ill-defined, and an association with pain.
- US of the area of interest (CPT® 76882) is appropriate for superficial or palpable soft tissue mass(es) after plain X-ray.
- MRI without and with contrast or without contrast is appropriate when EITHER of the following are met:
  - Soft tissue mass(es) after plain X-ray
  - Known or suspected soft tissue mass in a patient with a cancer predisposition syndrome if a recent ultrasound is inconclusive. **Plain X-ray is not required for these patients.** See PEDONC-2: Screening Imaging in Cancer Predisposition Syndromes
- CT with contrast or CT without and with contrast is appropriate when MRI is contraindicated or after a metal limiting MRI evaluation.
- Advanced imaging is not indicated for: Subcutaneous lipoma with no surgery planned, Ganglia See MS-7: Ganglion Cysts, Sebaceous cyst

*Practice Notes*

- Plain X-rays can determine if an advanced imaging procedure is indicated, and if so, which modality is most appropriate. If non-diagnostic, these initial plain X-rays can provide complementary information if advanced imaging is indicated.

**MS-10.2: Lesion of Bone**

- History and physical exam should include documentation of: location, size, duration, growing or stable, discrete or poorly defined, and an association with pain.
- Complete radiograph of the entire bone containing the lesion of bone is required prior to consideration of advanced imaging. Many benign bone tumors have a characteristic appearance on plain X-ray and advanced imaging is not necessary.
- MRI without and with contrast, MRI without contrast, or CT without contrast may be indicated if ONE of the following applies:
  - Diagnosis uncertain based on plain X-ray appearance.
  - Imaging requested for preoperative planning.
- MRI without and with contrast or without contrast is appropriate when plain X-ray reveals an osteochondroma with clinical concern of malignant transformation.
- For Paget’s Disease:
  - Bone scan See MS-28: Nuclear Medicine or MRI (contrast as requested) can be considered if the diagnosis (based on plain X-rays and laboratory studies) is in doubt
MRI (contrast as requested) can be considered if malignant degeneration, which occurs in up to 10% of cases, is suspected.

References
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<tr>
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</tr>
<tr>
<td><strong>MS-11.3:</strong> Chronic Exertional Compartment Syndrome</td>
</tr>
</tbody>
</table>
**MS-11.1: Muscle/Tendon Unit Injuries/Diseases**

- Plain X-ray is the initial imaging study for Muscle/Tendon Unit Injuries.
- MRI without contrast or US (CPT® 76882) is supported for **EITHER** of the following:
  - Suspected partial tendon rupture of a specific (named) tendon
  - Complete tendon ruptures for preoperative planning (for example, Achilles tendon rupture, posterior tibial tendon rupture, humeral insertion of the pectoralis major rupture, proximal and distal biceps tendon rupture, patellar ligament/tendon rupture, proximal/distal hamstring tendon rupture).
- MRI is not medically necessary for muscle belly strains/muscle tears.
- See **MS-19: Shoulder** for clinical suspicion of a partial or complete rotator cuff tear.
- See **PN-6.2: Inflammatory Muscle Diseases** and **PEDMS-10.3: Inflammatory Muscle Diseases**.

**MS-11.2: Acute Compartment Syndrome**

- Advanced imaging is not indicated. Diagnosis is made clinically and by direct measurement of compartment pressure and is a surgical emergency.

**Practice Notes**

- Noninvasive methods of measuring compartment pressures and diagnosing acute compartment syndrome are under study, but are currently experimental, investigational, and unproven.

**MS-11.3: Chronic Exertional Compartment Syndrome**

- Advanced imaging should only be considered when ruling out other potential causes of extremity pain following a plain X-ray and conservative treatment as indicated.

**Practice Notes**

- Direct measurement of compartment pressure remains the diagnostic standard. Noninvasive methods of measuring compartment pressures and diagnosing chronic exertional compartment syndrome are under study, but are currently experimental, investigational, and unproven.


<table>
<thead>
<tr>
<th>MS-12: Osteoarthritis</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-12.1: Osteoarthritis</td>
</tr>
</tbody>
</table>
**MS-12.1: Osteoarthritis**

- Plain X-ray is the initial imaging study for osteoarthritis.

- CT without contrast is appropriate for treatment planning when congenital or significant atypical post-traumatic arthritic deformities are present in the shoulder, elbow, wrist, hip, knee, or ankle that would require further evaluation of the clinical significance of the deformity already identified on plain X-rays.
  - CT Shoulder without contrast (CPT® 73200) and/or MRI shoulder without contrast (CPT® 73221) are considered medically necessary for preoperative planning prior to shoulder replacement.

- Preoperative non-contrast CT/MRI requests (for either a diagnostic or unlisted CPT code) of the shoulder, elbow, wrist, hip, knee, or ankle to be utilized as part of treatment planning for customized-to-patient joint replacement surgery or as an integral part of surgical planning using intraoperative navigation for joint replacement surgery (e.g. MAKOplasty) are considered medically necessary once the joint replacement surgery has been approved or if the joint replacement surgery does not require prior authorization.
  - Requests for preoperative imaging are considered not medically necessary if the surgery has been deemed experimental, investigational, or unproven by the health plan.
  - See **Preface-4.3: Unlisted Procedures/Therapy Treatment Planning**

- MRI arthrogram or CT arthrogram is appropriate when joint sparing/salvage reconstructive surgery is planned for the following:
  - Suspected concomitant rotator cuff tear of the shoulder - See **MS-19: Shoulder**
  - Suspected concomitant labral tear of the shoulder - See **MS-19: Shoulder**
  - Suspected concomitant labral tear of the hip - See **MS-24: Hip**
  - Suspected concomitant internal derangement of the knee - See **MS-25: Knee**

**Note:**

- Refer to the Anatomic Area Tables **MS-19: Shoulder, MS-20: Elbow, MS-21: Wrist, MS-24: Hip, MS-25: Knee**, and **MS-26: Ankle** for the clinical imaging criteria regarding preoperative joint replacement surgery for each anatomic area.

- MRI knee without contrast (CPT® 73721) is appropriate in a patient with osteoarthritis for clinical suspicion of a symptomatic degenerative meniscus tear following plain X-rays and conservative treatment. See **MS-25: Knee**

**Practice Notes**

Plain X-rays are performed initially and will reveal characteristic joint space narrowing, osteophyte formation, cyst formation, and subchondral sclerosis.
References
<table>
<thead>
<tr>
<th>MS-13: Chondral/Osteochondral Lesions</th>
</tr>
</thead>
<tbody>
<tr>
<td>MS-13.1: Chondral/Osteochondral Lesions, Including Osteochondritis Dissecans and Fractures</td>
</tr>
</tbody>
</table>
MS-13.1: Chondral/Osteochondral Lesions, Including Osteochondritis Dissecans and Fractures

- MRI without contrast, MRI with contrast (arthrogram), or CT with contrast (arthrogram) of the area of interest is indicated when **EITHER** of the following are met:
  - Plain X-rays are negative and an osteochondral fracture is still suspected
  - Plain X-ray and clinical exam suggest an unstable osteochondral injury

- If plain X-rays show a non-displaced osteochondral fragment, follow-up imaging should be with plain X-rays. Advanced imaging is not necessary.

- MRI without contrast or CT without contrast is indicated when healing (including post-operative fixation) cannot be adequately assessed on follow-up plain X-rays.

References


Plain X-ray is not required for **MS-14: Osteoporosis**.

Quantitative CT (CPT® 77078) can be approved for screening when DXA scanner is unavailable or known to be inaccurate for ANY of the following populations:

- **Women age ≥65 years**
- **Men age >70 years**
- **Women age <65 years who have additional risk factors for osteoporosis based on medical history and other findings:**
  - Estrogen deficiency
  - A history of maternal hip fracture that occurred after age 50 years
  - Low body mass (<127 lb or 57.6 kg)
  - History of amenorrhea (>1 year before age 42 years)
- **Women age <65 years or men age <70 years who have additional risk factors:**
  - Current use of cigarettes
  - Loss of height, thoracic kyphosis
- **Individuals of any age with bone mass osteopenia or fragility fractures on imaging studies such as radiographs, CT, or MRI**
- **Individuals age 50 years and older who develop a wrist, hip, spine, or proximal humerus fracture with minimal or no trauma, excluding pathologic fractures**
- **Individuals of any age who develop 1 or more insufficiency fractures**
- **Premenopausal females or males age 20 to 50 years with risk factors:**
  - Individuals with medical conditions that could alter bone mineral density
    - Chronic renal failure
    - Rheumatoid arthritis and other inflammatory arthritides
    - Eating disorders, including anorexia nervosa and bulimia
    - Organ transplantation
    - Prolonged immobilization
    - Conditions associated with secondary osteoporosis, such as gastrointestinal malabsorption or malnutrition, sprue, osteomalacia, vitamin D deficiency, endometriosis, acromegaly, chronic alcoholism or established cirrhosis, and multiple myeloma
    - Individuals who have had gastric bypass for obesity
    - Individuals with an endocrine disorder known to adversely affect bone mineral density (e.g., hyperparathyroidism, hyperthyroidism, or Cushing syndrome)
  - Individuals receiving (or expected to receive) glucocorticoid therapy for >3 months
  - Hypogonadal men older than 18 years and men with surgically or chemotherapeutically induced castration
  - Individuals beginning or receiving long-term therapy with medications known to adversely affect BMD (e.g. anticonvulsant drugs, androgen deprivation therapy, aromatase inhibitor therapy, or chronic heparin)

**Note:** Repeat screening quantitative computed tomography (QCT) can be approved no sooner than every two years.
Quantitative CT scan (CPT® 77078) can be approved for non-screening/monitoring when DXA scanner is unavailable or known to be inaccurate for ANY of the following circumstances:

- Follow-up in cases where QCT was the original study
- Multiple healed vertebral compression fractures
- Significant scoliosis
- Advanced arthritis of the spine due to increased cortical sclerosis often with large marginal osteophytes. Obese patient over the weight limit of the dual-energy X-ray absorptiometry (DXA) exam table
- Severely obese patients (BMI >35kg/m2)
- Extremes in body height (i.e. very large and very small patients)
- Patients with extensive degenerative disease of the spine
- A clinical scenario that requires sensitivity to small changes in trabecular bone density (parathyroid hormone and glucocorticoid treatment monitoring).

**Note:** Repeat non-screening/monitoring QCT can be approved no earlier than one year following a change in treatment regimen, and only when the results will directly impact a treatment decision.

**References**


### MS-15: Rheumatoid Arthritis (RA) and Inflammatory Arthritis

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
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<td>42</td>
</tr>
<tr>
<td>MS-15.2: Pigmented Villonodular Synovitis (PVNS)</td>
<td>42</td>
</tr>
</tbody>
</table>
**MS 15.1: Rheumatoid Arthritis (RA) and Inflammatory Arthritis**

- Plain X-ray, physical exam and appropriate laboratory studies* are required prior to advanced imaging.
- MRI without contrast or MRI without and with contrast or US (CPT® 76881 or 76882) is appropriate for the most symptomatic joint, or of the dominant hand or wrist, in ALL of the following situations:
  - When diagnosis is uncertain prior to initiation of drug therapy.
  - To study the effects of treatment with disease modifying anti-rheumatic drug (DMARD) therapy.
  - To identify seronegative RA patients that might benefit from early DMARD therapy.
  - To determine change in treatment, such as:
    - Switching from standard DMARD therapy to tumor necrosis factor (TNF) therapy.
    - Changing to a different TNF drug therapy, then one MRI (contrast as requested) of a single joint can be performed.
    - Addition of other treatments, including joint injections
- MRI or US should NOT be considered for routine follow-up of treatment.

**Practice Notes**

- *Examples of appropriate laboratory studies may include: Lyme titers, rheumatoid factor (RF), anti-cyclic citrullinated peptide (anti-CCP), sedimentation rate (ESR), C-reactive protein (CRP), and antinuclear antibody (ANA)], joint fluid analysis

**MS-15.2: Pigmented Villonodular Synovitis (PVNS)**

- MRI of the affected joint without contrast, or CT of the affected joint with contrast (arthrogram) if MRI contraindicated is supported following plain X-rays.
References


**MS-16.1: Post-Operative Joint Replacement Surgery - General**

- CT without contrast or bone scan (CPT® 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831)* or hybrid SPECT/CT (CPT® 78830, or 78832)* may be indicated for the evaluation of suspected aseptic loosening of orthopaedic joint replacements when recent plain X-ray is nondiagnostic.
  - CT Shoulder without contrast (CPT® 73200) can be performed as additional imaging following plain X-rays regardless of plain X-ray findings. See **MS-19: Shoulder**

- CT without contrast is appropriate with a high suspicion for a periprosthetic fracture and a negative plain X-ray.
  - CT Shoulder without contrast (CPT® 73200) can be performed as additional imaging following plain X-rays regardless of plain X-ray findings. See **MS-19: Shoulder**

- Joint aspiration is the initial evaluation after plain X-ray for a painful joint replacement when periprosthetic infection is suspected.
  - For suspected infection with negative or inconclusive joint aspiration culture See **MS-28: Nuclear Medicine**

- MRI Hip without contrast (CPT® 73721) or ultrasound (CPT® 76881 or 76882) are both appropriate for EITHER of the following:
  - Diagnosis of ALVAL (aseptic lymphocytic-dominated vasculitis-associated lesion) pseudotumors surrounding metal-on-metal (MoM) hip prostheses. One of these two imaging modalities can be approved but not both. See **MS-10.1: Soft Tissue Mass or Lesion of Bone**
  - Metal-On-Metal (MoM) Hip Prostheses that are considered high risk for implant performance issues from THA cup-neck impingement and subsequent ALTR (adverse local tissue reaction) with Co and Cr ion levels greater than 10 ppb.

- CT Hip without contrast (CPT® 73700) or MRI Hip without contrast (CPT® 73721) is appropriate to evaluate suspected particle disease (aggressive granulomatous disease) of the hip when infection has been excluded.

- For specific joints post-operative from replacement surgery:
  - See **MS-19: Shoulder**
  - See **MS-20: Elbow**
  - See **MS-24: Hip**
  - See **MS-25: Knee**
  - See **MS-26: Ankle**

**Practice Notes**

- Complications following joint replacement surgery include (not limited to) periprosthetic fracture, infection, aseptic loosening, failure of fixation/component malpostition, and wear.
*The usefulness of bone scan for the evaluation of suspected aseptic loosening of a shoulder replacement may be limited as bone remodeling–related increased uptake can be seen at the site of joint replacement for up to 1 year following surgery.

References
| MS-17.1: Limb Length Discrepancy | 48 |
**MS-17.1: Limb Length Discrepancy**

- Requests will be sent to Medical Director Review. Either plain radiographic or “CT scanogram,” both reported with CPT® 77073, is appropriate to radiographically evaluate limb length discrepancy due to congenital anomalies, acquired deformities, growth plate (physeal injuries or surgery), or inborn errors of metabolism.

**Reference**

### MS-18: Anatomical Area Tables – General Information

The imaging guidelines for each anatomical area are presented in table format. The table below includes a description of how each column header should be utilized for each guideline MS-19: Shoulder through MS-27: Foot.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient’s condition</td>
<td>Are the results of an initial plain X-ray required before advanced imaging can be approved? (Yes or No)</td>
<td>Is failure of 6 weeks of provider-directed conservative treatment within the past 12 weeks with clinical re-evaluation required? (Yes or No)</td>
<td>The appropriate advanced imaging indicated for this condition. In some scenarios, advanced imaging may not be indicated.</td>
<td>Additional comments related to the condition.</td>
</tr>
</tbody>
</table>
### MS-19: Shoulder

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Shoulder Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221)</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) if MRI contraindicated</td>
</tr>
<tr>
<td>Symptomatic Loose Bodies</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221)</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) if MRI contraindicated</td>
</tr>
<tr>
<td>Impingement</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or MRI Shoulder with contrast (arthrogram) (CPT® 73222) or US Shoulder (CPT® 76881 or 76882)</td>
<td>&gt; CT Shoulder with contrast (CPT® 73201) if MRI is contraindicated</td>
</tr>
<tr>
<td>Tendonitis/ Bursitis</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or US Shoulder (CPT® 76881 or 76882)</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or US Shoulder (CPT® 76881 or 76882) when clinical exam is inconclusive due to inability to visualize a “Popeye” sign clinically or for preoperative planning</td>
</tr>
<tr>
<td>Tendon Rupture (Biceps Long Head)</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or US Shoulder (CPT® 76881 or 76882)</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or MRI Chest without contrast (CPT® 71550) when clinical exam is inconclusive or for preoperative planning</td>
</tr>
<tr>
<td>Tendon Rupture (Pectoralis Major/Minor)</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or MRI Chest without contrast (CPT® 71550)</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or MRI Chest without contrast (CPT® 71550) when clinical exam is inconclusive or for preoperative planning</td>
</tr>
<tr>
<td>Shoulder Rotator Cuff Tear (Complete and Partial)</td>
<td>Yes</td>
<td>Yes*</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or MRI Shoulder with contrast (arthrogram) (CPT® 73222) or US Shoulder (CPT® 76881 or 76882)</td>
<td>&gt; CT Shoulder with contrast (arthrogram) (CPT® 73201) if MRI is contraindicated *Conservative treatment is not required with an acute shoulder injury prior to the onset of symptoms and consideration of surgery. For surgery criteria, See CMM-315: Shoulder Surgery-Arthroscopic and Open Procedures.</td>
</tr>
<tr>
<td>Partial Tendon Rupture (Excluding Partial Rotator Cuff Tears)</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI Shoulder without contrast (CPT® 73221) or US Shoulder (CPT® 76881 or 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td>MRI is NOT needed for muscle belly strains/muscle tears.</td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
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</tr>
<tr>
<td>Shoulder Labral Tear (e.g., SLAP, ALPSA, HAGL)</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI Shoulder with contrast (arthrogram) (CPT® 73222) or MRI Shoulder without contrast (CPT® 73221) or CT Shoulder with contrast (arthrogram) (CPT® 73201)</td>
<td>For surgery criteria, See CMM-315: Shoulder Surgery-Arthroscopic and Open Procedures.</td>
</tr>
<tr>
<td>Shoulder Dislocation/Subluxation/Instability, or Bankart/Hill-Sachs Lesions</td>
<td>Yes</td>
<td>Yes*</td>
<td>MRI Shoulder with contrast (arthrogram) (CPT® 73222) or MRI Shoulder without contrast (CPT® 73221) is medically necessary without conservative treatment in patients 40 years of age or younger with a first time dislocation and in patients with recurrent dislocations CT Shoulder with contrast (arthrogram) (CPT® 73201) or CT Shoulder without contrast (CPT® 73200) if MRI is contraindicated</td>
<td>*Conservative treatment is required in patients over age 40 with a first time dislocation. For surgery criteria, See CMM-315: Shoulder Surgery-Arthroscopic and Open Procedures.</td>
</tr>
<tr>
<td>Frozen Shoulder/Adhesive Capsulitis</td>
<td>Yes</td>
<td>Yes</td>
<td>Advanced imaging is rarely indicated – in those rare situations, MRI Shoulder without contrast (CPT® 73221)</td>
<td>Requests will be forwarded to Medical Director Review. For surgery criteria, See CMM-310: Manipulation Under Anesthesia and CMM-315: Shoulder Surgery-Arthroscopic</td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
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</tbody>
</table>
| Avascular Necrosis (AVN) of the Humeral Head  | Yes          | No                     | > MRI Shoulder without contrast (CPT® 73221) when suspected and plain X-ray is negative or equivocal
> CT Shoulder without contrast (CPT® 73200) and/or MRI Shoulder without contrast (CPT® 73221) for preoperative planning prior to shoulder replacement | See MS-4.1: AVN |
| Acromioclavicular (AC) Separation             | Yes          | No                     | > MRI Shoulder without contrast (CPT® 73221) to rule out possible rotator cuff tear following AC separation |
| Sternoclavicular (SC) Dislocation             | Yes          | No                     | > CT Chest without contrast (CPT® 71250) if posterior SC dislocation is evident or suspected |
| Post-Operative Shoulder Surgery for Impingement, Rotator Cuff Tear, and/or Labral Tear | Yes          | Yes                    | > MRI Shoulder without contrast (CPT® 73221) or MRI Shoulder with contrast (arthrogram) (CPT® 73222) in symptomatic individuals
> US Shoulder (CPT® 76881 or 76882) is also appropriate in symptomatic individuals following rotator cuff repair
> CT Shoulder with contrast (arthrogram) (CPT® 73201) if MRI contraindicated | Other requests for advanced imaging will be forwarded to Medical Director Review. |
<table>
<thead>
<tr>
<th>Condition</th>
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<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
</table>
| Preoperative Shoulder (Glenohumeral) Replacement Surgery | Yes          | Yes                    | CT Shoulder without contrast (CPT® 73200) and/or MRI shoulder without contrast (CPT® 73221) for preoperative planning prior to shoulder replacement | See MS-12: Osteoarthritis  
For joint surgery criteria, See CMM-318: Shoulder Arthroplasty/Arthrodesi  
s  

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Operative Shoulder (Glenohumeral) Replacement Surgery</td>
<td>Yes</td>
<td>No</td>
<td>CT Shoulder without contrast (CPT® 73200) for suspected aseptic loosening or fracture as additional imaging following plain X-rays</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In-111 WBC (CPT® 78800, 78801, 78802, 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) and Tc-99m sulfur colloid scan shoulder (CPT® 78102 or 78103) for suspected infection with negative or inconclusive joint aspiration culture (See MS-28: Nuclear Medicine)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT Shoulder with contrast (arthrogram) (CPT® 73201) or US shoulder (CPT® 76881 or 76882) for possible rotator cuff tear</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MRI Shoulder without contrast (CPT® 73221) or US Shoulder (CPT® 76881 or 76882) for possible nerve injury</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review. See MS-16: Post-Operative Joint Replacement</td>
</tr>
</tbody>
</table>

References


<table>
<thead>
<tr>
<th>Condition</th>
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<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Elbow Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI Elbow without contrast (CPT® 73221)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic Loose Bodies</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI Elbow without contrast (CPT® 73221) if effusion is present; or</td>
<td>▶ MRI Elbow with contrast (arthrogram) (CPT® 73222) if no effusion is present</td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882)</td>
<td></td>
</tr>
<tr>
<td>Bursitis</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI Elbow without and with contrast (CPT® 73223) or MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882)</td>
<td></td>
</tr>
<tr>
<td>Lateral (tennis elbow) or Medial (golfer's elbow) Epicondylitis</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882) can confirm the clinical diagnosis of epicondylitis if symptoms persist for longer than 6 months in cases refractory to conservative treatment.</td>
<td>Epicondylitis, caused by tendon degeneration and tear of the common extensor tendon laterally or of the common flexor tendon medially, is a common clinical diagnosis for which imaging is not medically necessary except as noted. Requests will be forwarded to Medical Director Review.</td>
</tr>
<tr>
<td>Suspected Osteochondral Injury</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI Elbow without contrast (CPT® 73221) or MRI Elbow with contrast (arthrogram) (CPT® 73222) or CT Elbow with contrast (arthrogram) (CPT® 73201) if plain X-rays are negative and an osteochondral fracture is still suspected</td>
<td>See MS-13: Chondral/Osteochondral Lesions</td>
</tr>
<tr>
<td>Ruptured Biceps Insertion at Elbow</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882) when clinical exam is inconclusive or for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Ruptured Triceps Insertion at Elbow</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882) when clinical exam is inconclusive or for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
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</tr>
<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td>MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td>MRI is NOT needed for muscle belly strains/muscle tears.</td>
</tr>
<tr>
<td>Trauma</td>
<td>Yes</td>
<td>No</td>
<td>MRI Elbow without contrast (CPT® 73221) or CT Elbow without contrast (CPT® 73200) when surgery is being considered</td>
<td></td>
</tr>
<tr>
<td>Ulnar Collateral Ligament (UCL) Tear</td>
<td>Yes</td>
<td>No</td>
<td>MRI Elbow with contrast (arthrogram) (CPT® 73222) or MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882) following acute or repetitive (including overhead throwing athletes) elbow trauma</td>
<td></td>
</tr>
<tr>
<td>Suspected Nerve Abnormality</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI Elbow without contrast (CPT® 73221) or US Elbow (CPT® 76881 or 76882) for surgical planning</td>
<td>Initial EMG/NCV is required prior to advanced imaging in accordance with PN-2: Focal Neuropathy</td>
</tr>
<tr>
<td>Post-Operative</td>
<td>Yes</td>
<td>Yes</td>
<td>CT Elbow without contrast (CPT® 73200) in symptomatic post-operative patients following surgical treatment of complex fractures; or MRI Elbow without contrast (CPT® 73221) in symptomatic post-operative patients following soft-tissue surgery</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review.</td>
</tr>
<tr>
<td>Preoperative Elbow Replacement Surgery</td>
<td>Yes</td>
<td>Yes</td>
<td>CT Elbow without contrast (CPT® 73200) for preoperative planning prior to elbow replacement when congenital or post-traumatic deformities exist</td>
<td>See: MS-12: Osteoarthritis</td>
</tr>
</tbody>
</table>
### Condition | Plain X-Ray? | Conservative Treatment | Advanced Imaging | Comments
---|---|---|---|---
Post-Operative Elbow Replacement Surgery | Yes | No | ▶ CT Elbow without contrast (CPT® 73200) for suspected aseptic loosening or periprosthetic fracture when recent plain X-ray is nondiagnostic ▶ In-111 WBC (CPT® 78800, 78801, 78802, 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) and Tc-99m sulfur colloid scan elbow (CPT® 78102 or 78103) for suspected infection with negative or inconclusive joint aspiration culture | Other requests for advanced imaging will be forwarded to Medical Director Review.

### References

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Wrist Pain</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>MRI wrist without contrast (CPT® 73221)</td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>MRI wrist without contrast (CPT® 73221) or US wrist (CPT® 76881 or 76882)</td>
</tr>
<tr>
<td>Kienbock’s Disease (Avascular Necrosis (AVN) of the Lunate)/Preiser’s Disease (Avascular Necrosis (AVN) of the Scaphoid)</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>MRI wrist without contrast (CPT® 73221) when suspected and plain X-ray is negative or equivocal</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>If diagnosed on plain X-ray, CT wrist without contrast (CPT® 73200) or MRI wrist without contrast (CPT® 73221)</td>
</tr>
<tr>
<td>Suspected Navicular/Scaphoid Fracture</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>MRI wrist without contrast (CPT® 73221) or CT wrist without contrast (CPT® 73200) when suspected based on history and physical exam</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>See MS-4.1: AVN</td>
</tr>
<tr>
<td>Distal Radioulnar Joint (DRUJ) Instability</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>CT of both wrists without contrast (CPT® 73200) (should include wrists in supination and pronation)</td>
</tr>
<tr>
<td>Complex Distal Radius/Ulna Fracture</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>CT wrist without contrast (CPT® 73200)</td>
</tr>
<tr>
<td>Carpal Tunnel Syndrome/ULnar Tunnel Syndrome</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>MRI wrist without contrast (CPT® 73221) or US wrist (CPT® 76881 or 76882) for surgical planning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Initial EMG/NCV is required prior to advanced imaging in accordance with PN-2: Focal Neuropathy</td>
</tr>
<tr>
<td>Intrinsic Ligament (e.g. scapholunate)/Triangular Fibrocartilage Complex (TFCC) Injuries</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td>MRI wrist with contrast (arthrogram) (CPT® 73222) or CT wrist with contrast (arthrogram) (CPT® 73201)</td>
</tr>
<tr>
<td>Complete Rupture of a Specific Named Tendon Not Otherwise Specified</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td>MRI wrist without contrast (CPT® 73221) or US wrist (CPT® 76881 or 76882) for preoperative planning</td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
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<td>----------------------------</td>
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<td>--------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI wrist without contrast (CPT® 73221) or US wrist (CPT® 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td>MRI is NOT needed for muscle belly strains/muscle tears.</td>
</tr>
<tr>
<td>Post-Operative</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; CT wrist without contrast (CPT® 73200) in symptomatic patients following surgery for navicular/scaphoid fractures and complex distal radius/ulna fractures; or&lt;br&gt; &gt; MRI wrist with contrast (arthrogram) (CPT® 73222) in symptomatic patients following DRUJ or TFCC surgery</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review.</td>
</tr>
<tr>
<td>Preoperative Wrist Replacement Surgery</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; CT wrist without contrast (CPT® 73200) for preoperative planning prior to wrist replacement when congenital or post-traumatic deformities exist</td>
<td>See MS-12: Osteoarthritis</td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
</tr>
<tr>
<td>----------------------------</td>
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<td>----------------------------------------------------------------------------------</td>
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</tr>
</tbody>
</table>
| Post-Operative Wrist       | Yes          | No                     | > CT wrist without contrast (CPT® 73200) for suspected aseptic loosening or periprosthetic fracture when recent plain X-ray is nondiagnostic  
> In-111 WBC (CPT® 78800, 78801, 78802, 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) and Tc-99m sulfur colloid scan wrist (CPT® 78102 or 78103) for suspected infection with negative or inconclusive joint aspiration culture | Other requests for advanced imaging will be forwarded to Medical Director Review. |
| Replacement Surgery        |              |                        |                                                                                  |          |

**References**

### MS-22: Hand

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Hand Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI hand or finger without contrast (CPT® 73218)</td>
<td></td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI hand or finger without contrast (CPT® 73218) or US hand or finger (CPT® 76881 or 76882)</td>
<td></td>
</tr>
<tr>
<td>Occult Fracture</td>
<td>Yes</td>
<td>No</td>
<td>▶ Advanced imaging guided by <a href="#">MS-5.2: Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints</a></td>
<td></td>
</tr>
<tr>
<td>Complex Fracture</td>
<td>Yes</td>
<td>No</td>
<td>▶ CT hand or finger without contrast (CPT® 73200) when plain X-ray shows a complex fracture</td>
<td></td>
</tr>
<tr>
<td>Ulnar Collateral Ligament (UCL)</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI thumb without contrast (CPT® 73218) or US thumb (CPT® 76881 or 76882) if rule out for Stener lesion or complete tear of UCL of the thumb MCP joint</td>
<td>Also called &quot;Gamekeeper’s Thumb&quot; or &quot;Skier’s Thumb&quot;</td>
</tr>
<tr>
<td>Thumb Injury</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI hand or finger without contrast (CPT® 73218) or US hand or finger (CPT® 76881 or 76882) for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Complete Rupture of a Specific Named Tendon not Otherwise Specified</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI hand or finger without contrast (CPT® 73218) or US hand or finger (CPT® 76881 or 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td>MRI is NOT needed for muscle belly strains/muscle tears.</td>
</tr>
<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI hand or finger without contrast (CPT® 73218) or US hand or finger (CPT® 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td></td>
</tr>
<tr>
<td>Post-Operative</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ CT hand or finger without contrast (CPT® 73200) or MRI hand or finger without contrast (CPT® 73218) in symptomatic post-operative patients following surgical treatment for complex hand or finger fractures or following soft-tissue surgery</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review.</td>
</tr>
</tbody>
</table>

### References
# MS-23: Pelvis

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Pain-Pelvis</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI pelvis without contrast (CPT® 72195); or</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ MRI RT and/or LT hip without contrast (CPT® 73721)</td>
<td></td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI pelvis without contrast (CPT® 72195); or</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ MRI RT and/or LT hip without contrast (CPT® 73721)</td>
<td></td>
</tr>
<tr>
<td>Occult/Insufficiency Fracture</td>
<td>Yes</td>
<td>No</td>
<td>➢ MRI pelvis without contrast (CPT® 72195) or CT pelvis without contrast (CPT® 72192)</td>
<td>See MS-5.2: Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints for occult and stress fractures of the pelvis</td>
</tr>
<tr>
<td>Complex Fracture/Dislocation - Pelvis, Sacrum and Acetabulum</td>
<td>Yes</td>
<td>No</td>
<td>➢ CT pelvis without contrast (CPT® 72192)</td>
<td>Additionally, 3D rendering may be appropriate for preoperative planning. See MS-3: 3D Rendering</td>
</tr>
<tr>
<td>Sacro-iliac (SI) Joint Pain, Sacroiliitis, Coccydynia</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ Advanced imaging guided by: SP-10.1: Sacroiliac (SI) Joint Pain/ Sacroiliitis and SP-5.2: Coccydynia without Neurological Features</td>
<td></td>
</tr>
<tr>
<td>Complete Rupture of a Specific Named Tendon</td>
<td>Yes</td>
<td>No</td>
<td>➢ MRI pelvis without contrast (CPT® 72195) for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td>➢ MRI Pelvis without contrast (CPT® 72195) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td>MRI is NOT needed for muscle belly strains/muscle tears.</td>
</tr>
<tr>
<td>Osteitis Pubis/ Symphysis Pubis Diastasis</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI pelvis without contrast (CPT® 72195)</td>
<td></td>
</tr>
<tr>
<td>Athletic Pubalgia (Sports Hernia)</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI pelvis without contrast (athletic pubalgia protocol) (CPT® 72195) or dynamic pelvic ultrasound (CPT® 76857) are appropriate to evaluate for the cause of suspected athletic pubalgia.</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
</tr>
<tr>
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</tr>
<tr>
<td>Post-Operative</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ CT pelvis without contrast (CPT® 72192) in symptomatic patients following surgery for complex pelvic ring/acetabular fractures</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review.</td>
</tr>
</tbody>
</table>

References

<table>
<thead>
<tr>
<th>Condition</th>
<th>Yes</th>
<th>No</th>
<th>MRI Hip without contrast (CPT® 73721)</th>
<th>MRI Hip without contrast (CPT® 73721) or US Hip (CPT® 76881 or 76882)</th>
<th>MRI Hip without contrast (CPT® 73721) or US Hip (CPT® 76881 or 76882) for preoperative planning</th>
<th>MRI is NOT needed for muscle belly strains/muscle tears.</th>
<th>See MS-5.2: Suspected Occult/ Stress/ Insufficiency Fracture/ Stress Reaction and Shin Splints for occult and stress fractures of the hip</th>
<th>See MS-4.1: AVN</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Hip Pain</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Symptomatic Loose Bodies</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
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<tr>
<td>Tendonitis/ Bursitis</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hip Abductor Tendon Tear/ Avulsion</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Complete Rupture of a Specific Named Tendon</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Occult/ Insufficiency Fracture</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Avascular Necrosis (AVN) of the Femoral Head</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Labral Tear</td>
<td>Yes</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>For surgery criteria, See CMM-314: Hip Surgery- Arthroscopic and Open Procedures</td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
<td>Conservative Treatment</td>
<td>Advanced Imaging</td>
<td>Comments</td>
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</tr>
<tr>
<td>Femoroacetabular Impingement</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI hip without contrast (CPT® 73721) or MRI hip with contrast (arthrogram) (CPT® 73722) in addition to CT hip without contrast (CPT® 73700) or CT pelvis without contrast (CPT® 72192) for preoperative planning for femoroacetabular impingement</td>
<td>For surgery criteria, See CMM-314: Hip Surgery: Arthroscopic and Open Procedures</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Piriformis Syndrome</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI pelvis without contrast (CPT® 72195) or CT pelvis without contrast (CPT® 72192) for preoperative planning</td>
<td>EMG/NCV may confirm the diagnosis. Refer to PN-2: Focal Neuropathy</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
| Post-Operative              | Yes          | Yes                    | > MRI hip with contrast (arthrogram) (CPT® 73722) in symptomatic patients following surgery for labral tears and femoroacetabular impingement  
                                  > CT hip without contrast (CPT® 73700) or MRI hip without contrast (CPT® 73721) in symptomatic patients following surgery for hip fracture and/or hip avascular necrosis | Other requests for advanced imaging will be forwarded to Medical Director Review. |
| Preoperative Hip Replacement Surgery | Yes          | Yes                    | > CT hip without contrast (CPT® 73700) for preoperative planning prior to hip replacement when congenital or post-traumatic deformities exist | See MS-12: Osteoarthritis  
For surgery criteria, See CMM-313: Hip Arthroplasty- Total and Partial |
<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Post-Operative Hip Replacement Surgery</td>
<td>Yes</td>
<td>No*</td>
<td>CT hip without contrast (CPT® 73700) or bone scan (CPT® 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) for suspected aseptic loosening of hip replacement when recent plain X-ray is nondiagnostic</td>
<td>See MS-16: Post-Operative Joint Replacement</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>In-111 WBC (CPT® 78800, 78801, 78802, 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) and Tc-99m sulfur colloid scan hip (CPT® 78102 or 78103) for suspected infection with negative or inconclusive joint aspiration culture (See MS-28: Nuclear Medicine)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT hip without contrast (CPT® 73700) for suspicion of a periprosthetic fracture when recent plain X-ray is nondiagnostic</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>CT hip without contrast (CPT® 73700) to evaluate component malposition or heterotopic bone after plain X-ray</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>MRI hip without contrast (CPT® 73721) for possible nerve injury</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>MRI hip without contrast (CPT® 73721) or US hip (CPT® 76881 or 76882) for suspected for suspected tendinitis/bursitis (*requires conservative treatment)</td>
<td></td>
</tr>
</tbody>
</table>

**Coding Notes**
- Unilateral hip MRI is reported as CPT® 73721.
- Bilateral hip MRI can be identified in several different ways on the claim.
  - eviCore will approve two separate codes (CPT® 73721 x 2) with RT and LT modifiers.
References


### MS-25: Knee

<table>
<thead>
<tr>
<th>Condition</th>
<th>Plain X-Ray?</th>
<th>Conservative Treatment</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Knee Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI knee without contrast (CPT® 73721)</td>
<td></td>
</tr>
<tr>
<td>Symptomatic Loose Bodies</td>
<td>Yes</td>
<td>No</td>
<td>➢ MRI knee without contrast (CPT® 73721)</td>
<td>➢ CT knee with contrast (arthrogram) (CPT® 73701) if MRI cannot be performed</td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI knee without contrast (CPT® 73721)</td>
<td>➢ MRI knee without contrast (CPT® 73721) or US knee (CPT® 76881 or 76882)</td>
</tr>
<tr>
<td>Complex Knee Fracture</td>
<td>Yes</td>
<td>No</td>
<td>➢ CT knee without contrast (CPT® 73700)</td>
<td>See MS-5: Fractures</td>
</tr>
<tr>
<td>Meniscus Tear</td>
<td>Yes</td>
<td>Yes*</td>
<td>➢ MRI knee without contrast (CPT® 73721)</td>
<td>➢ MRI knee without contrast (CPT® 73721) for clinical suspicion of a symptomatic degenerative meniscus tear in a patient with osteoarthritis following conservative treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Conservative treatment is not required if at least 2 of following 4 criteria are met: 1) Positive McMurray's or positive Thessaly test 2) twisting or acute injury of the knee 3) locked knee/inability to fully extend the knee 4) knee effusion</td>
<td></td>
</tr>
<tr>
<td>Ligament Tear</td>
<td>Yes</td>
<td>Yes*</td>
<td>➢ MRI knee without contrast (CPT® 73721)</td>
<td>➢ MRI knee without contrast (CPT® 73721) for clinical suspicion of a symptomatic degenerative meniscus tear in a patient with osteoarthritis following conservative treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>*Conservative treatment is not required if any of the following signs are positive in comparison to the normal knee: ➢ Anterior drawer ➢ Lachman ➢ Pivot shift ➢ Posterior drawer ➢ Posterior sag ➢ Valgus stress ➢ Varus stress</td>
<td></td>
</tr>
<tr>
<td>Knee Joint Dislocation</td>
<td>Yes</td>
<td>No</td>
<td>➢ MRI knee without contrast (CPT® 73721)</td>
<td>➢ MRI knee without contrast (CPT® 73721) and MRA knee without and with contrast (CPT® 73725) following significant trauma to evaluate for ligament and vascular injury</td>
</tr>
</tbody>
</table>

*Conservative treatment is not required if at least 2 of following 4 criteria are met:
1) Positive McMurray's or positive Thessaly test
2) twisting or acute injury of the knee
3) locked knee/inability to fully extend the knee
4) knee effusion

*Conservative treatment is not required if any of the following signs are positive in comparison to the normal knee:
- Anterior drawer
- Lachman
- Pivot shift
- Posterior drawer
- Posterior sag
- Valgus stress
- Varus stress

For surgery criteria, See **CMM-312: Knee Surgery - Arthroscopic and Open Procedures**
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<tr>
<th>Condition</th>
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<tbody>
<tr>
<td>Patellar Dislocation/Subluxation</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI knee without contrast (CPT® 73721) with acute knee injury, consideration of surgery and concern for osteochondral fracture or loose osteochondral fracture fragment</td>
<td>For surgery criteria, See CMM-312: Knee Surgery- Arthroscopic and Open Procedures</td>
</tr>
<tr>
<td>Recurrent Patellar Instability</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI knee without contrast (CPT® 73721) if consideration for surgery</td>
<td>For surgery criteria, See CMM-312: Knee Surgery- Arthroscopic and Open Procedures</td>
</tr>
<tr>
<td>Patellofemoral Pain Syndrome/ Anterior Knee Pain/ Tracking Disorder</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI knee without contrast (CPT® 73721) if consideration for surgery</td>
<td>See MS-13: Chondral Osteochondral Lesions for other osteochondral injury scenarios. For surgery criteria, See CMM-312: Knee Surgery- Arthroscopic and Open Procedures</td>
</tr>
<tr>
<td>Suspected Osteochondral Injury</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI knee without contrast (CPT® 73721) or MRI knee with contrast (arthrogram) (CPT® 73722) or CT knee with contrast (arthrogram) (CPT® 73701) if plain X-rays are negative and an osteochondral fracture is still suspected</td>
<td>See MS-4.1: Avascular Necrosis</td>
</tr>
<tr>
<td>Avascular Necrosis (AVN) of the Distal Femur</td>
<td>Yes</td>
<td>No</td>
<td>▶ MRI knee without contrast (CPT® 73721) when suspected and plain X-ray is negative or equivocal or with AVN confirmed by plain X-ray if needed for treatment planning</td>
<td>See PVD-7.5: Lower Extremity Deep Venous Thrombosis (DVT) and/ or Lower Extremity Edema</td>
</tr>
<tr>
<td>Baker’s Cyst (Popliteal Cyst)</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ US knee (CPT® 76882) is the initial imaging study ▶ MRI knee without contrast (CPT® 73721) for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Plica (Symptomatic Synovial Plica/ Medial Synovial Shelf)</td>
<td>Yes</td>
<td>Yes</td>
<td>▶ MRI knee without contrast (CPT® 73721)</td>
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<th>Condition</th>
<th>Plain X-Ray?</th>
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<th>Advanced Imaging</th>
<th>Comments</th>
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</thead>
</table>
| Hemarthrosis                                   | Yes          | No                      | ▶ MRI knee without contrast (CPT® 73721) for clinical suspicion of cruciate ligament tear (requires a positive objective sign for ACL/PCL tear) or patellar dislocation (requires a positive apprehension sign)  
▶ CT knee without contrast (CPT® 73700) for clinical suspicion of non-displaced intra-articular fracture |                                                                                                                                                                                                                                                                   |
| Complete Rupture of the Distal Quadriceps Tendon or Patellar Ligament/Tendon | Yes          | No                      | ▶ MRI knee without contrast (CPT® 73721) or US knee (CPT® 76882) for preoperative planning | MRI is NOT needed for muscle belly strains/muscle tears.                                                                                                                                                                                                           |
| Partial Tendon Rupture                         | Yes          | No                      | ▶ MRI knee without contrast (CPT® 73721) or US knee (CPT® 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified | Other requests for advanced imaging will be forwarded to Medical Director Review.                                                                                                                                                                                   |
| Post-Operative                                 | Yes          | Yes                     | ▶ MRI knee with contrast (arthrogram) (CPT® 73722) or MRI knee without contrast (CPT® 73721) in symptomatic patients following surgery for meniscus tears and reconstruction of the anterior cruciate ligament  
▶ CT knee without contrast (CPT® 73700) in symptomatic patients following surgery for fracture/dislocation | See MS-12: Osteoarthritis  
For surgery criteria, See CMM-311: Knee Arthroplasty-Total and Partial                                                                                                                                                                                   |
<p>| Preoperative Knee Replacement Surgery          | Yes          | Yes                     | ▶ CT knee without contrast (CPT® 73700) for preoperative planning prior to knee replacement when congenital or post-traumatic deformities exist of the patella, distal femur and/or proximal tibia |                                                                                                                                                                                                                                                                   |</p>
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<tr>
<td>Post-Operative Knee Replacement Surgery</td>
<td>Yes</td>
<td>No*</td>
<td>CT knee without contrast (CPT® 73700) or bone scan (CPT® 78315, 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) for suspected aseptic loosening when recent plain X-ray is nondiagnostic</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review. See MS-16: Post-Operative Joint Replacement Surgery</td>
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<td></td>
<td>Tc-99m 3-phase bone scan (CPT® 78315) and In-111 WBC scan knee (CPT® 78800, 78801, 78802, 78803, or 78831) or In-111 WBC (CPT® 78800-78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) and Tc-99m sulfur colloid scan knee (CPT® 78102 or 78103) for suspected infection with negative or inconclusive joint aspiration culture (See MS-28: Nuclear Medicine)</td>
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<tr>
<td></td>
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<td></td>
<td>CT knee without contrast (CPT® 73700) following plain X-ray for suspected periprosthetic fracture</td>
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<td>CT knee without contrast (CPT® 73700) or MRI knee without contrast (CPT® 73721) for suspected osteolysis or component instability, rotation, or wear; MRI knee without contrast (CPT® 73721) or US knee (CPT® 76881 or 76882) for suspected periprosthetic soft tissue abnormality unrelated to infection (e.g., tendinopathy, arthrofibrosis, patellar clunk syndrome, impingement of nerves or other soft tissue) *requires conservative treatment.</td>
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# MS-26: Ankle

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<td>General Ankle Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI ankle without contrast (CPT® 73721)</td>
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<td>Symptomatic Loose Bodies</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI ankle without contrast (CPT® 73721)</td>
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<tr>
<td>Complex Fracture</td>
<td>Yes</td>
<td>No</td>
<td>&gt; CT ankle without contrast (CPT® 73700)</td>
<td></td>
</tr>
<tr>
<td>Ankle Sprain, Including Avulsion Fracture</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI ankle without contrast (CPT® 73721) or CT without contrast (CPT® 73700)</td>
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</tr>
<tr>
<td>High Ankle Sprain ( Syndesmosis Injury)</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI ankle without contrast (CPT® 73721)</td>
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<tr>
<td>Suspected Osteochondral Injury</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI ankle without contrast (CPT® 73721) or MRI ankle with contrast (arthrogram) (CPT® 73722) or CT ankle with contrast (arthrogram) (CPT® 73701) if plain X-rays are negative and an osteochondral fracture is still suspected</td>
<td>See MS-13: Chondral Osteochondral Lesions for other osteochondral injury scenarios</td>
</tr>
<tr>
<td>Avascular Necrosis (AVN) of the Talus</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI ankle without contrast (CPT® 73721) when suspected and plain X-ray is negative or equivocal or with plain X-ray-confirmed AVN if needed for treatment planning</td>
<td>See MS-4.1: AVN</td>
</tr>
<tr>
<td>Anterior Impingement Anterior-Lateral Impingement Posterior Impingement (e.g., Os Trigonom Syndrome)</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI ankle with contrast (arthrogram) (CPT® 73722) or CT ankle with contrast (arthrogram) (CPT® 73701) or MRI ankle without contrast (CPT® 73721)</td>
<td></td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td>&gt; MRI ankle without contrast (CPT® 73721) or US ankle (CPT® 76882) for suspected posterior tibial dysfunction, peroneal tendon or subluxation, Achilles tendonitis</td>
<td></td>
</tr>
<tr>
<td>Ruptured Achilles Tendon</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI ankle without contrast (CPT® 73721) or US ankle (CPT® 76882) for preoperative evaluation</td>
<td></td>
</tr>
<tr>
<td>Complete Rupture -Tear of a Specific Named Tendon</td>
<td>Yes</td>
<td>No</td>
<td>&gt; MRI ankle without contrast (CPT® 73721) or US ankle (CPT® 76882) for preoperative planning</td>
<td></td>
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<tr>
<td>Condition</td>
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<td>Advanced Imaging</td>
<td>Comments</td>
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<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td>➢ MRI ankle without contrast (CPT® 73721) or US ankle (CPT® 76882) for a suspected</td>
<td>MRI is NOT needed for muscle belly strains/ muscle tears.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>partial tendon rupture of a specific named tendon not otherwise specified</td>
<td></td>
</tr>
<tr>
<td>Instability</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI ankle without contrast (CPT® 73721) or MRI ankle with contrast (arthrogram)</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(CPT® 73722) for preoperative evaluation</td>
<td>Review.</td>
</tr>
<tr>
<td>Charcot Ankle</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI ankle without contrast (CPT® 73721)</td>
<td></td>
</tr>
<tr>
<td>Post-Operative</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ MRI ankle without contrast (CPT® 73721) in symptomatic patients following surgery</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director</td>
</tr>
<tr>
<td></td>
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<td>for ligament/tendon injuries</td>
<td>Review.</td>
</tr>
<tr>
<td></td>
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<td></td>
<td>➢ CT ankle without contrast (CPT® 73700) for symptomatic patients following surgery</td>
<td></td>
</tr>
<tr>
<td></td>
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<td></td>
<td>for complex fractures</td>
<td></td>
</tr>
<tr>
<td>Preoperative Ankle Replacement</td>
<td>Yes</td>
<td>Yes</td>
<td>➢ CT ankle without contrast (CPT® 73700) for preoperative planning prior to ankle</td>
<td>See MS-12: Osteoarthritis</td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
<td>replacement when congenital or post-traumatic deformities exist</td>
<td></td>
</tr>
<tr>
<td>Post-Operative Ankle Replacement</td>
<td>Yes</td>
<td>No</td>
<td>➢ CT ankle without contrast (CPT® 73700) for suspected aseptic loosening or</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director</td>
</tr>
<tr>
<td>Surgery</td>
<td></td>
<td></td>
<td>periprosthetic fracture when recent plain X-ray is nondiagnostic</td>
<td>Review.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>➢ In-111 WBC (CPT® 78800, 78801, 78802, 78803, or 78831) and Tc-99m 3-phase bone</td>
<td>See MS-16: Post-Operative Joint Replacement Surgery</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>scan (CPT® 78315), or In-111 WBC (CPT® 78800-78803, or 78831) or hybrid SPECT/CT</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(CPT® 78830, or 78832) and Tc-99 sulfur colloid scan ankle (CPT® 78102 or 78103), for</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>suspected infection with negative or inconclusive joint aspiration culture (See MS-28: Nuclear Medicine)</td>
<td></td>
</tr>
</tbody>
</table>

**One Study/Area Only**

In foot and ankle advanced imaging, studies are frequently ordered of both areas. This is unnecessary since ankle MRI will image from above the ankle to the mid-metatarsal area. Only one CPT® code should be reported.
References
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<thead>
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<tbody>
<tr>
<td>General Foot Pain</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718)</td>
<td></td>
</tr>
<tr>
<td>Complex Fractures</td>
<td>Yes</td>
<td>No</td>
<td>CT foot without contrast (CPT® 73700)</td>
<td></td>
</tr>
<tr>
<td>Plantar Plate Disorders, Including Turf Toe Injuries</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718)</td>
<td></td>
</tr>
<tr>
<td>Sesamoid Disorders</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718) or CT foot without contrast (CPT® 73700)</td>
<td></td>
</tr>
<tr>
<td>Lisfranc Tarsometatarsal Fracture or Dislocation</td>
<td>Yes</td>
<td>No</td>
<td>MRI foot without contrast (CPT® 73718) or CT foot without contrast (CPT® 73700)</td>
<td></td>
</tr>
<tr>
<td>Tarsal Navicular Stress/Occult Fracture</td>
<td>Yes</td>
<td>No</td>
<td>MRI foot without contrast (CPT® 73718)</td>
<td>See MS-5.2: Suspected Occult/ Stress/ In-sufficiency Fracture/ Stress Reaction and Shin Splints</td>
</tr>
<tr>
<td>Avascular Necrosis (AVN) of the Tarsal Navicular (Kohler Disease)</td>
<td>Yes</td>
<td>No</td>
<td>MRI foot without contrast (CPT® 73718) when suspected and plain X-ray is negative or equivocal or with AVN confirmed by plain X-ray if needed for treatment planning</td>
<td>See MS-4.1: AVN</td>
</tr>
<tr>
<td>Tendonitis</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718) or US foot (CPT® 76882)</td>
<td></td>
</tr>
<tr>
<td>Complete rupture/tear of a specific named tendon</td>
<td>Yes</td>
<td>No</td>
<td>MRI foot without contrast (CPT® 73718) or US foot (CPT® 76882) for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Partial Tendon Rupture</td>
<td>Yes</td>
<td>No</td>
<td>MRI foot without contrast (CPT® 73718) or US foot (CPT® 76882) for a suspected partial tendon rupture of a specific named tendon not otherwise specified</td>
<td>MRI is NOT needed for muscle belly strains/muscle tears.</td>
</tr>
<tr>
<td>Morton’s Neuroma</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without and with contrast (CPT® 73720) or US foot (CPT® 76882) for preoperative planning</td>
<td></td>
</tr>
<tr>
<td>Plantar Fasciitis</td>
<td>Yes</td>
<td>Yes*</td>
<td>MRI foot without contrast (CPT® 73718) or US foot (CPT® 76882) for preoperative planning</td>
<td>*Provider-directed conservative treatment must be for 6 months or more.</td>
</tr>
<tr>
<td>Condition</td>
<td>Plain X-Ray?</td>
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<td>Advanced Imaging</td>
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</tr>
<tr>
<td>Suspected Plantar Fascia Rupture or Tear</td>
<td>Yes</td>
<td>Yes</td>
<td>MRi foot without contrast (CPT® 73718) or US foot (CPT® 76882)</td>
<td></td>
</tr>
<tr>
<td>Diabetic Foot Infection</td>
<td>Yes*</td>
<td>No</td>
<td>MRI foot without and with contrast (CPT® 73720) or MRI foot without contrast (CPT® 73718) for suspected osteomyelitis or soft tissue infection as a complement to plain X-ray (both plain X-ray and MRI are indicated)</td>
<td>* Plain X-ray results do not preclude the necessity for advanced imaging studies. See MS 9.1: Infection-General</td>
</tr>
<tr>
<td>Tarsal Tunnel Syndrome</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718) or MRI foot without and with contrast (CPT® 73720) or US foot (CPT® 76882) for preoperative planning if mass/lesion is suspected as etiology of entrapment</td>
<td></td>
</tr>
<tr>
<td>Tarsal Coalition</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI ankle without contrast (CPT® 73721) or CT without contrast (CPT® 73700) for preoperative planning</td>
<td></td>
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<tr>
<td>Sinus Tarsi Syndrome</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI ankle without contrast (CPT® 73721) if diagnosis is unclear or for preoperative evaluation</td>
<td></td>
</tr>
<tr>
<td>Charcot Foot</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718)</td>
<td>Other requests for advanced imaging will be forwarded to Medical Director Review.</td>
</tr>
<tr>
<td>Post-Operative</td>
<td>Yes</td>
<td>Yes</td>
<td>MRI foot without contrast (CPT® 73718) in symptomatic patients following surgery for conditions including the tendons, ligaments and plantar plate CT foot without contrast (CPT® 73700) in symptomatic patients following surgery for complex fractures, sesamoid fractures and subtalar arthrodesis</td>
<td></td>
</tr>
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</table>

**One Study/Area Only**
In foot and ankle advanced imaging, studies are frequently ordered of both areas. This is unnecessary since ankle MRI will image from above the ankle to the mid-metatarsal area. **Only one CPT® code should be reported.**
References
2. Needell S, Cutler J. Morton neuroma imaging. eMedicine, April 11, 2011,
SPECT scan may be approved for any of the indications for which a bone scan can be approved. If the request is for CPT® 78300 and CPT® 78803, then only CPT® 78803 is to be approved if medical necessity is established. If the request is for CPT® 78305 or CPT® 78306 and CPT® 78803, then two CPT codes may be approved if medical necessity is established.

Nuclear Medicine

- Nuclear medicine studies may be used in the evaluation of some musculoskeletal disorders, and other rare indications exist as well:
  - Bone scan (CPT® 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) or hybrid SPECT/CT (CPT® 78830) may be indicated for the evaluation of suspected aseptic loosening of orthopedic prostheses when recent plain X-ray is nondiagnostic (See MS-16: Post-Operative Joint Replacement Surgery).
  - Nuclear medicine bone marrow imaging (CPT® 78102, CPT® 78103, or CPT® 78104) is indicated for detection of ischemic or infarcted regions in sickle cell disease.
  - Triple phase bone scan (CPT® 78315) is indicated for evaluation of complex regional pain syndrome or reflex sympathetic dystrophy (For interventional pain criteria See CMM-209: Regional Sympathetic Blocks and CMM-211: Spinal Cord Stimulators).
  - Bone scan (CPT® codes: 78300, 78305, 78306, 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of suspected frostbite.
  - Bone scan (CPT® codes: 78300, 78305, 78306) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of Paget’s disease (See MS-10: Soft Tissue Mass or Lesion of Bone).

- Tc-99m bone scan whole body (CPT® 78306) with SPECT of the area of interest (CPT® 78803) is indicated for suspected fractures if MRI cannot be performed. See MS-5.2: Suspected Occult/Stress/Insufficiency Fracture/Stress Reaction and Shin Splints.

- Bone scan (CPT® 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831) or hybrid SPECT/CT (CPT® 78830, or 78832) is indicated for the evaluation of suspected bone infection if MRI cannot be done and when infection is multifocal, or when the infection is associated with orthopedic hardware or chronic bone alterations from trauma or surgery. Combining bone scintigraphy with a labeled leukocyte scan enhances sensitivity. A labeled leukocyte scan (radiopharmaceutical inflammatory imaging - one of CPT® codes: 78800, 78801, 78802, or 78803) in concert with Tc-99m sulfur colloid marrow imaging (one of CPT® codes: 78102, 78103, or 78104) is particularly useful in cases with altered bone marrow distribution, such as joint prosthesis. See MS-16: Post-Operative Joint Replacement Surgery.
For specific joints post-operative from replacement surgery:
- See **MS-19: Shoulder**
- See **MS-20: Elbow**
- See **MS-24: Hip**
- See **MS-25: Knee**
- See **MS-26: Ankle**

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# Neck Imaging Guidelines

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</tr>
</thead>
<tbody>
<tr>
<td>ALS</td>
<td>amyotrophic lateral sclerosis</td>
</tr>
<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>ENT</td>
<td>Ear, Nose, Throat</td>
</tr>
<tr>
<td>FNA</td>
<td>fine needle aspiration</td>
</tr>
<tr>
<td>GERD</td>
<td>gastroesophageal reflux disease</td>
</tr>
<tr>
<td>GI</td>
<td>gastrointestinal</td>
</tr>
<tr>
<td>HIV</td>
<td>human immunodeficiency virus</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
</tbody>
</table>
Neck-1: General

- A current clinical evaluation (within 60 days), which includes a relevant history and physical examination and appropriate laboratory studies and non-advanced imaging modalities, such as plain x-ray or ultrasound, are required prior to considering advanced imaging. Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.

- Advanced imaging of the neck covers the following areas:
  - Skull base (thus a separate CPT® code for head imaging in order to visualize the skull base is not necessary).
  - Nasopharynx
  - Upper oral cavity to the head of the clavicle
  - Parotid glands and the supraclavicular region

- Ultrasound of the soft tissues of the neck including thyroid, parathyroid, parotid and other salivary glands, lymph nodes, cysts, etc. is coded as CPT® 76536. This can be helpful in more ill-defined masses or fullness and differentiating adenopathy from mass or cyst, to define further advanced imaging.

- CT Neck
  - CT Neck is usually obtained with contrast only (CPT® 70491).
    - Little significant information is added by performing a CT Neck without and with contrast (CPT® 70492), and there is the risk of added radiation exposure, especially to the thyroid.
    - CT Neck without contrast (CPT® 70490) can be difficult to interpret due to difficulty identifying the blood vessels.
    - Exception: Contrast is not generally used when evaluating the trachea with CT. Evaluate salivary duct stones in the appropriate clinical circumstance where intravenous contrast may obscure high attenuation stones.
    - Contrast enhanced CT is helpful in the assessment of cervical adenopathy and preoperative planning in the setting of thyroid carcinomas.
      - Contrast is recommended as an adjunct to US for patients with clinical suspicion for advanced disease, including invasive primary tumor, or clinically apparent multiple or bulky lymph node involvement.
      - Contrast may cause intense and prolonged enhancement of the thyroid gland which interferes with radioactive iodine nuclear medicine studies.
      - Use of IV contrast is an important adjunct because it helps to delineate the anatomic relationship between the primary tumor and metastatic disease. Iodine is generally cleared within four to eight weeks in most patients, so concern about iodine burden from IV contrast causing a clinically significant delay in subsequent whole-body scans (WBSs) or radioactive iodine (RAI) treatment after the imaging followed by surgery is generally unfounded. The benefit gained from improved anatomic imaging generally outweighs any potential risk of a several week delay in RAI imaging or therapy. Where there is concern, a urinary iodine to creatinine ratio can be measured.
MRI Neck

- MRI Neck is used less frequently than CT Neck.
- MRI Neck without and with contrast (CPT® 70543) is appropriate if CT suggests the need for further imaging or if ultrasound or CT suggests any of the following:
  - Neurogenic tumor (schwannoma, neurofibroma, glomus tumor, etc.)
  - Vascular malformations
  - Deep neck masses
  - Angiofibromas

Reference
Neck-2: Cerebrovascular and Carotid Disease

See these related topics in the Head Imaging Guidelines:
- **HD-1.5: General Guidelines – CT and MR Angiography (CTA and MRA)**
- **HD-12: Aneurysm and AVM**
- **HD-21: Stroke/TIA**
- **HD-22: Cerebral Vasculitis**
- **HD-23: Dizziness, Vertigo and Syncope**
- **HD-31: Hearing Loss and Tinnitus**
- **HD-32: Eye Disorders and Visual Loss**

See **PVD-3: Cerebrovascular and Carotid Disease** in Peripheral Vascular Disease Imaging Guidelines.
Neck-3: Dysphagia and Esophageal Disorders

Neck-3.1: Dysphagia and Esophageal Disorders
Neck-3.1: Dysphagia and Esophageal Disorders

Gastroesophageal Reflux Disease (GERD)

- Advanced imaging is generally not indicated for the evaluation of GERD, the diagnosis of which is usually made on the basis of clinical history, in conjunction with endoscopy, pH monitoring, and occasionally manometry. Exceptions would include the following:
  - Non-cardiac chest pain suspected of being GERD should be evaluated first to exclude cardiac and other etiologies. See CH-4.1: Non-Cardiac Chest Pain-Imaging in the Chest Imaging Guidelines.
  - Gastric emptying study (CPT® 78264) can be approved for patients with refractory GERD symptoms, and gastroparesis is being considered.

- Suspected foreign body impaction and ingested foreign bodies:
  - Initial imaging is performed with appropriate plain films.
  - If imaging is negative, or there is suspicion of a radiolucent foreign body (such as fish or chicken bones, wood, plastic, thin metal objects, aluminum can pop-ups, etc.):
    - CT Neck and/or Chest with or without contrast
    - 3-D reconstruction (CPT® 76377 or CPT® 76376) can be approved in this setting
  - The use of oral contrast is discouraged for acute dysphagia or foreign body impaction, as the contrast may not pass, may be aspirated, and can interfere with subsequent endoscopic intervention.

- Oropharyngeal or esophageal dysphagia
  - Oropharyngeal (difficulty in transferring food from the mouth to the pharynx)
    - Suspected neurologic causes: See appropriate sections in Head Imaging Guidelines
    - Video fluoroscopic swallowing study
  - Esophageal dysphagia (difficulty in transferring food down the esophagus in the retrosternal region, e.g. food sticking in the chest)
    - Initial barium esophagram or upper gastrointestinal endoscopy
    - Esophageal manometry if indicated
    - Structural lesions identified on esophagram or endoscopy requiring further evaluation (e.g. tumors, extrinsic compression):
      - CT Neck (CPT® 70491), CT Chest (CPT® 71260) and/or CT Abdomen (CPT® 74160) depending on the level of the lesion.

- Suspected perforation, abscess, or fistula
  - CT Neck, Chest, and/or Abdomen, preferably with contrast, as requested, depending on location

- Evaluation of structural abnormalities demonstrated on barium esophagram or endoscopy (e.g., external compression, tumor, stricture, diverticulum, etc.)
  - CT Chest (CPT® 71260), CT Neck (CPT® 70491), and/or CT Abdomen (CPT® 74160) depending on location

- Hiatal hernia
  - See AB-12.3: Hiatal Hernia in the Abdomen Imaging Guidelines
Globus Sensation\textsuperscript{7-9}
- Globus sensation is a feeling of a lump or foreign body in the throat. In general, laryngoscopy, endoscopy, and physical examination will rule out malignant causes and advanced imaging is usually not needed for evaluation.
  - If alarm symptoms are present (dysphagia, weight loss, odynophagia, throat pain, hoarseness, and lateralization of symptoms)
    - Laryngoscopy and upper endoscopy should be performed prior to advanced imaging.
  - CT Neck with contrast (CPT\textsuperscript{®} 70491) for ANY of the following:
    - Negative or equivocal findings on laryngoscopy and upper endoscopy
    - Known history of upper aerodigestive or esophageal malignancy
    - Known history of lymphoma
    - History of previous neck, esophageal, or gastric surgery
    - Palpable abnormality on physical examination

Suspected Vascular Ring\textsuperscript{10,11,14,15}
- CTA Chest with contrast (CPT\textsuperscript{®} 71275) can be used in the evaluation of suspected vascular ring
- MRI Chest without contrast, or MRI Chest without and with contrast (CPT\textsuperscript{®} 71550 or CPT\textsuperscript{®} 71552), can be performed if vascular ring is suspected

Post-operative dysphagia
- Dysphagia following surgery on the oropharynx, soft tissues of the neck, cervical spine, esophagus, or stomach:
  - In the immediate post-operative period the concern is for fluid collections, anastomotic leaks, perforations, and abscess. In the delayed post-operative period (>1 month) the concern is recurrent disease or a late post-operative fluid collection.
  - CT Neck with contrast (CPT\textsuperscript{®} 70491) and, if requested CT Chest with contrast (CPT\textsuperscript{®} 71260) can be approved (IV contrast better defines the anatomic structures than a non-contrast study as soft-tissue and blood vessel enhancement are better delineated from post-operative fluid collections, such as hematomas and abscesses – Note: CT without and with contrast offers little additional benefit compared to a CT with contrast alone\textsuperscript{10})

Practice Notes
- A detailed history of the dysphagia symptoms is important to distinguish neurogenic, pharyngeal and esophageal disorders
- Dysphagia (difficulty swallowing) can be caused by a wide range of benign and malignant causes that affects the body’s ability to move food or liquid from the mouth to the pharynx and into the esophagus.
- A short duration (weeks to months) of rapidly progressive esophageal dysphagia with associated weight loss is highly suggestive of esophageal cancer.
Advanced imaging for patients presenting with isolated globus rarely impacts clinical management. In a study of 148 neck CTs and 104 barium esophagrams done for the evaluation of globus sensation, there were no malignancies detected.

References
Neck-4.1: Imaging
See Neck-5.1: Neck Masses – Imaging
Neck-5.1: Neck Masses – Imaging

- Cervical lymphadenitis is common and follows most viral or bacterial infections of the ears, nose and throat. Painful acute lymphadenopathy should be treated with a trial of conservative therapy for 2 weeks, including antibiotics if appropriate. If there is improvement with conservative treatment, advanced imaging is not indicated but if the adenopathy persists it may be imaged as per below.1,2,4

- Ultrasound (CPT® 76536) can be considered for ANY of the following:1,2,4
  - Anterior neck masses2
  - Cervical adenopathy/lymphadenitis or an inflammatory, infective, or reactive mass that has failed a 2 week trial of treatment or observation (including antibiotics if appropriate)1,2
  - Any ill-defined mass, fullness or asymmetry2
  - High suspicion of malignancy2,4

- CT Neck with contrast (CPT® 70491) can be considered if:2,4
  - Neck mass with high suspicion for malignancy with any ONE of the following:
    - Non-tender neck masses4
    - Size ≥1.5cm4
    - Firm texture or fixation of the mass4
    - Absence of infectious etiology4
    - 2 or more weeks duration4
    - Cervical adenopathy/lymphadenitis or an inflammatory, infective, or reactive mass that has failed a 2 week trial of treatment or observation (including antibiotics if appropriate)2,4
    - Ear pain ipsilateral to the neck mass4
    - Associated onset of persistent hoarseness, tonsil asymmetry, oral or oropharyngeal ulceration, or ulceration of skin overlying the neck mass4
    - History of malignancy that would be primary or metastatic to the neck4
    - Prior ultrasound results are suspicious or indeterminate for malignancy2
    - Carcinoma found in a lymph node or other neck mass2
    - Suspected peritonsillar, retropharyngeal or other deep neck space abscess2
    - Suspected sarcoidosis5
    - Preoperative evaluation of any neck mass2

- MRI Neck without and with contrast (CPT® 70543) is supported if:2
  - CT suggests the need for further imaging2
  - Ultrasound or CT suggests neurogenic tumor (schwannoma, neurofibroma, glomus tumor, etc.), vascular malformations, deep neck masses, or angiofibroma.2
Practice Notes

- Painful acute lymphadenopathy associated with uncomplicated pharyngitis, URI or tonsillitis should undergo conservative therapy for two weeks including antibiotics, if appropriate. If there is improvement with conservative treatment, advanced imaging is not indicated if:3,4,5
  - Inflammatory neck adenopathy is often associated with URI, pharyngitis, dental infection, HIV and toxoplasmosis. Occasionally it is associated with sarcoidosis and tuberculosis.

- Malignancy is a greater possibility in adults that are heavy drinkers and smokers, but HPV associated disease is on the rise and there can be a high suspicion for malignancy even without these traditional risk factors.

- ENT evaluation can be helpful in determining the need for advanced imaging.

- Although CT and MRI can have characteristic appearances for certain entities, biopsy and histological diagnosis are the only way to obtain a definitive diagnosis. The preferred initial method of biopsy is FNA or Ultrasound guided FNA of the mass.5

- The most common causes of neoplastic cervical adenopathy are metastasis from head and neck tumors or lymphoma.

References


Neck-6: Malignancies Involving the Neck

See the following in the Oncology Imaging Guidelines:
- ONC-3: Squamous Cell Carcinomas of the Head and Neck
- ONC-4: Salivary Gland Cancers
- ONC-6: Thyroid Cancer
- ONC-9: Esophageal Cancer
- ONC-27: Non-Hodgkin Lymphomas
- ONC-28: Hodgkin Lymphoma
Neck-7: Recurrent Laryngeal Palsy

See HD-7: Recurrent Laryngeal Palsy in the Head Imaging Guidelines
### Neck-8: Thyroid and Parathyroid

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<td>Neck-8.2: Hyperthyroidism</td>
<td>22</td>
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<tr>
<td>Neck-8.3: Parathyroid Imaging</td>
<td>22</td>
</tr>
</tbody>
</table>
**Neck-8.1: Thyroid Nodule**

- Serum thyrotropin (TSH) should be measured in the initial evaluation of thyroid nodule/mass/asymmetry/goiter.
- Nuclear scan (CPT® 78013 or CPT® 78014) should be performed as the initial imaging study if the serum TSH is subnormal and ANY of the following:
  - Single or multiple thyroid nodules
  - Suspicion of ectopic thyroid tissue
  - Presence of thyroid nodule in the setting of Grave’s disease (to rule out cold nodule).
  - Non-diagnostic or indeterminate FNA of thyroid nodule, (e.g. follicular lesion of undetermined significance) to see if hot (functioning) nodule that may be benign vs cold nodule.
- Ultrasound (US) Neck (CPT® 76536) is the appropriate initial study for evaluation of suspected thyroid abnormalities, including goiter and thyroid mass(es) in the following clinical scenarios (See Neck-5.1: Neck Masses – Imaging regarding nonthyroidal anterior neck masses):
  - Normal or High serum thyrotropin (TSH)
  - Thyroid nodule(s) being monitored with imaging: US is the indicated imaging modality rather than CT or MRI
  - Incidentally found on CT, MRI, or PET (focal activity)
  - Nodules ≤1 cm with very low suspicion US pattern including spongiform pattern and pure cysts do not require repeat US.
  - For more suspicious or larger nodules, if Fine Needle Aspiration (FNA) is not performed or was not diagnostic for malignancy, US can be repeated:
    - If US features are highly suspicious: repeat US every 6 months for up to 24 months.
    - If US features are of low to intermediate suspicion: repeat US at 12 and 24 months.
    - If nodule is stable after 24 months, follow-up ultrasound exams (CPT® 76536) can be performed every 3 to 5 years for interval surveillance.
- Fine-Needle Aspiration (FNA) is indicated for suspicious and/or large thyroid nodules prior to CT or MRI imaging.
<table>
<thead>
<tr>
<th>Sonographic Pattern</th>
<th>US features</th>
<th>Estimated risk % of Malignancy</th>
<th>FNA size cutoff (largest dimension)</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Suspicion</td>
<td>Solid hypoechoic nodule or solid hypoechoic component of a partially cystic nodule with one or more of the following features: Irregular margins (infiltrative, microlobulated), microcalcifications, taller than wide shape, rim calcifications with small extrusive soft tissue component, evidence of ETE (extrathyroidal extension)</td>
<td>&gt;70-90</td>
<td>Recommend FNA at ≥1cm</td>
</tr>
<tr>
<td>Intermediate Suspicion</td>
<td>Hypoechoic solid nodule with smooth margins without microcalcifications, ETE, or taller than wide shape</td>
<td>10-20</td>
<td>Recommend FNA at ≥1cm</td>
</tr>
<tr>
<td>Low Suspicion</td>
<td>Isoechoic or hypoechoic solid nodule, or partially cystic nodule with eccentric solid areas, without microcalcifications, irregular margin or ETE, or taller than wide shape</td>
<td>5-10</td>
<td>Recommend FNA at ≥1.5cm</td>
</tr>
<tr>
<td>Very Low Suspicion</td>
<td>Spongiform or partially cystic nodule without any of the sonographic features described in low, intermediate, or high suspicion patterns</td>
<td>&lt;3</td>
<td>Consider FNA at ≥2cm Observation without FNA is also a reasonable option</td>
</tr>
<tr>
<td>Benign</td>
<td>Purely cystic nodules (no solid component)</td>
<td>&lt;1</td>
<td>No biopsy</td>
</tr>
</tbody>
</table>

(Source: 2015 American Thyroid Management Guideline for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer)

- Nuclear medicine thyroid scan (CPT® 78013 or CPT® 78014) is considered for ANY of the following:
  - Evaluate eligibility for radiiodine therapy³
  - Select nodules to biopsy in multinodular goiter even if TSH not low¹,⁶
  - Substernal goiter with compressive symptoms (e.g. dyspnea, stridor, cough, dysphonia, dysphagia)

- CT Neck with contrast (CPT® 70491) or CT Neck without contrast (CPT® 70490), or MRI Neck without and with contrast (CPT® 70543). MRI and CT are not indicated for routine thyroid nodule evaluation and should only be considered for:
  - Evaluation of extent of known substernal goiter³
  - Airway compression³
  - Presence of pathologic lymph nodes in cervical regions not visualized on ultrasound³
  - Clinically suspected advanced disease confirmed by FNA, including invasive primary tumor³,⁶
  - Preoperative planning for any thyroid disease
A thyroid nodule detected for the first time during pregnancy should be managed in the same way as in non-pregnant patients, except for avoiding the use of radioactive agents for diagnostic and therapeutic purposes\(^3\)

**Practice Notes**

- The basis of thyroid nodule management is the use of ultrasonography (US), thyrotropin (TSH, formerly thyroid-stimulating hormone) assay, and FNA biopsy, together with clinical findings.

- Patient Features Suggesting Increased Risk for Thyroid Malignancy.
  - History of head and neck irradiation
  - Family history of medullary thyroid carcinoma, multiple endocrine neoplasia type 2, or papillary thyroid carcinoma
  - Age <14 or >70 years
  - Male sex
  - Growth of the nodule
  - Firm or hard nodule consistency
  - Cervical adenopathy
  - Fixed nodule
  - Persistent dysphonia, dysphagia, or dyspnea

- Iodinated CT contrast may interfere with diagnostic nuclear medicine thyroid scans (scintigraphy) and radioiodine treatment.

- There is insufficient evidence supporting the use of PET to distinguish indeterminate thyroid nodules that are benign from those that are malignant.

- \(^{18}\)FDG-PET imaging is not routinely recommended for the evaluation of thyroid nodules with indeterminate cytology. Routine preoperative \(^{18}\)FDG-PET scanning is not recommended.

- A thyroid nodule is distinct either on palpation or radiologically (incidentaloma). Nonpalpable nodules have the same risk of cancer as palpable. Nodules >1 cm are evaluated, while smaller nodules are generally evaluated if suspicious, associated with adenopathy or a history of radiation or cancer exists.

- Ultrasound is not used to screen: 1) the general population, 2) patients with normal thyroid on palpation with a low risk of thyroid cancer, 3) patients with hyperthyroidism, 4) patients with hypothyroidism or 5) patients with thyroiditis. Conversely, US can be considered in patients who have no symptoms but are high risk as a result of: history of head and neck irradiation, total body irradiation for bone marrow transplant, exposure to fallout from radiation during childhood or adolescence, family history, thyroid cancer syndromes such as MEN2, medullary or papillary thyroid cancer, Cowden’s disease, familial adenomatous polyposis, Carney complex, Werner syndrome/progeria.

- Incidental focal FDG-PET uptake often corresponds to a clinically relevant thyroid nodule and ultrasound is recommended; incidentally noted diffuse thyroid FDG-PET uptake most often corresponds to inflammatory uptake, however, ultrasound should be done to ensure that there is no evidence of clinically relevant nodularity.
Elastography provides information about nodule stiffness that is complementary to gray scale ultrasound findings in nodules with indeterminate cytology or ultrasound findings. It should not be used as a substitute for gray scale ultrasound.

Use of ultrasound contrast medium is not recommended for the diagnostic evaluation of thyroid nodules and its current use is restricted to definition of size and limits of necrotic zones after minimally invasive nodule ablation techniques.

Neck-8.2: Hyperthyroidism

Hyperthyroidism suspected\(^4,7\)

- Thyroid Uptake Study (CPT® 78012 or CPT® 78014) if ONE of the following:
  - TSH below normal range and elevated free T4 and/or free T3, OR
  - Subclinical hyperthyroidism with TSH <0.1 mU/L and normal free T4 and free T3.

Neck-8.3: Parathyroid Imaging

Classic primary hyperparathyroidism

- Parathyroid Planar Imaging (CPT® 78070), Parathyroid Planar Imaging with SPECT (CPT® 78071), or Parathyroid Planar Imaging with SPECT/CT (preferred study) (CPT® 78072)\(^2,3,5\) AND/OR Ultrasound (CPT® 76536)\(^1,2\) are approvable as initial imaging if ALL of the following conditions are met\(^1,2,3\):
  - Both PTH and Calcium levels are elevated above the reference range for lab testing facility (See Practice Notes).
  - Individual is a surgical candidate (See Practice Note).
  - Intention of the study is preoperative localization.

Note: Ultrasound (CPT® 76536) may be ordered independently to evaluate the thyroid per criteria in Neck-8.1: Thyroid Nodule

Additional imaging may be ordered by an Endocrinologist, Parathyroid surgeon or Radiologist\(^1,3\):

- 4D CT Neck without and with contrast (CPT® 70492)\(^8-13\)
- MRI Neck without and with contrast (CPT® 70543) for cases of re-operation, difficult localization or ionizing radiation contraindication\(^1,6\).
- CT Chest with contrast (CPT® 71260) may be indicated in rare circumstances in the evaluation of ectopic mediastinal parathyroid adenomas\(^14\).

Repeat imaging may be approved in cases of recurrent or persistent hyperparathyroidism if reimaging is being ordered by a surgeon with expertise in parathyroidectomy\(^1\).

Choline PET/CT (CPT® 78815 or CPT® 78816) is considered experimental and investigational for preoperative localization in cases of primary hyperparathyroidism. Send these requests to Medical Director Review\(^15-17\).

Atypical primary hyperparathyroidism

- Normocalcemic hyperparathyroidism (Calcium level within and PTH elevated above the reference range for the lab testing facility).
  - Confirmatory study is elevated ionized calcium\(^1,4\).
- See Practice Note for information on differential diagnosis of secondary and tertiary hyperparathyroidism.
- Hypercalcemia with inappropriately non-suppressed PTH (Calcium level elevated above and PTH within the reference range for the lab testing facility).
- No current consensus exists on the degree of PTH non-suppression for confirmation of primary hyperparathyroidism however PTH level is ≥25 pg/mL is a reasonable cutoff1,7.
- See Practice notes for more information.
- Intention of parathyroid imaging should also be for pre-operative localization rather than diagnostic1.
- Proceed with the same imaging pathway as in “classic” primary hyperparathyroidism if primary hyperparathyroidism is confirmed or strongly suggested in these atypical cases.

<table>
<thead>
<tr>
<th></th>
<th>Calcium</th>
<th>PTH</th>
<th>Confirms/strongly suggests primary hyperparathyroidism</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classic primary hyperparathyroidism</td>
<td>High</td>
<td>High</td>
<td>Yes</td>
</tr>
<tr>
<td>Normocalcemic hyperparathyroidism</td>
<td>Normal</td>
<td>High</td>
<td>Elevated ionized calcium</td>
</tr>
<tr>
<td>Hypercalcemia with inappropriately non-suppressed PTH</td>
<td>High</td>
<td>Normal</td>
<td>PTH ≥25 pg/ml</td>
</tr>
</tbody>
</table>

**Practice Notes**

- Hypercalcemia may be determined by elevated serum calcium, elevated serum ionized calcium, or elevated serum calcium level corrected for albumin. A comparison of serial measurements of calcium may also be helpful in determining the presence of true hypercalcemia as calcium levels may be variable over time in primary hyperparathyroidism.

- Candidates for Surgery1,4
  - All individuals <50 years of age, regardless of whether objective features are present or absent.
  - All symptomatic individuals, including those with kidney stones, hypercalcemic crises, pathologic fractures or other associated symptoms.
  - Individuals with findings concerning for parathyroid cancer (very high calcium >13).
  - All asymptomatic individuals with the following:
    - Serum calcium >1.0 mg/dl (0.25 mmol/l) above the normal range
    - BMD by DEXA: T-score ≤2.5 at the lumbar spine, total hip femoral neck or distal 1/3 radius
    - Vertebral fracture by x-ray, CT, MRI and vertebral fracture assessment
    - Estimated glomerular filtration rate of less than 60 ml/min
    - Urinary calcium excretion >400 mg in 24 hours
    - Nephrolithiasis or nephrocalcinosis by x-ray, ultrasound or CT
Neck Imaging

Asymptomatic individuals who cannot participate in appropriate medical surveillance
Asymptomatic individuals desiring definitive surgical management

For cases of “normocalcemic hyperparathyroidism” in which primary hyperparathyroidism is not confirmed, additional investigation for secondary/tertiary causes of hyperparathyroidism (chronic kidney disease, urinary calcium imbalance, vitamin D deficiency and gastrointestinal malabsorption problems such as short gut syndrome, celiac disease, Crohn’s disease or a prior Roux-en-Y bypass surgery) is indicated.

For cases of hypercalcemia in which primary hyperparathyroidism is not confirmed, additional consideration for other causes of hypercalcemia (malignancy including PTH-RP mediated and myeloma, granulomatous disease, FHH, medications including thiazide diuretics, excessive calcium/D supplementation and the history of or present lithium use) is indicated.

References

Thyroid
Neck Imaging


**Parathyroid**


Neck-9.1: Trachea and Bronchus – Imaging

Plain x-rays neck and chest and bronchoscopy are the initial imaging studies for evaluating patients with suspected tracheal and visualized bronchial pathology. Bronchoscopy can further evaluate the distal (endo) bronchial tree.

- Suspected tracheal disease can be identified by inspiratory stridor and a characteristic flow-volume loop of PFTs.¹

CT Neck with contrast (CPT® 70491) or without contrast (CPT® 70490) and/or CT Chest with contrast (CPT® 71260) or without contrast (CPT® 71250) can be performed to further evaluate abnormalities, which include tracheal or bronchial tumor, foreign bodies, or persistent segmental or lobar lung collapse seen on other imaging studies.¹,²

- Expiratory HRCT (CPT® 71250) is indicated in patients with obstructive physiology tracheomalacia.¹

- Trachea or bronchial “inspissation” without an abnormality described above, is not a risk for malignancy.³

References
## Neck-10: Neck Pain

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<td>Neck-10.2: Torticollis and Dystonia</td>
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</table>
**Neck-10.1: Neck Pain (Cervical)**

- Neck pain is usually related to a specific process including pharyngitis, radiculopathy, adenopathy, mass, carotid dissection and torticollis, and therefore found elsewhere in these guidelines.¹
- For the evaluation of neck pain or other symptoms which may involve the cervical spine, including myelopathy and cervical radiculopathy¹ See [Spine Imaging Guidelines](#).

**Neck-10.2: Torticollis and Dystonia**

**Older Child (beyond infancy) or Adult¹**

- For trauma, CT Neck with contrast (CPT® 70491) and/or CT Cervical Spine without contrast (CPT® 72125) is the initial study to identify fracture or mal-alignment
- For no trauma, CT Neck with contrast (CPT® 70491), and/or MRI Cervical Spine without contrast (CPT® 72141), or CT Cervical Spine without contrast (CPT® 72125) is the initial study to locate a soft tissue or neurological cause
  - Positive → Further advanced imaging is not required if CT Neck or CT Cervical Spine has identified local cause
  - Negative → MRI Brain without and with contrast (CPT® 70553) to exclude CNS cause

**Practice Notes**

- Torticollis or cervical dystonia is an abnormal twisting of the neck with head rotated or twisted. Its causes are many and may be congenital or acquired and caused by trauma, infection/inflammation, neoplasm and those less defined and idiopathic. It occurs more frequently in children and on the right side (75%).
- Retropharyngeal space abscess could be associated with torticollis because child would not move neck freely.

**References**

Neck-11: Salivary Gland Disorders

- Xerostomia (Dry Mouth)
  - Salivary Gland Nuclear Imaging (one of CPT® 78230, CPT® 78231, or CPT® 78232) can be considered for any one of the following:
    - Dry mouth and either:
      - Sjögren’s syndrome
      - Sialadenitis
      - History of head or neck radiation therapy
      - History of cerebral palsy
      - Parotid mass to allow preoperative diagnosis of Warthin’s tumor

- Salivary Gland Stones:
  - CT Neck without contrast (CPT® 70490) or CT Neck without and with contrast (CPT® 70492) or CT Maxillofacial area without and with contrast (usually CPT® 70488) or MRI Neck without and with contrast (CPT® 70543) for suspected salivary duct or gland stone.
  - Sialography (contrast dye injection) under fluoroscopy, may be performed to rule out a stone, with post sialography CT (CPT® 70486), or post sialography MRI (CPT® 70540).

- Parotid or Salivary Gland Mass
  - Any ONE of the following can be approved:
    - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)
    - CT Neck with contrast (CPT® 70491)
    - CT Neck without contrast (CPT® 70490)

References


# Neck-12: Sore Throat, Odynophagia, and Hoarseness

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**Neck-12.0: Definitions**

- Hoarseness – A symptom of altered voice quality reported by the individual
- Dysphagia – Disordered or impaired swallowing (See Neck-3: Dysphagia and Esophageal Disorders)
- Odynophagia – Pain upon swallowing

**Neck-12.1: Sore Throat/Throat Pain/Odynophagia**

See Neck-3.1: Dysphagia and Esophageal Disorders for dysphagia

- Sore Throat/Throat Pain/Odynophagia
  - Imaging studies are not indicated for uncomplicated viral or streptococcal pharyngitis with sore throat
  - See Neck-5: Neck Masses for suspected complicated pharyngitis/deep neck abscesses
  - Persistent sore throat/throat pain/odynophagia:
    - Initial evaluation is barium esophagram and laryngoscopy
      - CT Neck with contrast (CPT® 70491) or MRI Neck without and with contrast (CPT® 70543) if initial barium esophagram and laryngoscopy are negative and there is a suspicion of submucosal tumor/lesion
    - Alarm symptoms of persistent unilateral throat pain or odynophagia with ipsilateral referred otalgia is especially suspicious for a submucosal tumor
      - Initial evaluation is laryngoscopy
      - CT Neck with contrast (CPT® 70491) or MRI Neck without and with contrast (CPT® 70543) if initial laryngoscopy negative
  - CT Neck with contrast (CPT® 70491) for postoperative throat pain or odynophagia after head and neck procedure with suspected complication of procedure.

**Practice Notes**

- Persistent unilateral throat pain or odynophagia with ipsilateral referred otalgia is especially suspicious for a submucosal tumor and advanced imaging is appropriate when initial evaluation is negative.

**Neck-12.2: Hoarseness**

- Laryngoscopy is the primary diagnostic modality for evaluating patients with hoarseness. Imaging studies, including CT and MRI, are unnecessary in most patients with hoarseness because most hoarseness is self-limited or caused by pathology that can be identified by laryngoscopy alone. The need for advanced imaging is based upon abnormal findings upon laryngoscopy.
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# Obstetrical Ultrasound Imaging Guidelines

## Abbreviations and Glossary for OB Ultrasound Imaging Guidelines

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## Abbreviations and Glossary for OB Ultrasound Imaging Guidelines

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<td>American College of Obstetricians and Gynecologists</td>
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<td>AFI</td>
<td>amniotic fluid index</td>
</tr>
<tr>
<td>AFP</td>
<td>alpha-fetoprotein</td>
</tr>
<tr>
<td>CST</td>
<td>contraction stress test</td>
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<tr>
<td>B-mode (brightness)</td>
<td>two dimensional imaging procedure, B-mode ultrasound is the basis for all static and real time B-scan images</td>
</tr>
<tr>
<td>BPP</td>
<td>Biophysical Profile includes the ultrasound variables: fetal breathing, muscle tone, and movement as well as amniotic fluid volume. BPP may be performed with or without a non-stress test (NST) which involves fetal heart rate (FHR) monitoring.</td>
</tr>
<tr>
<td>D &amp; C/D &amp; E</td>
<td>dilatation and curettage/ Dilation and Evacuation</td>
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<tr>
<td>dichorionic twins</td>
<td>twins having distinct chorions (membrane that forms the fetal part of the placenta), including monozygotic twins (from one oocyte [egg]) separated within 72 hours of fertilization and all dizygotic twins (from two oocytes fertilized at the same time)</td>
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<tr>
<td>Doppler</td>
<td>involves measuring a change in frequency when the motion of vascular flow is measured</td>
</tr>
<tr>
<td>EDC</td>
<td>Estimated Date of Confinement; determined from the first day of the last menstrual cycle</td>
</tr>
<tr>
<td>EDD</td>
<td>Estimated Date of Delivery</td>
</tr>
<tr>
<td>FHR</td>
<td>fetal heart rate</td>
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<tr>
<td>hCG</td>
<td>human chorionic gonadotropin</td>
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<tr>
<td>IDDM</td>
<td>insulin-dependent diabetes mellitus</td>
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<td>FGR</td>
<td>Fetal growth restriction; an estimated weight of the fetus at or below 10th percentile for gestational age; and/or abdominal circumference of the fetus at or below 10th percentile for gestational age</td>
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<td>M-mode</td>
<td>ultrasound imaging technique in which structure movement can be depicted in a wave-like manner; primarily used in cardiac and fetal cardiac imaging</td>
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<tr>
<td>macrosomia</td>
<td>estimated fetal weight of greater than 4000 or 4500 grams</td>
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<td>monochorionic twins</td>
<td>twins developed from one oocyte (egg) developing with a single chorions (membrane that forms the fetal part of the placenta)</td>
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<td>NICU</td>
<td>Neonatal Intensive Care Unit</td>
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<td>NST</td>
<td>fetal non-stress test</td>
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<td>oligohydramnios</td>
<td>diminished amniotic fluid volume (AFV) for gestational age; definitions include: maximum deepest pocket of ≤2cm and/or AFI of ≤5cm or &lt;the 5th percentile for gestational age if &lt;30 weeks.</td>
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<td>PACS</td>
<td>Picture Archiving and Communications System</td>
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<td>polyhydramnios</td>
<td>AFI ≥24cm or maximum vertical pocket of ≥8 cm</td>
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<td>PROM</td>
<td>preterm rupture of membranes</td>
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<td>quad screen</td>
<td>alpha-fetoprotein (AFP), estriol, human chorionic gonadotropin (hCG), inhibin A</td>
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<td>real time scan</td>
<td>considered the most common type of ultrasound; a 2-dimensional scan that reflects structure and motion over time, scanning and display of images are run at a sufficiently rapid rate so that moving structures can be viewed moving at their natural rate; frame rates ≥15 frames per second are considered “real time”</td>
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# OB-1: Obstetrical Ultrasound Imaging General Guidelines

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OB-1.0: Obstetrical Imaging

- This document offers an in-depth, indication driven guide to obstetrical imaging

- Ultrasound assessment is an accurate method of determining gestational age, fetal number, viability, and placental location, and it is recommended for all pregnant patients.

- Normal (Low Risk) Pregnancy Imaging
  - Per ACOG, in the absence of other specific indications, the optimal time for a single ultrasound examination is at 18 to 22 weeks of gestation (but may be performed any time after 14 weeks). This timing allows for a survey of fetal anatomy in most women and an accurate estimation of gestational age. If <16 weeks gestation, send to Medical Director Review.
  - Report a fetal anatomy ultrasound CPT® 76805 for a normal/low risk pregnancy.
  - Current SMFM guidelines state that CL screening in singleton gestations without a prior spontaneous PTB cannot yet be universally mandated.
  - Transvaginal ultrasound (CPT® 76817) may be considered if the transabdominal cervical length (CL) is ≤3.6 cm or in certain circumstances of poor cervical visualization on transabdominal ultrasound
  - Fetal Nucal Translucency (CPT® 76813) can be considered if Cell-Free DNA (cfDNA) is not planned or has not already been performed, as they are both screening tools for fetal aneuploidy

OB-1.1: Required Documentation

- An evaluation of pregnancy with history and physical exam (an initial office visit) is necessary prior to obstetric ultrasound imaging requests

- The following information must be submitted with each request:
  - Expected date of delivery
  - Gestational age at date of service
  - Results of prior ultrasound studies if available

OB-1.2: Inappropriate Use of OB Ultrasound

Obstetrical ultrasound studies cannot be authorized for payment for individuals who do not have a positive pregnancy test or clinical evidence of a pregnancy (fetal heart tones)

- Obstetrical ultrasound is not medically indicated for the following:
  - Sex determination only
  - To provide a keepsake or souvenir picture
OB-1.3: Ultrasound Code Selection

See OB-28: Procedure Coding Basics for Established Pregnancy

- It is not appropriate to report non-obstetrical pelvic ultrasound procedure codes (CPT® 76830, CPT® 76856, and CPT® 76857) if pregnancy has already been diagnosed.

### CPT® Code Guidance

CPT® 76801 and CPT® 76802 (for each additional fetus) are reported for complete studies performed during the first trimester (<14 weeks). These codes should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication for ultrasound.

CPT® 76813 and CPT® 76814 (each additional fetus) are used to report nuchal translucency screening: an ultrasound measurement of the clear (translucent) space at the back of the fetal neck to assess risk for Down Syndrome (Trisomy 21), Trisomy 18, and other genetic disorders.

CPT® 76805 and CPT® 76810 (for each additional fetus) are used to report complete studies (anatomy scan) performed during the second and third trimester, in a normal (low risk) pregnancy. These studies should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication for ultrasound.

CPT® 76811 and CPT® 76812 (for each additional fetus) describe an extensive fetal ultrasound evaluation and detailed anatomic survey and are used only when the study includes this service. These studies should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication for ultrasound. This detailed fetal anatomic evaluation is generally performed by those with special skills to perform this study, such as a Maternal Fetal Medicine specialist (Perinatologist), or a Radiologist with advanced training in fetal imaging.

In circumstances where a detailed fetal anatomy (CPT® 76811) is indicated but access is limited due to geographic or other constraints, a standard fetal anatomy survey (CPT® 76805) may be authorized instead at the appropriate gestational age.

CPT® 76817 is used to report a transvaginal ultrasound. The other OB ultrasound codes are used for transabdominal studies.

CPT® 76816 is used to report a follow up study, such as a growth scan or follow up on anatomy when more than one area requires reexamination.

- CPT® 76816 (should not be performed prior to a CPT® 76801 or an anatomy scan CPT® 76805 (normal pregnancy) or Detailed anatomy scan CPT® 76811 (high risk pregnancy)

CPT® 76815 describes a limited or ‘quick look’ study

- It can be used at any gestational age for various indications, including quick look for AFI assessment, fetal heart beat, fetal position or placental location etc.
- It may be used specifically for ‘dating’ (when indicated) in those that don’t meet gestational age criteria for dating with CPT® 76801 or are too early for anatomy scan (i.e. >14 weeks but <16 weeks)
- It is also used to report a modified BPP.

CPT® 76818 (includes non-stress test) and 76819: are used to report a Biophysical profile (BPP), a test for antepartum fetal surveillance.

CPT® 76820 describes Doppler velocimetry of the umbilical artery.

CPT® 76821 describes Doppler velocimetry of the middle cerebral artery.
CPT® Code Guidance

- CPT® 76825 describes fetal echocardiography and and CPT® 76827 describes the Doppler portion of the echocardiogram. These codes should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office or there is a new medical indication for ultrasound.
- CPT® 76826 describes a follow up fetal echocardiography and CPT® 76828 describes a follow up Doppler portion of the echocardiogram.
- CPT® 93325 may be added for color mapping in conjunction with fetal echocardiography procedures.
- CPT® 93976 describes a limited duplex scan and is used during pregnancy for characterizing the pattern and direction of blood flow in arteries and veins. It can be used to report fetal umbilical-placental flow evaluation (accreta or other placental or cord abnormalities).
- CPT® 74712 and CPT® 74713 (for each additional fetus) are used to report a fetal MRI (indicated for more in depth imaging of certain fetal abnormalities).

Practice Note

➢ In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.
➢ CPT® 76816 (should not be performed prior to a CPT® 76801 or an anatomy scan CPT® 76805 (normal pregnancy) or Detailed anatomy scan CPT® 76811 (high risk pregnancy)
➢ SMFM suggest that ductus venosus, middle cerebral artery, or uterine artery Doppler use for routine clinical management of early- or late-onset FGR is not recommended (GRADE 2A)
➢ The minimal use of color Doppler alone (CPT® 93976), when performed for anatomical structure identification, during a standard ultrasound procedure, is not separately reimbursable.

References


OB-2: Uncertain Dates

OB-2.1: Uncertain Dates/Unknown Last Menstrual Period (LMP)
OB-2.1: Uncertain Dates/Unknown Last Menstrual Period (LMP)

- If there is a difference between the clinical size of the uterus on pelvic exam, and the date of the last menstrual period is uncertain or there have been irregular periods in the past year, one ultrasound can be performed to confirm dates:
  - When thought to be <14 weeks: CPT® 76801 (plus CPT® 76802 for each additional fetus) and/or CPT® 76817 if a complete ultrasound has not yet been performed or
  - CPT® 76815 and/or CPT® 76817

- When thought to be ≥14 weeks and there is a difference between the clinical size of the uterus on abdominal exam and the date of the last menstrual period is uncertain or there have been irregular periods in the past year, one ultrasound can be performed to confirm dates:
  - CPT® 76805/CPT® 76811 if high risk if complete fetal anatomic scan has not yet been performed or
  - CPT® 76815 and/or CPT® 76817

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OB-3.1: Locate an Intrauterine Device (IUD)

- Can report CPT® 76801 and/or CPT® 76817 if <14 weeks and a complete ultrasound has not yet been performed or
- CPT® 76815 and/or CPT® 76817 if complete ultrasound has already been performed
- 3-D Rendering (CPT® 76376/CPT® 76377) may be added for “Lost” IUD (inability to feel or see IUD string).

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**OB-4.1: History of Infertility**

- If there is a history of infertility treatment (CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 if <14 weeks, for dating) or
- CPT® 76815 and/or CPT® 76817
- Repeat ultrasound is not usually necessary unless there are new clinical indications

**OB-4.2: Present Pregnancy with ART Treatment (IVF)**

- Follow high risk imaging, See **OB-9: High Risk Pregnancy**

**OB-4.3: Recurrent Pregnancy Loss**

- Ultrasound imaging is supported if there is a history of at least 2 consecutive or 3 non-consecutive clinical miscarriages/losses at <20 weeks gestation (CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 if <14 weeks, for dating) or
- CPT® 76815 and/or CPT® 76817
- Repeat ultrasound is not usually necessary unless there are new clinical indications. Send requests for repeat imaging to Medical Director Review

**References**

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### OB-5.1: Abdominal/Pelvic Pain

**For abdominal/pelvic pain that presents without bleeding:**

- Initially CPT® 76815 and/or CPT® 76817 or CPT® 76801 and/or CPT® 76817 if complete ultrasound has not yet been performed, and is <14 weeks or
- CPT® 76805 (plus CPT® 76810 for each additional fetus) if ≥14 weeks, when complete fetal anatomic scan (CPT® 76805) is planned and has not yet been performed or
- CPT® 76816 (if a complete ultrasound CPT® 76801 or CPT® 76805 or CPT® 76811 has previously been performed)

### OB-5.2: Vaginal Bleeding

#### First Trimester

- Initially CPT® 76815 and/or CPT® 76817 or CPT® 76801 and/or CPT® 76817 if complete ultrasound has not yet been performed, and is <14 weeks

#### Second and Third Trimesters

- Limited CPT® 76815 and/or CPT® 76817 or CPT® 76805 (plus CPT® 76810 for each additional fetus) if ≥14 weeks, when complete fetal anatomic scan CPT® 76805 has not yet been performed, and/or CPT® 76817 or
- CPT® 76816 and/or CPT® 76817
- CPT® 93976 (limited duplex scan) may be indicated as an add-on, (See OB-21: Placental and Cord Abnormalities).
- Additionally, starting at 26 weeks, BPP (CPT® 76818 or CPT® 76819) can be considered.
- For suspected placental abruption, (See OB-21.5: Suspected Abruptio Placentae).
- If vaginal bleeding with +KB (Kleihauer-Betke) – feto-maternal hemorrhage – at risk for fetal anemia and hydrops CPT® 76821 may be indicated, send to Medical Director Review

### OB-5.3: Ectopic Pregnancy

#### Ectopic Pregnancy

#### First Trimester

- Signs and symptoms of ectopic pregnancy include pain and/or bleeding. However, imaging may also be indicated without pain and bleeding, if there is a history of ectopic pregnancy or with non-doubling hCG.
  - CPT® 76815 and/or CPT® 76817 or
  - CPT® 76801 and/or CPT® 76817 if complete ultrasound has not yet been performed, and is <14 weeks
  - Once an adnexal mass is confirmed, Color Doppler ultrasonography (CPT® 93976) may be useful to evaluate the vascular characteristics
  - If ectopic pregnancy is being treated non-surgically with Methotrexate, imaging may be required per OB-5: Vaginal Bleeding and/or Abdominal/Pelvic Pain/Cramping or the imaging guidelines above for ectopic pregnancy
**OB-5.4: Spontaneous Abortion/Threatened/Missed Abortion**

- Imaging may be indicated with or without vaginal bleeding to evaluate for threatened or missed abortion.
  - CPT® 76801 and/or CPT® 76817 if complete ultrasound has not yet been performed, and is <14 weeks or
  - CPT® 76815 and/or CPT® 76817 or
  - CPT® 76805 (plus CPT® 76810 for each additional fetus) if ≥14 weeks, when complete fetal anatomic scan CPT® 76805 has not yet been performed, and/or CPT® 76817
  - Repeat ultrasound (CPT® 76815 and/or CPT® 76817) may be appropriate at weekly intervals in the setting of rising or non-falling serum hCG levels or if unable to confirm viable IUP (fetal pole with + cardiac activity)
  - Ultrasound imaging can be repeated earlier than seven days if there are new symptoms

- For complete spontaneous abortion, ultrasound is generally not indicated if there is no pain, no ongoing bleeding, and hCG levels are decreasing.

**OB-5.5: Hydatidiform Mole**

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<td>First, Second and Third Trimester</td>
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<tr>
<td>Ultrasound can be performed for diagnosis of hydatidiform mole</td>
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  - CPT® 76801 and/or CPT® 76817 if complete ultrasound has not yet been performed, and is <14 weeks, or
  - CPT® 76815 and/or CPT® 76817 or
  - CPT® 76805 (plus CPT® 76810 for each additional fetus) if ≥14 weeks, when complete fetal anatomic scan CPT® 76805 has not yet been performed, and/or CPT® 76817
  - Ultrasound may be necessary for follow-up (CPT® 76830 and CPT® 76856 or CPT® 76857) if hCG titers are not decreasing as expected, are increasing following treatment, or if there is onset of pain despite falling hCG titers.
  - See PV-16.1: Molar Pregnancy and GTN

- History of a Molar Pregnancy: Early ultrasound can be performed (CPT® 76801 if <14 weeks, or CPT® 76815 and/or CPT® 76817) to rule out a recurrent molar pregnancy

**References**

# OB-6: Fetal Aneuploidy and Anomaly Screening

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OB-6.1: First Trimester Screening

First trimester screening includes biochemical markers and fetal nuchal translucency (NT) (CPT® 76813) assessment. An increased Fetal Nuchal Translucency (NT ≥3.0 mm), may indicate a fetus with aneuploidy (e.g. Down’s syndrome, Trisomy 18) but may also indicate an increased risk for cardiac defects or other structural defects or genetic syndromes in euploid fetuses.

Nuchal translucency is most accurate when performed between 11 and 13 6/7 weeks, but can be performed if the crown rump length (CRL) measures between 44-83 mm regardless of gestational age (range 10 4/7 to 14 weeks).

<table>
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<th>First Trimester Screening:</th>
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<tr>
<td>- Ultrasound CPT® 76813 (plus CPT® 76814 for each additional fetus) is the initial imaging for the first trimester screening, to evaluate fetal nuchal translucency</td>
</tr>
<tr>
<td>- If increased Fetal Nuchal Translucency (NT ≥3.0 mm):</td>
</tr>
<tr>
<td>- Fetal anatomic ultrasound (CPT® 76811) at ≥16 weeks</td>
</tr>
<tr>
<td>- cfDNA, Amniocentesis or CVS may be performed</td>
</tr>
<tr>
<td>- An abnormal fetal NT (≥3.0 mm) with normal chromosomal analysis (as measured by cfDNA, CVS or amniocentesis) should be evaluated with a fetal echo (CPT® 76825 and/or CPT® 76827 and/or CPT® 93325) and a detailed fetal anatomy ultrasound (CPT® 76811)</td>
</tr>
</tbody>
</table>

- Cell-Free DNA (cfDNA) can be performed any time after 10 weeks gestation and is currently the most sensitive screening test for Down’s syndrome per the American College of Medical Genetics and Genomics (99% accurate).
- Fetal NT (CPT® 76813) is NOT recommended if cfDNA is planned or has already been performed, as they are both screening tools for fetal aneuploidy.
- Those with a positive cfDNA should be offered diagnostic testing (amniocentesis or CVS) and a detailed anatomy scan (CPT®76811) at ≥16 weeks. See OB-9.1: High Risk Group One – Risk Factors.
- A “no call” or indeterminate result can occur (risk is higher with maternal obesity), which also has a higher risk of aneuploidy. These patients should managed as if positive.

Coding Notes

- CPT® 76813/CPT® 76814 can be performed once per pregnancy, and should be performed only by those certified by the Fetal Medicine Foundation or Nuchal Translucency Quality Review Program (NTQR).
- The use of ultrasound codes (CPT® 76801/CPT® 76802) should be indication driven and should NOT be routinely done whenever an ultrasound for nuchal translucency (CPT® 76813/CPT® 76814) is requested. In cases where there is either a maternal and/or fetal indication, then the CPT® 76801/CPT® 76802 code can indeed be billed along with the nuchal translucency screening (CPT® 76813/CPT® 76814).
OB-6.2: Second Trimester Screening

**Second Trimester Screening:**
- A fetal anatomy ultrasound (CPT® 76805) and/or QUAD screen can be performed during the second trimester to detect fetal aneuploidy, neural tube defects, and other anatomical defects.
  - See **OB-7.1: Fetal Anatomic Scan**
- If the quad screening is abnormal, a detailed anatomy ultrasound (CPT® 76811) may also be performed.

**Practice Notes**

Multiple marker screening is used in the second trimester (15 to 20 weeks) to screen for aneuploidy as well as open neural tube defects (ONTD).

- Maternal serum alpha-fetoprotein (MSAFP) can be done at 15 to 20 weeks to screen for neural tube defects in those that have had cfDNA or NT screen.
- The “quad” screen (AFP (alpha-fetoprotein), hCG (human chorionic gonadotropin), uE (Unconjugated estriol), dimeric inhibin-A) is the most commonly used test for the second trimester.
- A penta screen (quad screen markers + hyperglycosylated hCG) may be done in lieu of a quad screen.
- Combined, integrated or sequential screening (first and second trimester screening) may also be used and provides a higher detection rate than a single screening.
- Providers often wait for the results of the quad screen before ordering CPT® 76805. If the quad screen is abnormal, they may request CPT® 76811 in lieu of CPT® 76805.

**References**

5. Society for Maternal and Fetal Medicine (SMFM), coding committee, October 2017. SMFM’s white paper on billing combination of 76801 and 76813
## OB-7: Fetal Anatomic Scan

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OB-7.1: Fetal Anatomic Scan

- Per ACOG, in the absence of other specific indications, the optimal time for a single ultrasound examination is at 18 to 22 weeks of gestation (but may be performed any time after 14 weeks). This timing allows for a survey of fetal anatomy in most women and an accurate estimation of gestational age. If <16 weeks gestation, send to Medical Director Review.
  - Report a fetal anatomy ultrasound CPT® 76805 for a normal/low risk pregnancy.
  - If pregnancy is high risk report a detailed fetal anatomy ultrasound (CPT® 76811). This is generally performed by a Maternal Fetal Medicine (MFM)/Perinatologist, or a Radiologist at an AIUM or ACR accredited facility. See OB-9: High Risk Pregnancy
  - Current SMFM guidelines state that CL screening in singleton gestations without a prior spontaneous PTB cannot yet be universally mandated.
  - Transvaginal ultrasound (CPT® 76817) may be considered if the transabdominal cervical length (CL) is ≤3.6 cm or in certain circumstances of poor cervical visualization on transabdominal ultrasound

OB-7.2: Fetal Anatomic Scan – Follow-up

- Follow-up ultrasounds (CPT® 76815 to assess a single item or CPT® 76816 if multiple areas to be assessed) can be performed once for incomplete or equivocal finding on initial fetal anatomic scan.
  - CPT® 76816 (should not be performed prior to a CPT® 76801 or an anatomy scan CPT® 76805 (normal pregnancy) or Detailed anatomy scan CPT® 76811 (high risk pregnancy)
  - If pregnancy is high risk See OB-9: High Risk Pregnancy or other applicable high risk guideline.
  - Detailed anatomy ultrasound CPT® 76811 can be performed if not previously performed when initial fetal anatomic scan CPT® 76805 is abnormal. See OB-9: High Risk Pregnancy

References


OB-8.1: Third Trimester Imaging – Ultrasound

- Imaging in the third trimester is indicated for bleeding, pain, absent fetal heart tones, decreased fetal movement and/or other high-risk indications.
  - See specific guidelines based on indication

- For suspected breech position, See OB-14: Abnormal Fetal Position/Presentation

Reference
## OB-9: High Risk Pregnancy

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OB-9.0: High Risk General Information

High Risk Pregnancy General Information:

- A Detailed Fetal Anatomic Scan (CPT® 76811/CPT® 76812 for each additional fetus) is ideally performed between 18 to 20 weeks, but can be performed after 16 weeks when criteria is met.
- This detailed fetal anatomic evaluation is generally performed by those with special skills to perform this study, such as a Maternal Fetal Medicine specialist (Perinatologist), or a Radiologist with advanced training in fetal imaging.
- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.
- CPT® 76805, CPT® 76810, CPT® 76811, and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.
- CPT® 76816 (should not be performed prior to a CPT® 76801 or an anatomy scan CPT® 76805 (normal pregnancy) or Detailed anatomy scan CPT® 76811 (high risk pregnancy)
- SMFM suggest that ductus venosus, middle cerebral artery, or uterine artery Doppler use for routine clinical management of early- or late-onset FGR is not recommended (GRADE 2A)

OB-9.1: High Risk Group One – Risk Factors

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<td>Age ≥35 years of age at the estimated date of confinement (EDC)</td>
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<td>Lifestyle Related Risk Factors (legal or illicit drug/alcohol use)</td>
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<td>Recreational drug or alcohol use during current pregnancy (marijuana use -See OB-10.1: Medications and Substances that Qualify for a Detailed Fetal Anatomic Scan)</td>
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<tr>
<td>≥10 cigarettes a day</td>
</tr>
<tr>
<td>Other nicotine exposure (e-cigs, vaping, chewing, patch) send to Medical Director Review</td>
</tr>
<tr>
<td>Maternal history of IV drug abuse</td>
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<tr>
<td>Current use of Suboxone, Subutex, Methadone</td>
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Practice Notes

Several studies noted lower birth weights among offspring exposed to marijuana. These findings were more pronounced among women who used more marijuana, particularly during the first and second trimesters (at least weekly during the pregnancy). CPT® 76811 may be indicated (See OB-10.1: Medications and Substances that Qualify for a Detailed Fetal Anatomic Scan), however, given the limited evidence for antenatally detected abnormal growth, serial growth ultrasounds may not be indicated in the absence of other findings concerning for growth restriction.
### Health Condition Related Risk Factors or Chronic medical condition that may affect fetal growth due to utero-placental insufficiency (maternal diseases or conditions)

- Anemia severe, <8 grams Hgb or 24% HCT
- Asthma (poorly controlled or steroid dependent)
- Autoimmune disease (e.g. Multiple Sclerosis, Immune Thrombocytopenic Purpura)
- Bariatric surgery
- Connective tissue disorders (lupus, RA, scleroderma, Sjogren’s, etc.)
- DVT/PE or Maternal thrombophilia (Antiphospholipid Syndrome, Factor V Leiden mutation, Antithrombin III deficiency, Protein C/Protein S deficiency, Prothrombin gene mutation etc.)
- Genetic Carrier status e.g., Cystic Fibrosis/Known carrier of Spinal Muscular Atrophy (SMA), CF, Tay-Sachs genetic diseases
- Heart disease (Maternal) – New York Heart Association class III or IV greater or arrhythmia
- Hemoglobinopathies (e.g. sickle cell disease, Alpha and Beta thalassemia minor (trait) or major)
- History of endometrial ablation or Uterine Artery embolization
- Inflammatory Bowel Disease (Ulcerative colitis, Crohn’s Disease)
- Liver disease e.g., Cholestasis of pregnancy, Hepatitis
- Maternal malnutrition (BMI <18.5); Send to Medical Director Review for poor weight gain
- PKU
- Renal disease eg glomerulonephritis, persistent protein in the urine, renal insufficiency
- Seizure disorders– on antiepileptic medication
- Systemic malignancy
- Thyroid disorder (e.g. hyperthyroidism, poorly controlled hypothyroidism)

### Previous pregnancy related risk factors

- Prior pregnancy with adverse outcome (early onset preeclampsia ≤34 weeks, abruption, accreta, previous uterine rupture, or FGR at any gestational age, nonimmune hydrops, etc.).
- Prior pregnancy with SGA (baby weighing <2500 grams at term or FGR less than the 10th percentile of expected weight)
- For stillbirth See [OB-9.10: History of Stillbirth](#)

### Current pregnancy related risk factors

- Abnormal 1st or 2nd trimester screen (e.g. MSAFP; Low PAPP_A, etc.) Known chromosomal abnormalities; or abnormal cfDNA
- Major Fetal anomaly such as gastroschisis, fetal ventriculomegaly, fetal hydronephrosis (>10mm), fetal congenital heart disease, sustained fetal arrhythmias (See [OB-16.5: Other Causes of Fetal Anemia](#))
- ART Conception with assisted reproductive technologies (IVF)
- Grand multiparity: must have completed 5 or more pregnancies of greater than 20 weeks gestation, living or stillbirth (does not include current pregnancy; twins count as 1 pregnancy)
- Abnormal Fetal Nuchal Translucency ≥3.0mm; Thickened nuchal fold found on second trimester imaging ≥6mm up to 22 weeks
- No prenatal care prior to the third trimester
### Maternal Infections (not exposure)

- Acquired Immune Deficiency Syndrome/HIV Positive
- Chicken Pox/Varicella
- Cytomegalovirus (CMV)
- Malaria
- Known parvovirus in current pregnancy post fetal treatment. See [OB-16.2: Exposure to Parvovirus B-19](#)
- Rubella
- Syphilis, untreated
- Toxoplasmosis
- Tuberculosis
- For Zika Virus and COVID-19 Virus See [OB-9.5: High Risk Group Five: Zika and COVID-19 Virus](#)

### Imaging For Above Conditions

- CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
- CPT® 76817 for a transvaginal ultrasound or
- CPT® 76815 can be performed for dating or quick look follow-up if ≥14 weeks but <16 weeks
- Detailed Fetal Anatomic Scan CPT® 76811 ≥16 weeks when criteria is met
- Starting at 23 follow-up growth scans (CPT® 76816) every 3 to 6 weeks
- Starting at 32 weeks, weekly BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815)

---

### OB-9.2: High Risk Group Two – Findings on Ultrasound that May Require Further Imaging

#### OB-9.2.1: Soft Markers for Aneuploidy

- If the following ‘soft markers’ are found in fetus of current pregnancy on routine imaging:
  - Shortened long bones (femur and/or humerus) identified Pyelectasis of ≥4 mm at 20 weeks (For Hydronephrosis defined as ≥10mm, See [OB-9.1: High Risk Group One - Risk factors](#))
  - Echogenic bowel
  - Hypoplastic nasal bone
  - See [OB-9.2.2: Other Findings on Ultrasound that May Require Further Imaging](#) for Fetal Echogenic intra-cardiac focus and/or choroid plexus cyst

- Detailed Fetal anatomic scan ≥16 weeks (CPT® 76811).
- One follow-up scan (CPT® 76816) in third trimester
OB-9.2.2: Other Findings on Ultrasound that May Require Further Imaging

- If the following conditions are found in fetus of current pregnancy on routine imaging:
  - Choroid plexus cyst
  - Echogenic intra-cardiac foci (Fetal echo or follow-up ultrasound are not warranted)
  - Prior pregnancy with a chromosomal and/or structural congenital anomaly
  - Current pregnancy with suspected fetal anomaly on routine anatomic survey
- Detailed fetal anatomic scan ≥16 weeks (CPT® 76811)

OB-9.3: High Risk Group Three – High BMI (>30 kg/m²)

- CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or:
  - CPT® 76817 for a transvaginal ultrasound or
  - CPT® 76815 can be performed for dating if ≥14 weeks but <16 weeks and a complete ultrasound has not yet been performed
- Detailed fetal anatomic scan ≥16 weeks (CPT® 76811)

OB-9.3.1: Class I Obesity - Pre-pregnancy BMI 30 to 34.9

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<th>Class I Obesity (BMI 30-34.9)</th>
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<td>After first and second trimester imaging as outlined above, Report One follow-up scan (CPT® 76816) between 32 to 36 weeks</td>
</tr>
<tr>
<td>If unable to clinically assess fundal height due to body habitus growth scan (CPT® 76816) can be considered in the early third trimester with follow up in 4 weeks</td>
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OB-9.3.2: Class II Obesity - Pre-pregnancy BMI 35-39.9

<table>
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<th>Class II Obesity (BMI 35-39.9)</th>
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<tr>
<td>After first and second trimester imaging as outlined above, Report:</td>
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<tr>
<td>Growth scans (CPT® 76816) every 4 weeks starting in the third trimester (&gt;28 weeks)</td>
</tr>
<tr>
<td>BPP (CPT® 76818 or CPT® 76819) or a modified BPP (CPT® 76815) weekly starting at 36 weeks</td>
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OB-9.3.3: Class III Obesity - Pre-pregnancy BMI ≥40

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<tr>
<th>Class III Obesity (BMI ≥40)</th>
</tr>
</thead>
<tbody>
<tr>
<td>After first and second trimester imaging as outlined above, Report:</td>
</tr>
<tr>
<td>Growth scans (CPT® 76816) every 4 weeks starting in the third trimester (&gt;28 weeks)</td>
</tr>
<tr>
<td>BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815) weekly starting at 32 weeks</td>
</tr>
</tbody>
</table>
OB-9.4: High Risk Group Four – Macrosomia

OB-9.4.1: Prior Pregnancy with Macrosomia

Prior pregnancy with macrosomia (baby weighing >4000 grams at term or greater than the 90th percentile of expected weight)

- Report one of the following in the first trimester to establish dates:
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
  - CPT® 76817 for a transvaginal ultrasound or
  - CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound has not already been performed, and ≥14 weeks and <16 weeks

- A detailed fetal anatomy scan (CPT® 76811) at ≥16 weeks

- One growth scan (CPT® 76816) in the third trimester

OB-9.4.2: Current Pregnancy with Suspected or Known Macrosomia

- See OB-20.2: Macrosomia – Large for Dates Current Pregnancy
- See OB-27: Unequal Fundal Size and Dates

OB-9.5: High Risk Group Five – Zika and COVID-19 Virus

OB-9.5.1: Zika Virus

Suspected exposure without symptoms

- Report one of the following:
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
  - CPT® 76817 for a transvaginal ultrasound or
  - CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound has not already been performed and ≥14 week and <16 weeks

- Fetal anatomic scan CPT® 76805 or CPT® 76811 at ≥16 weeks.

- If test positive or if symptoms developed, See below.

Suspected exposure with symptoms or known infection

- Report one of the following
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
  - CPT® 76817 for a transvaginal ultrasound or
  - CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound has not already been performed and ≥14 week and <16 weeks

- Fetal anatomic scan CPT® 76805 or CPT® 76811 at ≥16 weeks.

- If FGR diagnosed then follow FGR imaging OB-20.1: Fetal Growth Restriction Current Pregnancy
OB-9.5.2: COVID-19 Virus

Person Under Investigation (PUI) for infection or known infection

- Report one of the following:
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
  - CPT® 76817 for a transvaginal ultrasound or
  - CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound not already been performed and ≥14 week and <16 weeks

- Fetal anatomic scan CPT® 76805 or CPT® 76811 at ≥16 weeks.

- Growth scan (CPT® 76816) every 3 to 4 weeks starting at 23 weeks (See OB-9.1: High Risk Group One - Risk factors).

- If FGR diagnosed then follow FGR imaging OB-20.1: Fetal Growth Restriction Current Pregnancy

- BPP or other imaging requests – send to Medical Director Review

Practice Notes

SMFM recommendation during COVID pandemic:

- Combine dating/NT to one ultrasound based on LMP. If ultrasound earlier in the first trimester (e.g., <10 weeks) is indicated due to threatened abortion, pregnancy of unknown anatomic location, may consider foregoing NT ultrasound and offering cell free DNA screening for those desiring early aneuploidy screening

- Perform Anatomy Ultrasound at 20-22 weeks and if needed, consider follow up views in 4-8 weeks rather than 1-2 weeks.

- If serial cervical length assessments are indicated, consider stopping after anatomy u/s if transvaginal cervical length ≥35 mm, or if prior preterm birth at >34 weeks

- BMI >40: schedule anatomy at 22 weeks to reduce risk of suboptimal views/need for follow up

- If Growth Ultrasounds indicated – recommend a single third trimester growth at 32 weeks.

- Follow up previa/low lying placenta at 34-36 weeks
## OB-9.6: High Risk Group Six – Pre-Gestational Diabetes

### OB-9.6.1: Pre-Gestational or Early Diagnosed Diabetes - not on Medication

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester Ultrasounds</td>
<td>&lt;14 weeks</td>
<td>Once</td>
<td>CPT® 76801 and/or CPT® 76817</td>
</tr>
<tr>
<td>Dating Ultrasound if no prior dating and ≥14 weeks</td>
<td>14-16 weeks</td>
<td>Once</td>
<td>CPT® 76815</td>
</tr>
<tr>
<td>Fetal anatomic scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76811</td>
</tr>
<tr>
<td>Fetal echo (initial)</td>
<td>Starting at ≥16 weeks</td>
<td>Once</td>
<td>CPT® 76825 and/or CPT® 76827 and/or CPT® 93325</td>
</tr>
<tr>
<td>Ultrasound (for fetal growth)</td>
<td>Starting in the 3rd trimester</td>
<td>Every 3 to 6 weeks</td>
<td>CPT® 76816</td>
</tr>
<tr>
<td>Biophysical Profile (BPP) or modified BPP</td>
<td>Starting at 32 weeks</td>
<td>Once per week</td>
<td>CPT® 76818 (BPP) or CPT® 76819 (BPP) or CPT® 76815 (modified BPP)</td>
</tr>
</tbody>
</table>

### OB-9.6.2: Pre-Gestational or Early Diagnosed Diabetes - on Medication

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester Ultrasounds</td>
<td>&lt;14 weeks</td>
<td>Once</td>
<td>CPT® 76801 and/or CPT® 76817</td>
</tr>
<tr>
<td>Dating Ultrasound if no prior dating and ≥14 weeks</td>
<td>14-16 weeks</td>
<td>Once</td>
<td>CPT® 76815</td>
</tr>
<tr>
<td>Fetal anatomic scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76811</td>
</tr>
<tr>
<td>Fetal echo (initial)</td>
<td>Starting at ≥16 weeks</td>
<td>Once</td>
<td>CPT® 76825 and/or CPT® 76827 and/or CPT® 93325</td>
</tr>
<tr>
<td>Ultrasound (for fetal growth)</td>
<td>Starting at viability 23 weeks</td>
<td>Every 2 to 4 weeks</td>
<td>CPT® 76816</td>
</tr>
<tr>
<td>Biophysical Profile (BPP) or AFI with NST*</td>
<td>Starting at 32 weeks</td>
<td>Up to twice weekly</td>
<td>CPT® 76818 (BPP) or CPT® 76819 (BPP) or CPT® 76815 (modified BPP)</td>
</tr>
<tr>
<td>Umbilical artery Doppler (if FGR diagnosed)</td>
<td>Upon diagnosis of FGR if ≥23 weeks</td>
<td>Weekly</td>
<td>CPT® 76820</td>
</tr>
</tbody>
</table>

### Practice Notes

- Per ACOG - If diabetes is diagnosed prior to pregnancy or in the first trimester or early second trimester with the standard diagnostic criteria of a hemoglobin A1c (HbA1c) ≥6.5%, a fasting plasma glucose ≥126 mg/dL, or a 2-hour glucose of ≥200 mg/dL on a 75-g oral glucose tolerance test, it is considered pre-gestational diabetes.
OB-9.7: High Risk Group Seven Gestational Diabetes

OB-9.7.1: Gestational Diabetes - Diet-Controlled (GDM-A1)

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal anatomic scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76805</td>
</tr>
<tr>
<td>Ultrasound (for fetal growth)</td>
<td>Once at the time of diagnosis, then starting at 32 weeks</td>
<td>Every 4 weeks</td>
<td>CPT® 76816</td>
</tr>
<tr>
<td>Biophysical Profile (BPP) or modified BPP</td>
<td>Starting at 34 weeks</td>
<td>Once weekly if diet controlled.</td>
<td>CPT® 76818 (BPP) or CPT® 76819 (BPP) or CPT® 76815 (modified BPP)</td>
</tr>
</tbody>
</table>

OB-9.7.2: Gestational Diabetes (GDM-A2) on Medications

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal anatomic scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76811</td>
</tr>
<tr>
<td>Fetal echo (initial) Requests for follow-up go to Medical Director Review</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76825 and/or CPT® 76827 and/or CPT® 93325</td>
</tr>
<tr>
<td>Ultrasound (for fetal growth)</td>
<td>Starting at viability 23 weeks</td>
<td>Every 2 to 4 weeks</td>
<td>CPT® 76816</td>
</tr>
<tr>
<td>Biophysical Profile (BPP) or modified BPP</td>
<td>Starting at 32 weeks</td>
<td>Up to twice weekly</td>
<td>CPT® 76818 (BPP) or CPT® 76819 (BPP) or CPT® 76815 (modified BPP)</td>
</tr>
<tr>
<td>Umbilical artery Doppler (if FGR diagnosed)</td>
<td>Upon diagnosis of FGR if ≥23 weeks</td>
<td>Weekly</td>
<td>CPT® 76820</td>
</tr>
</tbody>
</table>

OB-9.8: Hypertensive Disorders in Pregnancy

OB-9.8.1: Screening in High Risk Groups

- SMFM state that uterine artery Doppler has limited diagnostic accuracy and clinical utility in predicting FGR, SGA birth, and perinatal mortality. As such, its use for screening in high risk groups is not recommended (GRADE 2A)
### OB-9.8.2: Current Chronic Hypertension not on Medication

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester Ultrasounds</td>
<td>&lt;14 weeks</td>
<td>Once</td>
<td>CPT® 76801 and/or CPT® 76817</td>
</tr>
<tr>
<td>Dating Ultrasound if no prior dating and ≥14 weeks</td>
<td>14-16 weeks</td>
<td>Once</td>
<td>CPT® 76815</td>
</tr>
<tr>
<td>Fetal anatomic scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76811</td>
</tr>
<tr>
<td>Ultrasound (for fetal growth)</td>
<td>In the third trimester (&gt;28 weeks)</td>
<td>Every 4-6 weeks</td>
<td>CPT® 76816</td>
</tr>
</tbody>
</table>

If blood pressure is elevated from baseline, See **OB-9.8.4: Gestational Hypertension (GH, preeclampsia, toxemia)** below

### OB-9.8.3: Current Chronic Hypertension on Medication

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Trimester Ultrasounds</td>
<td>&lt;14 weeks</td>
<td>Once</td>
<td>CPT® 76801 and/or CPT® 76817</td>
</tr>
<tr>
<td>Dating Ultrasound if no prior dating and ≥14 weeks</td>
<td>14-16 weeks</td>
<td>Once</td>
<td>CPT® 76815</td>
</tr>
<tr>
<td>Detailed Fetal Anatomic Scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76811</td>
</tr>
<tr>
<td>Ultrasound (for fetal growth)</td>
<td>Starting at viability 23 weeks gestation</td>
<td>Every 3 to 4 weeks</td>
<td>CPT® 76816</td>
</tr>
<tr>
<td>Biophysical profile (BPP) or modified BPP</td>
<td>Starting at 32 weeks (If complicated by additional risk factors may start at ≥26 weeks)</td>
<td>Weekly</td>
<td>CPT® 76818 (BPP) or CPT® 76819 (BPP) or CPT® 76815 (AFI)</td>
</tr>
<tr>
<td>Umbilical artery Doppler (if FGR diagnosed) See <strong>OB-20.1: Fetal Growth Restriction Current Pregnancy</strong></td>
<td>Upon diagnosis of FGR if ≥23 weeks</td>
<td>Weekly</td>
<td>CPT® 76820</td>
</tr>
</tbody>
</table>
OB-9.8.4: Gestational Hypertension (GH, preeclampsia, toxemia)

<table>
<thead>
<tr>
<th>Test</th>
<th>When</th>
<th>Frequency</th>
<th>Codes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fetal anatomic scan</td>
<td>≥16 weeks</td>
<td>Once</td>
<td>CPT® 76805 or CPT 76811 if other high risk issues and if not previously completed</td>
</tr>
<tr>
<td>Growth US</td>
<td>Starting at time of diagnosis</td>
<td>Every 3 to 4 weeks If FGR, Oligohydramnios or severe preeclampsia (every 2 to 4 weeks)</td>
<td>CPT® 76816</td>
</tr>
<tr>
<td>BPP or modified BPP</td>
<td>Starting at time of diagnosis</td>
<td>Once weekly If FGR or Oligohydramnios is also present, twice weekly</td>
<td>CPT® 76818 or CPT® 76819 or CPT® 76815</td>
</tr>
<tr>
<td>Umbilical artery Doppler</td>
<td>Starting at time of diagnosis</td>
<td>Twice weekly</td>
<td>CPT® 76820</td>
</tr>
</tbody>
</table>

**Practice Note**

<table>
<thead>
<tr>
<th>Disorder</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertension in pregnancy</td>
<td>Systolic blood pressure ≥140 mm Hg or diastolic BP ≥90 mm Hg, or both, measured on two occasions at least 4 hours apart</td>
</tr>
<tr>
<td>Severe-range hypertension</td>
<td>Systolic blood pressure ≥160 mm Hg or diastolic BP ≥110 mm Hg, or both, measured on two occasions at least 4 hours apart</td>
</tr>
<tr>
<td>Chronic hypertension</td>
<td>Hypertension diagnosed or present before pregnancy or before 20 weeks of gestation; or hypertension that is diagnosed for the first time during pregnancy and that does not resolve in the postpartum period</td>
</tr>
<tr>
<td>Chronic hypertension with superimposed preclampsia</td>
<td>Preclampsia in a woman with a history of hypertension before pregnancy or before 20 weeks of gestation</td>
</tr>
<tr>
<td>Gestational hypertension</td>
<td>Hypertension diagnosed after 20 weeks of gestation, in a woman with a previously normal blood pressure.</td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>Disorder of pregnancy associated with new-onset hypertension, which occurs most often after 20 weeks of gestation and frequently near term. Although often accompanied by new-onset proteinuria, hypertension and other signs or symptoms of preeclampsia may present in some women in the absence of proteinuria.</td>
</tr>
<tr>
<td>Eclampsia</td>
<td>Convulsive manifestation of the hypertensive disorders of pregnancy and is among the more severe manifestations of the disease.</td>
</tr>
</tbody>
</table>
OB-9.9: History of Spontaneous Pre-Term Delivery/History of PPROM

OB-9.9.1: Spontaneous Preterm Delivery ≤34 Weeks; History of PPROM ≤34 weeks

筼

For initial imaging:
- CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
- CPT® 76817 for a transvaginal ultrasound or
- CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound not already been performed and ≥14 week and <16 weeks

筼

Fetal Anatomy Ultrasound CPT® 76805 or CPT® 76811 [plus CPT® 76810 or CPT® 76812 for each additional fetus] if ≥16 weeks and a complete fetal anatomic scan has not yet been during this pregnancy.
- CPT® 76817 and/or CPT® 76815 every 2 weeks, starting at ≥16 weeks until 24 weeks
- Starting after the fetal anatomic scan at ≥23 weeks, ultrasound (CPT® 76816) can be performed every 3 to 6 weeks until delivery
- Starting at 32 weeks, weekly BBP CPT® 76818 or CPT® 76819 or modified BPP CPT® 76815

If funneling or short cervix ≤25 mm (2.5 cm) is found on a transvaginal ultrasound in a singleton pregnancy
- CPT® 76816 may be performed after a complete ultrasound every 3 to 4 weeks and/or
- CPT® 76817 and/or CPT® 76815 every 1 to 2 weeks until 32 weeks
- Note: CPT® 76815 should not be done on same date of service as CPT® 76816

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For current preterm labor See OB-18.3: Current Preterm Labor

OB-9.9.2: History of Spontaneous Preterm Delivery >34 weeks <37 weeks; History of PPROM >34 weeks <37 weeks

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For initial imaging:
- CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
- CPT® 76817 for a transvaginal ultrasound or
- CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound not already been performed and ≥14 week and <16 weeks

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An anatomy ultrasound CPT® 76805 or CPT® 76811 [plus CPT® 76810 or CPT® 76812 for each additional fetus] and/or CPT® 76817 if >16 weeks and a complete fetal anatomic scan has not yet been performed during this pregnancy.
- CPT® 76815 and/or CPT® 76817 every 2 weeks, starting at ≥16 weeks until 24 weeks
- Starting after the fetal anatomic scan at ≥23 weeks, ultrasound (CPT® 76816) can be
performed every 3-6 weeks until delivery

- If funneling or short cervix ≤25 mm (2.5 cm) is found on a transvaginal ultrasound in a singleton pregnancy
  - CPT® 76816 may be performed after a complete ultrasound every 3 to 4 weeks and/or
  - CPT® 76817 and/or CPT® 76815 every 1 to 2 weeks until 32 weeks
  - Note: CPT® 76815 should not be done on same date of service as CPT® 76816

- For current preterm labor See OB-18.3: Current Preterm Labor

**OB-9.10: History of Stillbirth**

- For initial imaging:
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
  - CPT® 76817 for a transvaginal ultrasound or
  - CPT® 76815 (limited ultrasound) can be performed for dating if an ultrasound not already been performed and ≥14 week and <16 weeks

- Fetal anatomic scan at ≥16 weeks (CPT® 76811)

- Follow up ultrasound (CPT® 76816) every 2 to 4 weeks to assess fetal growth starting at 23 to 24 weeks or two weeks before prior pregnancy loss.

- Weekly BPP (CPT® 76818 or CPT® 76819) or modified BPP CPT® 76815 for starting at 32 weeks or two weeks before prior pregnancy loss

**Practice Notes**

- A history of stillbirth is not an indication for fetal echo. Per 2020 ACOG bulletin – no mention of recommendation for echo – just detailed anatomy US. If demised fetus had a confirmed cardiac anomaly on autopsy, or if the detailed anatomy scan on either the demised fetus or the current pregnancy had findings suspicious for cardiac anomaly, then echo may be indicated.

**References**

<table>
<thead>
<tr>
<th>OB-10: High Risk Medications and Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB-10.1: Medications and Substances that Qualify for a Detailed Fetal Anatomic Scan</td>
</tr>
</tbody>
</table>
OB-10.1: Medications and Substances that Qualify for a Detailed Fetal Anatomic Scan

A detailed fetal anatomy ultrasound (CPT® 76811) is indicated for maternal use of the following:

<table>
<thead>
<tr>
<th>High Risk Medications/Substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alcohol</td>
</tr>
<tr>
<td>Aminoglycosides (amikacin, gentamycin, kanamycin, tobramycin, and other mycins)</td>
</tr>
<tr>
<td>Amphetamines</td>
</tr>
<tr>
<td>Angiotensin II antagonists or blockers</td>
</tr>
<tr>
<td>Anti-neoplastics (cancer drugs)</td>
</tr>
<tr>
<td>Accutane/isoretinoin/retinoic acid</td>
</tr>
<tr>
<td>Aspirin – only if exposed less than 10 weeks gestation</td>
</tr>
<tr>
<td>Atenolol</td>
</tr>
<tr>
<td>ACE inhibitors (benzapril, captopril, enalopril, fosinopril, lisinopril, etc)</td>
</tr>
<tr>
<td>Anticonvulsants (phenytoin, carbamazepine, valproate, primidone, phenobarbital, Dilantin)</td>
</tr>
<tr>
<td>Azathioprine</td>
</tr>
<tr>
<td>Benzodiazepines (Diazepam (valium), etc)</td>
</tr>
<tr>
<td>Carbon monoxide</td>
</tr>
<tr>
<td>Chlordiazepoxide</td>
</tr>
<tr>
<td>Cocaine</td>
</tr>
<tr>
<td>Codeine</td>
</tr>
<tr>
<td>Cortisone</td>
</tr>
<tr>
<td>Coumadin/ warfarin</td>
</tr>
<tr>
<td>Cyclophosphamide</td>
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<tr>
<td>Cytarabine</td>
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<tr>
<td>Daunorubicin</td>
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<tr>
<td>Dextroamphetamine</td>
</tr>
<tr>
<td>Ergotamine</td>
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<tr>
<td>Fluconazole (and other anti-fungals)</td>
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<tr>
<td>Heparin</td>
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<tr>
<td>Lead</td>
</tr>
<tr>
<td>Leflunomide</td>
</tr>
<tr>
<td>Lithium</td>
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<tr>
<td>Methimazole</td>
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<tr>
<td>Methotrexate</td>
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<tr>
<td>Methyl mercury</td>
</tr>
<tr>
<td>Misoprostol</td>
</tr>
<tr>
<td>Mycophenolate mofetil</td>
</tr>
<tr>
<td>Oral contraceptives</td>
</tr>
<tr>
<td>Paramethadione</td>
</tr>
<tr>
<td>Penicillamine</td>
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<tr>
<td>Primidone</td>
</tr>
<tr>
<td>Progesterones (exposure less than 12 weeks) and anti-progesterone drug RU486</td>
</tr>
<tr>
<td>Pregabalin/Lyrica</td>
</tr>
<tr>
<td>Quinine</td>
</tr>
<tr>
<td>Retinoic acid/retinoid medications</td>
</tr>
<tr>
<td>Selective serotonin reuptake inhibitors (SSRI)</td>
</tr>
<tr>
<td>Substance abuse (heroin, methadone, subutex, cocaine, marijuana/cannabinoids)</td>
</tr>
</tbody>
</table>
### High Risk Medications/Substances

<table>
<thead>
<tr>
<th>Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tetracyclines</td>
</tr>
<tr>
<td>Thalidomide</td>
</tr>
<tr>
<td>Trifluoperazine</td>
</tr>
<tr>
<td>Trimethadione</td>
</tr>
<tr>
<td>Valproic acid</td>
</tr>
</tbody>
</table>

- If another high risk indication see appropriate guideline for any further imaging

### Practice Note

There may be other medications or drugs not included on this list that cause increased risk in pregnancy. These cases should be sent for Medical Director Review.

- Several studies noted lower birth weights among offspring exposed to marijuana. These findings were more pronounced among women who used more marijuana, particularly during the first and second trimesters (at least weekly during the pregnancy). CPT® 76811 may be indicated, however, given the limited evidence for antenatally detected abnormal growth, serial growth ultrasounds may not be indicated in the absence of other findings concerning for growth restriction.

- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.

### References

## OB-11: Multiple Gestations

| OB-11.1: Suspected Multiple Gestations   | 49 |
| OB-11.2: Known Dichorionic Multiple Gestations | 49 |
| OB-11.3: Known Monochorionic-Diamniotic or Monochorionic-Monoamniotic Multiple Gestations | 50 |
OB-11.1: Suspected Multiple Gestations

For Suspected multiple pregnancies:

- CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 if a complete ultrasound has not yet been performed and is <14 weeks, or
- CPT® 76815 and/or CPT® 76817 can be performed for dating if an ultrasound not already been performed and ≥14 week and <16 weeks, or
- CPT® 76805 and CPT® 76810 for each additional fetus if ≥14 weeks if a dating ultrasound or a complete anatomy ultrasound has not yet been performed during this pregnancy

OB-11.2: Known Dichorionic Multiple Gestations

For Known dichorionic multiple pregnancies:

- CPT® 76811 and CPT® 76812 for each additional fetus at ≥16 weeks if a complete detailed anatomic scan (CPT® 76811) has not yet been performed during this pregnancy. If requested prior to 16 weeks, send to Medical Director Review.
- Growth ultrasound (CPT® 76816) can be performed every 4 to 6 weeks after diagnosis.
- Universal cervical length (CL) screening with transvaginal ultrasound (CPT® 76817) is NOT recommended in twin gestations. However, transvaginal ultrasound (CPT® 76817) may be considered if the cervical length (CL) is <3.6 cm on trans-abdominal ultrasound (as with singleton pregnancies – See OB-7.1: Fetal Anatomic Scan), or in certain circumstances of poor visualization with trans-abdominal ultrasound. Send all these requests to Medical Director Review.
- BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815) may be performed starting at 32 weeks or sooner if additional risk factors
- If FGR or growth discordance ≥20% is diagnosed, can perform:
  - UA Doppler (CPT® 76820) weekly
    - If UA Dopplers are abnormal (significantly elevated or absent or reversed end diastolic flow), then more frequent testing (twice per week or even daily) BPPs (CPT® 76818 or CPT® 76819) and/or UA Dopplers (CPT® 78620) may be considered. Send all these requests to Medical Director Review.
- If IVF dichorionic twins, report initial fetal echo as CPT® 76825 and/or CPT® 76827 with or without CPT® 93325. Trans-abdominal fetal echo is usually not performed prior to 16 weeks. See OB-12.3: Indications for Maternal Conditions
- If other high risk factors, See OB-9: High Risk Pregnancy
**OB-11.3: Known Monochorionic-Diamniotic or Monochorionic-Monoamniotic Multiple Gestations**

<table>
<thead>
<tr>
<th>For Known monochorionic-diamniotic or monochorionic-monoamniotic multiple pregnancies</th>
</tr>
</thead>
<tbody>
<tr>
<td>➤ CPT® 76811 and CPT® 76812 for each additional fetus if ≥16 weeks and a complete detailed anatomic scan (CPT® 76811) has not yet been performed (if earlier send to Medical Director Review).</td>
</tr>
<tr>
<td>➤ Universal cervical length (CL) screening with transvaginal ultrasound (CPT® 76817) is NOT recommended in twin gestations. However, transvaginal ultrasound (CPT® 76817) may be considered if the cervical length (CL) is &lt;3.6 cm on trans-abdominal ultrasound (as with singleton pregnancies – See OB-7.1: Fetal Anatomic Scan), or in certain circumstances of poor visualization with trans-abdominal ultrasound. Send all these requests to Medical Director Review.</td>
</tr>
<tr>
<td>➤ CPT® 76816 (growth ultrasound) every 2 to 4 weeks starting at 16 weeks</td>
</tr>
<tr>
<td>➤ Fetal echo (CPT® 76825 and/or CPT® 76827) with or without color Doppler (CPT® 93325) is indicated (usually not performed &lt;16 weeks).</td>
</tr>
<tr>
<td>➤ MCA Doppler (CPT® 76821) and limited ultrasound (CPT® 76815) is indicated every 2 weeks starting at 16 weeks until delivery to monitor for Twin-Twin Transfusions Syndrome (TTTS) and/or Twin Anemia Polycythemia Sequence (TAPS).</td>
</tr>
<tr>
<td>➤ BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815) may be performed weekly starting at 32 weeks or sooner if additional risk factors</td>
</tr>
<tr>
<td>➤ If TTTS is diagnosed, up to daily evaluation can be performed to aid in planning intervention and/or imminent delivery. In these cases, may perform:</td>
</tr>
<tr>
<td>➤ Limited ultrasound (CPT® 76815), and/or</td>
</tr>
<tr>
<td>➤ BPP (CPT® 76818 or CPT® 76819) if &gt;26 weeks or</td>
</tr>
<tr>
<td>➤ UA Doppler (CPT® 76820) and/or</td>
</tr>
<tr>
<td>➤ MCA Doppler (CPT® 76821)</td>
</tr>
<tr>
<td>➤ If FGR or growth discordance &gt;20% is diagnosed, can perform:</td>
</tr>
<tr>
<td>➤ UA Doppler (CPT® 76820) weekly</td>
</tr>
<tr>
<td>➤ If UA Dopplers are abnormal (significantly elevated or absent or reversed end diastolic flow), then more frequent testing (twice per week or even daily) BPPs (CPT® 76818 or CPT® 76819) and/or UA Dopplers (CPT® 78620) may be considered. Send these requests to Medical Director Review.</td>
</tr>
<tr>
<td>➤ If other high risk factors, See OB-9: High Risk Pregnancy</td>
</tr>
<tr>
<td>➤ Triplets or higher order Multiple Pregnancy receive same imaging as monochorionic-diamniotic twins. These requests will be forwarded for Medical Director Review.</td>
</tr>
</tbody>
</table>

**Practice Notes**

➤ Birth weight discordance = (larger twin weight minus smaller twin weight) divided larger twin weight × 100.

➤ Universal CL screening with transvaginal ultrasound (CPT® 76817) is NOT recommended in twin gestations. In addition, Per ACOG - Cerclage placement (prophylactic or rescue) should be avoided in multifetal pregnancies. However, because several studies have shown that a one-time CL measurement ≤20 mm at
18-24 weeks may be an accurate predictor of preterm birth in multiple gestation, and because progesterone therapy might reduce the risk of neonatal morbidity and mortality associated with PTB, then a one-time transvaginal CL assessment may be considered if trans-abdominal CL measures ≤3.6 cm (as with singleton gestation—See: OB-7.1: Fetal Anatomic Scan). Transvaginal ultrasound (CPT® 76817) may be considered if the cervical length (CL) is ≤3.6 cm on trans-abdominal ultrasound (as with singleton pregnancies—See OB-7.1: Fetal Anatomic Scan), or in certain circumstances of poor visualization with trans-abdominal ultrasound.

- TTTS is diagnosed by the ultrasound findings of polyhydramnios in one twin (the recipient) and oligohydramnios in the other twin (the donor). If AFI is discordant between the twins (low but not <2 cm in one and/or high but not >8 cm in the other); weekly imaging (MCA and/or limited US) may be indicated to ensure not developing TTTS.

- Fetal loss of one twin during the first trimester does not appear to increase the risk of FGR or preterm delivery in the surviving twin, however, loss of one or more fetus(es) after 17 weeks gestation is associated with increased risk for FGR and PTB and should be imaged according to OB-11: Multiple Gestations. Monochorionic twin pregnancies with demise of one twin after 17 weeks have up to an 18% chance of major morbidity or mortality for the remaining fetus, these cases should be sent for Medical Director Review.

- In circumstances where CPT® 76811 cannot be performed See OB-1.3: Ultrasound Code Selection

References
### OB-12: Fetal Echocardiography (ECHO)

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<td>OB-12.2: Indications for Fetal Conditions</td>
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</table>
**OB-12.1: Fetal Echocardiography – Coding**

- Transabdominal fetal echo is usually not performed prior to 16 weeks. If ordered prior to 16 weeks send to Medical Director Review.
- Fetal echocardiography (Initial study-CPT® 76825 or follow-up-CPT® 76826) and Doppler echocardiography (Initial study-CPT® 76827 or follow-up-CPT® 76828) and/or Doppler color flow velocity mapping (CPT® 93325) can be ordered together or separately for the following conditions:

**OB-12.2: Indications for Fetal Conditions**

<table>
<thead>
<tr>
<th>Indication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Known or suspected abnormal fetal cardiac evaluation on fetal anatomic scan.</td>
</tr>
<tr>
<td>- Known or suspected abnormality must be documented as hard copy or acknowledged verbally by provider of known or suspected fetal cardiac evaluation</td>
</tr>
<tr>
<td>- Suboptimal cardiac evaluation alone is not an indication for fetal echogram. If the 4-chamber view is adequate and there is no other suspicion of a cardiac abnormality, a fetal echocardiogram is not considered medically necessary. A follow up ultrasound (CPT® 76815 or CPT® 76816) is indicated for suboptimal visualization.</td>
</tr>
<tr>
<td>Fetal cardiac arrhythmia; sustained fetal tachycardia or bradyarrhythmia</td>
</tr>
<tr>
<td>Major fetal extra-cardiac anomaly, (excluding soft markers for aneuploidy: for example shortened long bones, pylectasis, echogenic bowel, hypoplastic nasal bone, cardiac echogenic foci and choroid plexus cyst) See <strong>OB-9.2: High Risk Group Two – Findings on Ultrasound that May Require Further Imaging</strong>.</td>
</tr>
<tr>
<td>Congenital heart disease (CHD) in a 1st degree relative of the fetus (i.e. CHD in the mother, father, or sibling of the fetus)</td>
</tr>
<tr>
<td>Known fetal chromosomal abnormalities (fetal aneuploidy) or ultrasound findings of a suspected chromosomal abnormality (excluding soft markers as only ultrasound findings)</td>
</tr>
<tr>
<td>Single umbilical artery</td>
</tr>
<tr>
<td>Chorioangioma or Umbilical cord varix (if suspicion of fetal hydrops)</td>
</tr>
<tr>
<td>Fetal intra-abdominal venous anomaly (persistent right umbilical vein)</td>
</tr>
<tr>
<td>Fetal effusion (pericardial, pleural effusion, ascites, etc.)</td>
</tr>
<tr>
<td>Fetal hydrops, See <strong>OB-16: Alloimmunization/Rh Isoimmunization/Other Causes of Fetal Anemia/Parvo/Hydrops</strong></td>
</tr>
<tr>
<td>Monochorionic twins/TTTS</td>
</tr>
<tr>
<td>Abnormal Fetal Nuchal Translucency scan (≥3.0mm) during current pregnancy.</td>
</tr>
</tbody>
</table>
OB-12.3: Indications for Maternal Conditions

<table>
<thead>
<tr>
<th>For Maternal Conditions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal pre-gestational DM or early diagnosed GDM (1st or early 2nd trimester)</td>
</tr>
<tr>
<td>Maternal gestational diabetes mellitus on medication if HbA1C &gt;6%</td>
</tr>
<tr>
<td>Maternal connective tissue disease (SLE, RA, Sjogrens) with Anti-Ro/SSA or anti-La/SSB antibodies present</td>
</tr>
<tr>
<td>Weekly Doppler fetal echocardiography (CPT® 76828) from the 18th through the 26th week of pregnancy and then every other week until 30 weeks</td>
</tr>
<tr>
<td>Phenylketonuria</td>
</tr>
<tr>
<td>Infections associated with cardiac anomalies (such as parvovirus, Rubella, Coxsackie virus)</td>
</tr>
<tr>
<td>Genetic conditions associated with CHD in a first degree relative of the fetus (e.g. Marfan syndrome, 22q11.2 deletion syndrome (DiGeorge Syndrome) or Noonan syndrome)</td>
</tr>
<tr>
<td>Seizure disorder on antiepileptic medication</td>
</tr>
<tr>
<td>IVF pregnancies</td>
</tr>
</tbody>
</table>

OB-12.4: Medication or Drug Exposure

- Lithium
- Excessive alcohol
- Anti-seizure medication, e.g. hydantoin
- Paroxetine (Paxil)
- Ace inhibitors
- Folate antagonists (methotrexate)
- Anticonvulsants
- Retinoic acid
- Thalidomide
- NSAIDS (Ibuprofen, Indomethacin) 2nd and 3rd trimester
- Vitamin A greater than 10,000 units per day
- Other teratogen exposure to the fetus with a known association for cardiac anomalies

Practice Note

- If HbA1c levels are >6%, fetal echocardiogram in the third trimester to assess for ventricular hypertrophy may be considered.
- With positive SSA/SSB antibodies, the most vulnerable period for the fetus is during the period from 18 to 24 weeks gestation. Normal sinus rhythm can progress to complete block in seven days during this high-risk period. New onset of heart block is less likely during the 26th through the 30th week, and it rarely develops after 30 weeks of pregnancy.
- Fetal echocardiography may be indicated with severe, unexplained polyhydramnios
if there are other suspicious findings on an anatomy scan. Send to Medical Director Review.

- An initial echo, CPT® 76825 and CPT® 76827 are performed only once per fetus/per facility (i.e. Maternal Fetal Medicine versus Pediatric Cardiology request)
- The minimal use of color Doppler (CPT® 93325) alone, when performed for anatomical structure identification during a standard ultrasound procedure, is not separately reimbursable.
- Procedure code (CPT® 76827 or CPT® 76828) includes the evaluation of veins, arteries, and valves. Guidelines do not support the billing of an additional code (CPT® 76820/CPT® 76821)

References
<table>
<thead>
<tr>
<th>OB-13: Fetal MRI</th>
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<td>OB-13.1: Indications for Fetal MRI</td>
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OB-13.1: Indications for Fetal MRI

<table>
<thead>
<tr>
<th>CPT® Code Guidance</th>
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</thead>
<tbody>
<tr>
<td>Fetal MRI (CPT® 74712); for each additional fetus (CPT® 74713)</td>
</tr>
<tr>
<td>Do not report CPT® 74712 and CPT® 74713 in conjunction with CPT® 72195, CPT® 72196, CPT® 72197</td>
</tr>
<tr>
<td>If only placenta or maternal pelvis is imaged without fetal imaging, use MRI Pelvis (CPT® 72195)</td>
</tr>
</tbody>
</table>

Fetal MRI (CPT® 74712) [plus CPT® 74713 for each additional fetus] may be considered for assessment of known or suspected fetal/pregnancy abnormalities for surgical planning, and/or if an ultrasound is equivocal and additional information is needed for counseling purposes, for indications which may include the following:

✈ Brain
- Congenital anomalies
  - ventriculomegaly
  - corpus callosal dysgenesis
  - holoprosencephaly
  - posterior fossa anomalies
  - malformations of cerebral cortical development
  - microcephaly
- Screening fetuses with a family risk for brain anomalies
  - tuberous sclerosis
  - corpus callosal dysgenesis
  - malformations of cerebral cortical development
- Vascular abnormalities
  - vascular malformations
  - hydranencephaly
  - Intra-uterine cerebrovascular accident (CVA)

✈ Spine
- Congenital anomalies
  - neural tube defects
  - sacrococcygeal teratomas
  - caudal regression/sacral agenesis
  - syringomyelia
  - vertebral anomalies

✈ Skull, face, and neck
- Masses of the face and neck
  - venolymphatic malformations
  - hemangiomas
  - goiter
  - teratomas
  - facial clefts
- Airway obstruction
• conditions that may impact parental counseling, prenatal management, delivery planning, and postnatal therapy

❖ Thorax
■ Masses
■ congenital pulmonary airway malformations (congenital cystic adenomatoid malformation; sequestration, and congenital lobar emphysema);
■ congenital diaphragmatic hernia
■ effusion
■ Volumetric assessment of lung
■ cases at risk for pulmonary hypoplasia secondary to oligohydramnios, chest mass, or skeletal dysplasias

❖ Abdomen, retroperitoneal and pelvis
■ Bowel anomalies such as megacystis microcolon
■ Abdominal wall defect
■ Mass
■ abdominal–pelvic cyst
■ tumors (e.g. hemangiomas, neuroblastomas, sacrococcygeal teratomas, and suprarenal or renal masses)
■ Complex genitourinary anomalies (e.g. cloaca)

❖ Congenital Heart Disease (CHD)
❖ Skeletal dysplasia
❖ Multiple malformations
❖ Complications of monochorionic twins/TTTS (eg. Laser treatment of twins, demise of one twin, conjoined twins)
❖ Any suspected fetal anomaly associated with severe oligohydramnios or anhydramnios

References
OB-14.1: Abnormal Fetal Position or Presentation

To confirm suspected abnormal fetal position or presentation (transverse or breech presentation) at ≥36 weeks gestation, report one of the following:

- CPT® 76805 (plus CPT® 76810 for each additional fetus) when complete anatomy scan has not yet been performed in the pregnancy or
- CPT® 76815 for limited ultrasound to check fetal position or CPT® 76816 if version is being considered and/or for delivery planning

Practice Note

- Fetal presentation should be assessed by abdominal palpation at 36 weeks or later, when presentation is likely to influence the plans for the birth. Routine assessment of presentation by abdominal palpation before 36 weeks is not always accurate. Suspected fetal malpresentation should be confirmed by an ultrasound assessment. An ultrasound can be performed at ≥36 weeks gestation to determine fetal position to allow for external cephalic version. Ultrasound to determine fetal position is not necessary prior to 36 weeks gestation unless delivery is imminent.

- Though rarely used anymore, there may still be occasional planned vaginal delivery of a breech presentation. There is not enough evidence to support the use of X-ray pelvimetry for deciding on mode of delivery in women whose fetuses have a cephalic presentation. However, pelvimetry in breech presentation may allow for better selection of the delivery route, with a significantly lower emergency caesarean-section rate noted in small trials. Send all pelvimetry requests to Medical Director Review.

References

## OB-15: Adnexal Mass/Uterine Fibroids and Uterine Anomalies

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<tr>
<td>OB-15.3: Uterine Anomalies in Pregnancy</td>
<td>64</td>
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</tbody>
</table>
OB-15.1: Adnexal Mass

- For a known or suspected adnexal/pelvic mass, may perform:
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 to establish dates if <14 weeks or
  - CPT® 76815 and/or CPT® 76817 if a complete ultrasound was previously performed or
  - CPT® 76805 [plus CPT® 76810 if more than one fetus] if a complete fetal anatomic scan has not yet been performed and ≥14 weeks, or CPT® 76815 or CPT® 76816 if a complete ultrasound scan was done previously.

- Following the initial ultrasound, follow up can be done once in each trimester
  - CPT® 76805 [plus CPT® 76810 for each additional fetus] if a complete fetal anatomic scan has not yet been performed, or
  - CPT® 76815 or CPT® 76816 if a complete ultrasound was previously performed.
  - CPT® 76817 may be indicated for poor visualization of the adnexal mass in certain circumstances.

- MRI Pelvis (CPT® 72195) without contrast can be done for indeterminate findings on ultrasound; for surgical planning and/or for suspected malignancy.

- See PV-5: Adnexal Mass/Ovarian Cysts

Practice Note

The majority of adnexal masses in pregnancy are benign, the most common diagnoses are mature teratomas and corpus luteum or paraovarian cysts. Malignancy is reported in only 1.2-6.8% of pregnant patients with persistent mass.

Levels of CA-125 are elevated in pregnancy, a low-level elevation in pregnancy is not typically associated with malignancy.

OB-15.2: Uterine Fibroids in Pregnancy

- If more than one fibroid, total size of all fibroids should be used, i.e. one fibroid at 2 cm and one 3 cm is total of 5 cm and imaging would be indicated as below:
  - Moderate (>5 cm) and large (>10 cm) fibroid(s):
    - CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 to establish dates if ≤14 weeks, or
    - CPT® 76815 can be performed for dating if ≥14 weeks but <16 weeks
    - Fetal anatomic scan (CPT® 76805 or CPT® 76811 if other high risk indication. See OB-9: High Risk Pregnancy) at ≥16 weeks.
    - If the fibroid is in the lower uterine segment or cervical fibroid then ultrasound (CPT® 76815) and/or transvaginal ultrasound (CPT® 76817) every 2 weeks between 16 to 24 weeks, and
    - Follow up ultrasound (CPT® 76816) every 3 to 6 weeks, starting at 23 weeks.

- Submucosal fibroid(s) of any size:
  - First trimester: CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 to establish dates if <14 weeks.
  - If placentation is over a submucosal fibroid:
    - Follow up ultrasound (CPT® 76816) every 3 to 6 weeks, starting at 23 weeks.
**Practice Note**

Though pregnancy seems to have little or no effect on the overall size of fibroids, fibroids affect pregnancy and delivery in several ways, with abdominal pain, miscarriage, malpresentation, and difficult delivery being the most frequent complications. These complications relate to preterm labor, placental abruption, fetal growth restriction, and fetal compression syndromes. The risk of preterm labor appears to correlate with the size of the fibroid (over 600 cm³) and/or the presence of multiple fibroids. Placental abruption has been reported to occur frequently in pregnancies complicated by fibroids, especially with placentation over a fibroid. Fibroid volumes >200 cm³ are more commonly associated with fetal growth restriction. Fetal compression syndrome is a direct result of large fibroids and is not commonly found with small fibroids. Finally, malposition or obstructed labor may be associated with fibroids of the lower uterine segment.

**OB-15.3: Uterine Anomalies in Pregnancy**

- For uterine septum, uterine didelphys, unicorneate uterus, bicornuate uterus:
  - CPT® 76801 [plus CPT® 76802 for each additional fetus] if a complete ultrasound has not yet been performed, or
  - If a complete ultrasound was previously performed, CPT® 76815 and/or CPT® 76817 or
  - CPT® 76805 or CPT® 76811 and/or CPT® 76817 at ≥16 weeks
  - CPT® 76817 and/or CPT® 76815 every 2 weeks at 16 to 24 weeks (See OB-18.1: Cervical Insufficiency)
  - CPT® 76816 every 3 to 6 weeks starting at ≥23 weeks
  - Starting at 32 weeks, weekly BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815)

**Practice Note**

In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.

- CPT® 76801 and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

**References**


### OB-16: Alloimmunization/Rh Isoimmunization/Other Causes of Fetal Anemia/Parvo/Hydrops

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| OB-16.2: Exposure to Parvovirus B-19 | 68 |
| OB-16.3: Twin Anemia Polycythemia Sequence | 68 |
| OB-16.4: Other Fetal Hydrops/Nonimmune Hydrops | 68 |
| OB-16.5: Other Causes of Fetal Anemia | 68 |
OB-16.1: Alloimmunization/Rh Isoimmunization

Imaging for Alloimmunization/Rh Isoimmunization for any of the following indications:

- When any one of the following maternal antibody titers are ≥1:8:
  - Rhesus antibodies (Cc/Dd/Ee)
  - Anti-Duffy (anti-fya) antibody
  - Anti-Kidd antibody
- With Anti-Kell antibody (any antibody titer)
- Evidence of fetal hydrops on previous imaging
- Prior pregnancy associated with HDFN (hemolytic disease of the fetus and newborn)

The following imaging is indicated:

- CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
- CPT® 76817 for a transvaginal ultrasound or
- CPT® 76815 can be performed for dating or quick look follow-up if ≥14 weeks but <16 weeks

- Detailed Fetal Anatomic Scan (CPT® 76811) ≥16 weeks Ultrasound (CPT® 76816) every 2 to 4 weeks to assess fetal growth starting after fetal anatomic scan (CPT® 76811)
- Fetal middle cerebral artery (MCA) Doppler (CPT® 76821) and CPT® 76815 every 1 to 2 weeks starting at 16 weeks
- BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815) weekly, starting at 32 weeks or sooner depending on fetal condition

Practice Note

- Fetal anemia and hydrops may be a result of immune conditions, such as red-cell or Kell alloimmunization, non-immune hydrops caused by parvovirus B19 infection or any other known acquired or congenital causes of fetal anemia.

- Rhesus isoimmunization/alloimmunization is the process through which fetal Rh+ red blood cells enter the circulation of an Rh negative mother causing her to produce antibodies which can cross the placenta and destroy the red blood cells of the current Rh+ fetus and/or in subsequent Rh+ pregnancies.

- Other antigens not listed above, may be associated with hemolytic disease of the fetus and newborn and may require fetal assessment as in OB-16.1: Alloimmunization/Rh Isoimmunization if maternal antibody titers are ≥1:8. Please send these cases to Medical Director Review. Some of these antigens include MNSsM, MNSsS, MNSs, MNSsU, MNSsMi, MSSsMT, Diego D1, Diego Di, PPPTj, Public antigen Yt, Public antigen En, Public antigen Co2. Private antigens-Biles, Good, Heibel, Radin, Wright, and ZD. Dia, Dib, PP1Pk, Far, Good, Lan, LW, Mta, U, Wra.

- Peak systolic velocity (PSV) of the fetal middle cerebral artery can be used as a substitute for amniocentesis to evaluate a fetus at risk for anemia due to Rhesus isoimmunization/alloimmunization. Measurements can be initiated as early as 16 weeks of gestation if there is a past history of early severe fetal anemia or very high titers. Because MCA-PSV increases across gestation, results are adjusted for gestational age.
In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.

CPT® 76811 and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

**OB-16.2: Exposure to Parvovirus B-19**

Parvovirus B-19 (Fifth Disease):
- CPT® 76801 [plus CPT® 76802 for each additional fetus] if <14 weeks and a complete ultrasound has not yet been performed, and/or
- CPT® 76817 for a transvaginal ultrasound or
- CPT® 76815 can be performed for dating or quick look follow-up if ≥14 weeks but <16 weeks
- Ultrasound (CPT® 76816) every 2 to 4 weeks to assess fetal growth starting after performance of the fetal anatomic scan (CPT® 76811). Continue for 8 to 12 weeks post-exposure
- Starting at time of known exposure weekly limited ultrasound (CPT® 76815) until 26 weeks then weekly BPP (CPT® 76818 or CPT® 76819) or a modified BPP (CPT® 76815) if ≥26 weeks gestation and continuing for 8 to 12 weeks post-exposure
- Fetal middle cerebral artery (MCA) Doppler (CPT® 76821) every 1 to 2 weeks, starting at time of known exposure (if ≥16 weeks) and continuing for 8 to 12 weeks post-exposure

**OB-16.3: Twin Anemia Polycythemia Sequence**

- See OB-11.3: Known Monochorionic-Diamniotic or Monochorionic-Monoamniotic Multiple Gestations

**OB-16.4: Other Fetal Hydrops/Nonimmune Hydrops**

Hydrops from any cause should be imaged according to **OB-16.1: Alloimmunization/Rh Isoimmunization**

**OB-16.5: Other Causes of Fetal Anemia**

A ‘one-time’ MCA Doppler (CPT® 76821) assessment may be indicated if at high risk or suspicious for fetal anemia, for example, chorioangioma, umbilical vein varix, or finding of sustained fetal tachyarrhythmia or bradyarrhythmia - See **OB-12.2: Indications for Fetal Conditions** and **OB-21: Placental and Cord Abnormalities**.
Practice Notes

- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.

- CPT® 76811 and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

References

OB-17.1: Amniotic Fluid Abnormalities

**For suspected polyhydramnios or oligohydramnios:**
- Imaging may be indicated for unequal size and dates or suspected preterm/prelabor rupture of membranes. See
  - OB-27: Unequal Fundal Size and Dates and/or
  - OB-23: Preterm/Prelabor Rupture of Membranes

**For confirmed diagnosis of polyhydramnios: AFI ≥24 cm or maximum deepest vertical pocket (MVP) ≥8 cm.**
- CPT® 76811 (Detailed Fetal Anatomy) at diagnosis, if not previously performed
- CPT® 76816 starting at ≥23 weeks (if <23 weeks, send to Medical Director Review)
  - Every 3 to 4 weeks for mild polyhydramnios (AFI 24 cm to 30 cm or MVP 8 cm to 10 cm)
  - Every 2 weeks for severe polyhydramnios (AFI >30 cm or MVP >10 cm)
- CPT® 76815 may be indicated weekly for antepartum fetal surveillance from 23-26 weeks
- BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815) for AFI with NST starting at 26 weeks
  - Weekly for mild polyhydramnios
  - Twice weekly for severe polyhydramnios

**For confirmed diagnosis of oligohydramnios: AFI ≤5 cm or maximum vertical pocket ≤2 cm**
- CPT® 76811 if not already performed; or
- CPT® 76816 every 2 to 4 weeks starting at ≥23 weeks (if <23 weeks, send to Medical Director Review)
- CPT® 76815 may be indicated weekly for antepartum fetal surveillance from 23-26 weeks
- CPT® 76818 or CPT® 76819 or a modified BPP (CPT® 76815), weekly, starting at 26 weeks, (If <26 weeks send to Medical Director Review)
- CPT® 76820, weekly starting at time of diagnosis if ≥23 weeks, (If <23 weeks, send to Medical Director Review)

**Practice Notes**
- Polyhydramnios can be an early presenting finding of fetal hydrops associated with fetal anemia. Middle cerebral artery Doppler is commonly used to diagnose whether this fetal anemia is present or not. See **OB-16.1: Alloimmunization/Rh Isoimmunization**.
- Polyhydramnios may also present as a finding of cardiac dysfunction, fetal arrhythmias or cardiac malformation. Fetal echocardiography may be indicated if there are abnormal findings on an anatomy scan. See **OB-12: Fetal Echocardiography (ECHO)**.
- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.
- CPT® 76811 and CPT® 76812 should only be used once per pregnancy unless the
mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

References
5. Guidelines for Perinatal Care, 8th Edition; By AAP Committee on Fetus and Newborn and ACOG Committee on Obstetric Practice; Edited by Sarah J. Kilpatrick, Lu-Ann Papile and George A. Macones; Published in 2017.
## OB-18: Cervical Insufficiency/Current Preterm Labor

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<tr>
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<td>OB-18.2: Cerclage in Place in Current Pregnancy</td>
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<td>OB-18.3: Current Preterm Labor</td>
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</table>
OB-18.1: Cervical Insufficiency

For any of the following:
- History of prior precipitous delivery
- History of cerclage in prior pregnancy
- Over dilation of cervix during a termination of pregnancy
- Cervical obstetrical laceration from a previous delivery
- Surgical trauma to cervix (e.g. conization [CKC—cold-knife conization] or Loop Electrosurgical Excision Procedure [LEEP])

- CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 once in first trimester (<14 weeks) if a complete ultrasound has not yet been performed or
- CPT® 76815 and/or CPT® 76817 for dating if ≥14 weeks and <16 weeks
- CPT® 76805 and/or CPT® 76817 at ≥16 weeks if a complete fetal anatomic scan has not yet been performed during this pregnancy
- CPT® 76815 and/or CPT® 76817 every 2 weeks from 16 to 24 weeks

If funneling or short cervix ≤25 mm (2.5 cm) is found on a transvaginal ultrasound in a singleton pregnancy
- CPT® 76816 may be performed after a complete ultrasound every 3 to 4 weeks and/or
- CPT® 76817 and/or CPT® 76815 every 1 to 2 weeks until 32 weeks
- Note: CPT® 76815 should not be done on same date of service as CPT® 76816

OB-18.2: Cerclage in Place in Current Pregnancy

- CPT® 76801 [plus CPT® 76802 for each additional fetus] and/or CPT® 76817 once in first trimester (<14 weeks) if a complete ultrasound has not yet been performed or
- CPT® 76815 and/or CPT® 76817 for dating if ≥14 weeks and <16 weeks
- CPT® 76805 or CPT® 76811 if other high risk factors [plus CPT® 76810/CPT® 76812 for each additional fetus] and/or CPT® 76817 once if a complete detailed fetal anatomic scan has not been performed
- CPT® 76816 can be performed every 3 to 6 weeks starting after the fetal anatomic scan at 16 weeks.
- Transvaginal (CPT® 76817 and/or CPT® 76815) every 2 weeks, starting at ≥16 weeks until 32 weeks if a rescue cerclage was placed.
**OB-18.3: Current Preterm Labor**

- Known preterm labor in current pregnancy (contractions PLUS cervical change) CPT® 76805 [plus CPT® 76810 for each additional fetus] if a complete fetal anatomic scan has not yet been performed during this pregnancy; if a complete fetal anatomic scan was performed previously, CPT® 76815 or CPT® 76816 (CPT® 76816 no more than every 2 weeks) when symptomatic
- CPT® 76817 once or when symptomatic
- Biophysical profile (BPP) (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815), once when symptomatic starting at 30 weeks; if <30 weeks send to Medical Director Review
- For history of pre-term labor, See OB-9.9: History of Spontaneous Pre-Term Delivery/History of PPROM

**Practice Notes**

- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.
- CPT® 76811 and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

**References**

<table>
<thead>
<tr>
<th>OB-19: No Fetal Heart Tones/Decreased Fetal Movement</th>
</tr>
</thead>
<tbody>
<tr>
<td>OB-19.1: No Fetal Heart Tones</td>
</tr>
<tr>
<td>OB-19.2: Decreased Fetal Movement</td>
</tr>
</tbody>
</table>
OB-19.1: No Fetal Heart Tones

Prior to considering ultrasound, fetal heart tone should be assessed with fetal hand-held or Doppler device.

The following is supported during the first trimester:

- Ultrasound imaging is supported if ≥12 weeks gestation and unable to obtain fetal heart tones using a hand-held Doppler device.
- Ultrasound imaging is supported, if <12 weeks gestation, in the setting of absent fetal heart tones, only if accompanied by other maternal signs or symptoms (such as cramping, vaginal bleeding, etc.) or if fetal heart tones had previously been heard using a fetal hand-held Doppler device, but now are unable to be heard by this method, regardless of symptoms.
- Report one of the following:
  - CPT® 76801 (plus CPT® 76802 for each additional fetus) and/or CPT® 76817 if a complete ultrasound has not yet been performed; or
  - CPT® 76815 and/or CPT® 76817

The following is supported during the second and third trimester:

- CPT® 76815 for limited ultrasound or
- CPT® 76805 (plus CPT® 76810 for each additional fetus) if ≥14 weeks, when complete fetal anatomic scan CPT® 76805 has not yet been performed or
- CPT® 76816 (requests should go to Medical Director Review)

OB-19.2: Decreased Fetal Movement

Report one of the following: limited ultrasound or modified BPP (CPT® 76815) or if ≥26 weeks BPP (CPT® 76818 or 76819) See OB-28.8: Biophysical Profile (BPP)

References

## OB-20: Fetal Growth Problems (FGR and Macrosomia)

| OB-20.1: Fetal Growth Restriction Current Pregnancy | 79 |
| OB-20.2: Macrosomia – Large for Dates Current Pregnancy | 80 |
**OB-20.1: Fetal Growth Restriction Current Pregnancy**

The ACOG definition of Fetal Growth Restriction (FGR): Estimated or actual weight of the fetus ≤10th percentile for gestational age. “Abdominal Circumference ≤10th percentile” also defines FGR.

### For Suspected FGR:

- If there is a ≥3 week difference in fundal height and gestational age report one of the following:
  - CPT® 76805 (plus CPT® 76810 for each additional fetus) if a complete ultrasound has not yet been performed during this pregnancy or
  - CPT® 76816 if a complete ultrasound was performed previously

- One follow-up ultrasound (CPT® 76816) can be performed in 2 to 4 weeks following the initial ultrasound to confirm FGR

- For clinical situations that have a higher probability of FGR such as maternal hypertension, maternal diabetes, previous stillbirth, etc. See **OB-9: High Risk Pregnancy**, or the specific guidelines for these clinical entities for guidance regarding follow-up ultrasounds to assess fetal growth

### For Known FGR:

- Detailed Fetal Anatomic Scan (CPT® 76811) upon diagnosis if not already performed

- Follow up ultrasound (CPT® 76816) may be performed every 2 to 4 weeks starting at 23 weeks if complete ultrasound previously performed. If <23 weeks, send to Medical Director Review.

- Between 23 to 26 weeks, a limited ultrasound/modified BPP (CPT®76815) can be considered weekly.

- Starting at 26 weeks, BPP (CPT® 76818 or CPT® 76819) or a modified BPP (CPT® 76815) may be performed weekly.

- Starting at 23 weeks, umbilical artery (UA) Doppler (CPT® 76820) may be performed every 1-2 weeks

- If severe FGR (EFW <3%, AC <3%), or with decreased end-diastolic velocity (S/D ratio, >95th percentile for gestational age) or with confirmed oligohydramnios, then umbilical artery (UA) Doppler (CPT® 76820) may be performed weekly

- With absent or reversed end diastolic flow more frequent BPPs (CPT® 76818 or CPT® 76819) and umbilical artery (UA) Doppler (CPT® 76820) may be considered (up to 2-3 times per week). If requested more frequently, or in all cases with reversed end diastolic flow, send to Medical Director Review.

**Practice Notes**

- An abnormal umbilical artery Doppler is defined as a PI, RI, or S/D ratio greater than the 95th percentile for gestational age or an absent or reversed end-diastolic velocity (AEDV or REDV).

- Those with REDV are usually hospitalized for closer surveillance and delivery planning.

- SMFM suggest that ductus venosus, middle cerebral artery, or uterine artery Doppler use for routine clinical management of early- or late-onset FGR is not recommended (GRADE 2A). In circumstances where CPT® 76811 cannot be performed See **OB-1.3: Ultrasound Code Selection**
OB-20.2: Macrosomia – Large for Dates Current Pregnancy

- The ACOG definition of macrosomia: Estimated fetal weight of greater than 4000 grams (DM) or 4500 grams (non-DM); ≥90th percentile for gestational age

- See OB-9.4.1: Prior Pregnancy with Macrosomia

For Suspected Macrosomia:

- In a low risk pregnancy, ultrasound is generally not indicated to estimate fetal weight before 30 weeks gestation

- At ≥23 weeks gestation, if there is a ≥3 week difference in fundal height and gestational age, may report one of the following:
  - CPT® 76805 [plus CPT® 76810 for each additional fetus] if a complete fetal anatomic scan has not yet been performed or
  - CPT® 76816 if a complete ultrasound was done previously

- See OB-27.1: Unequal Fundal Size and Dates

For Known Macrosomia ≥90th percentile

- Repeat imaging is generally not necessary unless needed to plan for delivery or if there are other high risk indications.
  - Additional imaging recommendations are usually guided by the cause of the fetal macrosomia (obesity, DM, etc.) See appropriate guideline for indication

- If no other high risk indication present, one CPT® 76816 >37 weeks to plan for delivery

Practice Notes

- Ultrasound is imprecise in predicting fetal macrosomia. Prospective studies have shown that clinical estimates of macrosomia may be as predictive as estimates derived by ultrasonography

References

## OB-21: Placental and Cord Abnormalities

| OB-21.1: Single Umbilical Artery (Two Vessel Cord) | 82 |
| OB-21.2: Persistent Right Umbilical Vein (PRUV) | 82 |
| OB-21.3: Placental/Cord Abnormalities | 83 |
| OB-21.3.1: Placental/Cord Abnormalities | 83 |
| OB-21.3.2: Other Placental/Cord Abnormalities | 84 |
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| OB-21.7: Placenta Accreta Spectrum (Accreta, Increta, Percreta) | 87 |
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| OB-21.7.2: Known | 87 |
OB-21.1: Single Umbilical Artery (Two Vessel Cord)

If a single umbilical artery is found on initial imaging:

- Detailed anatomic ultrasound at 16 weeks or greater
  CPT® 76811

- Fetal echocardiogram (usually done >16 weeks)
  CPT® 76825 and/or
  CPT® 76827 and/or
  CPT® 93325

- Follow-up ultrasound to evaluate fetal growth at ≥28 weeks and then every 3 to 6 weeks if more than one clinical high-risk factors are documented
  CPT® 76816

- Weekly BPP or modified BPP starting at 36 weeks
  CPT® 76818 or
  CPT® 76819 (BPP) or
  modified BPP CPT® 76815

Practice Note

- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.

- CPT® 76811 and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

OB-21.2: Persistent Right Umbilical Vein (PRUV)

If a PRUV is found on initial imaging:

- Detailed anatomic ultrasound at 16 weeks or greater
  CPT® 76811

- Fetal echocardiogram (usually done >16 weeks)
  CPT® 76825 and/or
  CPT® 76827 and/or
  CPT® 93325

- Follow-up ultrasound to evaluate fetal growth at ≥28 weeks and then every 3 to 6 weeks if more than one clinical high-risk factors are documented
  CPT® 76816

- Weekly BPP or modified BPP starting at 32 weeks
  CPT® 76818 or
  CPT® 76819 (BPP) or
  modified BPP CPT® 76815
OB-21.3: Placental/Cord Abnormalities

OB-21.3.1: Placental/Cord Abnormalities

Circumvallate Placenta
Placental hemangioma
Succenturiate placenta or accessory lobe
Hypo/Hyper-coiled Umbilical Cord
Marginal Cord Insertion
Umbilical cord cyst
Velamentous Cord Insertion

- Fetal anatomic scan can be performed after 16 weeks (CPT® 76805/CPT® 76811) and/or CPT® 93976 (limited duplex scan of arterial and venous)
- Ultrasound CPT® 76817 may be indicated to evaluate the placenta and/or cord in relation to the cervix
- Ultrasound (CPT® 76816) and/or CPT® 93976 (limited duplex scan) every 3-6 weeks starting at 28 weeks until delivery
- Weekly BPP or modified BPP (CPT® 76818/CPT® 76819 or CPT® 76815) starting at 32 weeks

**Practice Note**

- **Hypo/Hyper-coiled umbilical cord** - Several studies have reported an increased frequency of adverse pregnancy outcome, including congenital anomalies, growth restriction, fetal heart rate abnormalities, preterm birth, and intrauterine death in pregnancies with both hypocoiled and hypercoiled umbilical cord

- **Amniotic bands** may occur due to uterine synechiae (intrauterine adhesions), residual gestation sac of a demised twin, fibrin strands s/p bleeding, chorioamniotic separation or may be noted with a circumvallate placenta. In general, they are benign entities and are not associated with adverse pregnancy outcome, as such, do not need to be followed. Most providers will want at least one follow-up US after it is identified (typically at the time of fetal anatomy scan) to ensure that the finding is indeed benign and the band has not increased in size, nor is it restricting fetal growth or movement. Therefore, one f/u scan in the third trimester may be indicated. (Note – Amniotic Band SYNDROME is a very different entity which is NOT benign, and is associated with very increased risk of fetal anomalies – this would be imaged as in **OB-9: High Risk Pregnancy**).
OB-21.3.2: Other Placental/Cord Abnormalities

Chorioangioma
Umbilical cord varix

- Detailed fetal anatomic scan can be performed after 16 weeks (CPT® 76811) with or without CPT® 93976 (limited duplex scan)
- Ultrasound (CPT® 76816) with or without CPT® 93976 (limited duplex scan) every 3-6 weeks starting at the time of diagnosis until delivery
- Weekly BPP (CPT® 76818 or CPT® 76819) or a modified BPP (CPT® 76815) starting at 32 weeks
- Both chorioangioma and UVV can be associated with fetal anemia and/or low output heart failure. As such, MCA Dopplers (CPT® 76821) may be indicated e.g. If turbulence develops within the UVV
- If suspected or known hydrops, Fetal ECHO (CPT® 76825, CPT® 76827, CPT® 93325) may be indicated. If fetal hydrops develops then image as per OB-16.1: Alloimmunization/Rh Isoimmunization

Practice Note

- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.
- CPT® 76811 and CPT® 76812 should only be used once per pregnancy unless the mother changes to a new medical caregiver at a new office and there is a new medical indication and/or change in condition.

OB-21.4: Subchorionic Hematoma/Hemorrhage (Placental Hematoma)

<table>
<thead>
<tr>
<th>Subchorionic Hematoma/Hemorrhage (Placental Hematoma)</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Ultrasound can be performed for follow-up of a known subchorionic hematoma or placental hematoma</td>
</tr>
<tr>
<td>- CPT® 76815 and/or CPT® 76817 if the last ultrasound was performed greater than seven days ago or</td>
</tr>
<tr>
<td>- CPT® 76816 and/or CPT® 76817 if a complete ultrasound scan was performed ≥2 weeks ago</td>
</tr>
<tr>
<td>- Imaging may be repeated earlier than seven days if there are new or worsening symptoms such as an increasing amount of vaginal bleeding or increasing cramping or pain.</td>
</tr>
<tr>
<td>- No further imaging is needed if the follow-up ultrasound shows that the hemorrhage has resolved.</td>
</tr>
<tr>
<td>- If pregnancy is in second or third trimester follow OB-21.5: Suspected Abruptio Placentae</td>
</tr>
</tbody>
</table>
OB-21.5: Suspected Abruptio Placentae

**Suspected Abruptio Placentae**

<table>
<thead>
<tr>
<th>Second and Third Trimesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>For suspected abruptio placentae:</td>
</tr>
<tr>
<td>- CPT® 76805 [plus CPT® 76810 for each additional fetus] and/or CPT® 76817 if a complete fetal anatomic scan has not yet been performed during this pregnancy, and/or CPT® 93976 (limited duplex scan)</td>
</tr>
<tr>
<td>- CPT® 76815 for limited ultrasound and/or CPT® 76817, or</td>
</tr>
<tr>
<td>- CPT® 76816 if a complete ultrasound scan was done previously, and/or CPT® 76817</td>
</tr>
<tr>
<td>- Vaginal bleeding with +KB (Kleihauer-Betke) – feto-maternal hemorrhage – at risk for fetal anemia and hydrops CPT® 76821 may be indicated, send to Medical Director Review</td>
</tr>
</tbody>
</table>

- Ultrasound is appropriate to follow-up a known abruption: |
  - CPT® 76815 or CPT® 76816 if a complete ultrasound was done previously and/or CPT® 76817. |
  - The number and frequency of follow-up ultrasounds will depend on the degree of abruption and the presence or absence of ongoing signs and symptoms.

OB-21.6: Previa (Placenta Previa and Vasa Previa)

**OB-21.6.1: Placenta Previa**

<table>
<thead>
<tr>
<th>Second and Third Trimesters</th>
</tr>
</thead>
<tbody>
<tr>
<td>For suspected placenta previa one of the following ultrasound can be performed:</td>
</tr>
<tr>
<td>- CPT® 76805 [plus CPT® 76810 for each additional fetus] and/or CPT® 76817 if a complete fetal anatomic scan has not yet been performed during this pregnancy and/or CPT® 93976 (limited duplex scan)</td>
</tr>
<tr>
<td>- CPT® 76815 for limited ultrasound and/or CPT® 76817 and/or CPT® 93976 (limited duplex scan)</td>
</tr>
<tr>
<td>- CPT® 76816 if a complete ultrasound was done previously and/or CPT® 76817 for a transvaginal ultrasound and/or CPT® 93976 (limited duplex scan)</td>
</tr>
</tbody>
</table>

- For known placenta previa: |
  - One routine follow-up ultrasound can be performed in the 3rd trimester (CPT® 76815 or CPT® 76816 and/or CPT® 76817) |
    - If placenta previa is still present, one follow-up ultrasound (CPT® 76815 or CPT® 76816 and/or CPT® 76817) can be performed in 3-4 weeks |
    - If persistent placenta previa, BPP (CPT® 76818 or CPT® 76819) or a modified BPP (CPT® 76815) weekly, starting at 32 weeks |
    - Follow-up ultrasound can be performed at any time if bleeding occurs BPP (CPT® 76818 or CPT® 76819) or CPT® 76815 or CPT® 76816 if a complete ultrasound was done previously and/or CPT® 76817 |

**Low Lying Placenta**

- Ultrasound (CPT® 76815 and/or CPT® 76817) is supported between 28-32 weeks one time to check the placental location. Further requests will be forwarded to Medical Director Review
**Practice Note**

- For pregnancies beyond 16 weeks, if the placental edge is ≥2 cm away from the internal os, the placental location should be reported as normal.

- If the placental edge is <2 cm from the internal os but not covering the internal os, it should be labeled as low lying.

- If the placental edge covers the internal cervical os, the placenta should be labeled as a placenta previa.

- At the follow-up examination at 28-32 weeks, if the placental edge is still <2 cm from the internal os (low lying) or covering the cervical os (placenta previa), follow-up transvaginal imaging at 36 weeks gestation is recommended.

"There is no evidence to guide the optimal time of subsequent imaging in pregnancies thought to have placenta previa. In stable patients it is reasonable to perform a follow-up ultrasonogram at approximately 32 weeks of gestation. This allows adequate time for “resolution” of low-lying placentas and avoids potentially unnecessary studies. It may be worthwhile to perform an additional study at 36 weeks of gestation (if the previa persists) to determine the optimal route and timing of delivery. There is no clear benefit from more frequent ultrasonograms (eg, every 4 weeks) in stable cases."

**OB-21.6.2: Vasa Previa**

- Vasa previa occurs when fetal blood vessels that are unprotected by the umbilical cord or placenta run through the amniotic membranes and cross over the internal cervical os.

| If a Vasa Previa is found on initial imaging: |  |
|-----------------------------------------------|  |
| Detailed anatomic ultrasound at ≥16 weeks     | CPT® 76811 |
| Follow-up growth ultrasound every 3-6 weeks starting at ≥23 weeks | CPT® 76816 |
| Once vasa previa is confirmed cervical length screening every 2 to 4 weeks starting at 28 weeks | CPT® 76817 and CPT® 76816 or CPT® 76815 |
| • If earlier request send to Medical Director Review |  |
| BPP or modified BPP weekly starting at 32 weeks | CPT® 76818 or CPT® 76819 (BPP) or CPT® 76815 |
OB-21.7: Placenta Accreta Spectrum (Accreta, Increta, Percreta)

- See PV-15.2: Placenta Accreta/Placenta Accreta Spectrum/Placenta Percreta

OB-21.7.1: Suspected

- For suspected placenta accreta:
  - CPT® 76811 or CPT® 76805 and/or CPT® 76817 if a complete fetal anatomic scan has not yet been performed and/or CPT® 93976 (limited duplex scan) or
  - CPT® 76816 (if a complete ultrasound was done previously) or CPT® 76815 and/or CPT® 76817 and/or CPT® 93976 (limited duplex scan), or
  - If the ultrasound is inconclusive or equivocal then MRI Pelvis without contrast (CPT® 72195) may be indicated

OB-21.7.2: Known

- For known placenta accreta/percreta:
  - Follow up growth ultrasounds can be performed every 2 to 4 weeks (CPT® 76816 if a complete ultrasound was done previously and/or CPT® 76817)
  - BPP (CPT® 76818 or CPT® 76819) or a modified BPP (CPT® 76815) weekly, starting at 32 weeks or sooner if indicated (other high-risk concerns)
  - Follow-up ultrasound can be performed at any time if bleeding occurs (CPT® 76815 and/or CPT® 76817)
  - Medical Director can approve MRI Pelvis without contrast (CPT® 72195) if the ultrasound is indeterminate or advanced imaging is needed for surgical planning. MRI Pelvis without contrast (CPT® 72195) is the appropriate code if only placenta or maternal pelvis is imaged without fetal imaging

References


19. SMFM Coding Committee White Paper: Coding for Placenta Accreta Spectrum.


OB-22.1: Late-term/Post-term Pregnancy

- Ultrasound is supported at ≥41 weeks gestation
  - CPT® 76816
  - Twice weekly BPP (CPT® 76818 or CPT® 76819) or modified BPP CPT® 76815

Practice Note
In post-date pregnancy, uterine artery Doppler velocimetry (CPT® 93976) has not been found to be useful. Per SMFM - uterine artery Doppler has limited diagnostic accuracy and clinical utility in predicting FGR, SGA birth, and perinatal mortality.

References
### OB-23: Preterm/Prelabor Rupture of Membranes

| OB-23.1: Current Preterm/Prelabor Rupture of Membranes (PPROM) | 92 |
| OB-23.2: Current Prelabor Rupture of Membranes (PROM) | 92 |

See [OB-17: Amniotic Fluid Abnormalities/Oligohydramnios/Polyhydramnios](#)
OB-23.1: Current Preterm/Prelabor Rupture of Membranes (PPROM)

- If ≤36 6/7 weeks - send to Medical Director Review.
  - This is likely a hospital admission for evaluation and monitoring until delivery.
  - Only in rare cases is outpatient monitoring performed

OB-23.2: Current Prelabor Rupture of Membranes (PROM)

- If ≥37 weeks - send to Medical Director Review.
  - This will likely result in a hospital admission for delivery

References
**OB-24.1: Previous C-section or History of Uterine Scar**

<table>
<thead>
<tr>
<th>Previous Cesarean section and/or uterine scar</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Ultrasound in the first trimester may be indicated to establish dates. Report one of the following:</td>
</tr>
<tr>
<td>◦ CPT® 76801 [plus CPT® 76802 for each additional fetus] if a complete ultrasound has not yet been performed, and/or CPT® 76817 if &lt;14 weeks, or</td>
</tr>
<tr>
<td>◦ CPT® 76815 and/or CPT® 76817 for dating if ≥14 weeks and &lt;16 weeks</td>
</tr>
<tr>
<td>▶ Fetal anatomic scan CPT® 76805 ≥16 weeks. (if requested earlier send to Medical Director Review)</td>
</tr>
<tr>
<td>▶ One growth scan (CPT® 76816) in the early third trimester (between 28-32 weeks) <strong>and</strong> one growth scan (CPT® 76816) for delivery planning later in third trimester (between 36-38 weeks)</td>
</tr>
<tr>
<td>▶ Transvaginal ultrasound, CPT® 76817 may be indicated for poor visualization of the lower uterine segment or if uterine wall thinning (dehiscence) is suspected.</td>
</tr>
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**References**


OB-25.1: Imaging for Planned Pregnancy Termination

For a planned pregnancy termination, ultrasound can be performed to determine intrauterine pregnancy and gestational age.
- One complete ultrasound (CPT® 76801) and/or one transvaginal ultrasound (CPT® 76817), if <14 weeks, or
- CPT® 76815 and/or CPT® 76817, or
- If ≥14 weeks, CPT® 76805 may be indicated, (there may be State mandated imaging prior to termination) send to Medical Director Review.

Practice Note

In general, most ultrasound requests are approvable for planned pregnancy termination regardless of clinical information provided. Imaging may be indicated to confirm EGA, placenta location, and/or fetal anomalies.

References

OB-26.1: Trauma – Imaging

Prior to 13 weeks:
Blunt trauma in the first trimester (prior to 13 weeks) generally does not cause pregnancy loss with the exception of profound hypotension:
- No imaging is indicated unless there is cramping and/or bleeding.

Between 13-20 weeks gestation:
- CPT® 76801 and/or CPT® 76817 when complete ultrasound has not yet been performed, if <14 weeks or
- CPT® 76815 and/or CPT® 76817 or
- CPT® 76805 (plus CPT® 76810 for each additional fetus) if ≥14 weeks, when complete fetal anatomic scan CPT® 76805 and/or CPT® 76817 has not yet been performed

After 20 weeks:
- CPT® 76805 (plus CPT® 76810 for each additional fetus) when complete fetal anatomic scan (CPT® 76805) has not yet been performed, or
- CPT® 76815 and/or CPT® 76817 or
- CPT® 76816
  - Additionally, starting at 26 weeks, BPP (CPT® 76818 or CPT® 76819) or modified BPP (CPT® 76815) can be considered
- Vaginal bleeding with +KB (Kleihauer-Betke) (feto-maternal hemorrhage) at risk for fetal anemia and hydrops, CPT® 76821 may be indicated, send to Medical Director Review.
- Other advanced imaging may be indicated, send for Medical Director Review

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OB-27.1: Unequal Fundal Size and Dates

Unequal fundal size is defined as a discrepancy between weeks of gestational age and fundal height measurement of ≥3 cm and gestational age at ≥23 weeks gestation.

- One ultrasound can be performed (CPT® 76805) if complete fetal anatomic scan is planned and has not been performed or
- CPT® 76816 if complete anatomy scan or detailed anatomy ultrasound (CPT® 76805/CPT® 76811) has been done previously
- Where fundus cannot be adequately palpated such as in obesity, leiomyomas, multiple gestations, See appropriate chapter

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OB-28.1: Procedure Coding Basics for Established Pregnancy

General Considerations

- All obstetric ultrasound studies require permanently recorded images which may be stored on film or in a Picture Archiving and Communication System (PACS). Obstetric ultrasound services may not be billed without image recording.
- Ultrasound procedure codes include the preparation of a required final written report which should be included in the patient’s medical record.
  - Each procedure code has specific required elements which are described in this section.
  - The report should document the results of the evaluation of each element or the reason any element is non-visualized.
  - Documentation of less than the required elements requires the billing of the “limited” code for that anatomic region.
  - Only one (1) limited exam may be billed per encounter.
- The use of a hand-held or any Doppler device that does not create a hard-copy output is considered part of the physical examination and is not separately billable.

OB-28.2: Required Elements for Complete First Trimester Ultrasound

<table>
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<tr>
<th>CPT® Code Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPT® 76801 and CPT® 76802 (for each additional fetus) can be performed up to and including 13 6/7 weeks gestation and is defined in CPT® as including the following elements:</td>
</tr>
<tr>
<td>- Number and size of gestational sacs and fetuses</td>
</tr>
<tr>
<td>- Survey of visible fetal anatomic structures and placental evaluation when possible</td>
</tr>
<tr>
<td>- Qualitative assessment of amniotic fluid volume/gestational sac shape</td>
</tr>
<tr>
<td>- Examination of maternal uterus and adnexa</td>
</tr>
<tr>
<td>CPT® 76801 and CPT® 76802 should only be reported once per pregnancy/per practice/facility unless the mother changes to a new medical caregiver at a new practice/facility and there is a new medical indication for ultrasound.</td>
</tr>
<tr>
<td>Follow-up studies to CPT® 76801 and CPT® 76802 should be reported as CPT® 76815</td>
</tr>
</tbody>
</table>
**OB-28.3: Required Elements for Second or Third Trimester Fetal Anatomic Evaluation Ultrasound**

<table>
<thead>
<tr>
<th>CPT® Code Guidance</th>
</tr>
</thead>
<tbody>
<tr>
<td>A complete second or third trimester transabdominal ultrasound (CPT® 76805 and CPT® 76810 for each additional fetus) is defined in CPT® as including the following elements:</td>
</tr>
<tr>
<td>✦ <strong>Head, face, and neck</strong>: Lateral cerebral ventricles; Choroid plexus; Midline falx; Cavum septi pellucidi; Cerebellum; Cistern magna; Upper lip: A measurement of the nuchal fold may be helpful during a specific age interval to assess the risk of aneuploidy</td>
</tr>
<tr>
<td>✦ <strong>Chest/Heart</strong>: Four-chamber view; Left and Right ventricular outflow tracts</td>
</tr>
<tr>
<td>✦ <strong>Abdomen</strong>: Stomach (presence, size, and situs); Kidneys; Urinary bladder; Umbilical cord insertion site into the fetal abdomen and number of vessels</td>
</tr>
<tr>
<td>✦ <strong>Spine</strong>: Cervical, thoracic, lumbar, and sacral spine</td>
</tr>
<tr>
<td>✦ <strong>Extremities</strong>: Legs and arms</td>
</tr>
<tr>
<td>✦ <strong>Genitalia</strong>: (In multiple gestations and when medically indicated)</td>
</tr>
<tr>
<td>✦ <strong>Placenta</strong>: Location; Relationship to internal os; Appearance; Placental cord insertion (when possible) and overall Standard evaluation</td>
</tr>
<tr>
<td>✦ <strong>Fetal number and Presentation</strong></td>
</tr>
<tr>
<td>✦ <strong>Qualitative or semi-qualitative estimate of amniotic fluid</strong></td>
</tr>
<tr>
<td>✦ <strong>Maternal anatomy</strong>: Cervix (transvaginal if cervical length is ( \leq 3.6 \text{ cm} )), Uterus, and Adnexa</td>
</tr>
<tr>
<td>✦ <strong>Fetal Biometry</strong>: Biparietal diameter, Head circumference, Femur length, Abdominal circumference, and Fetal weight estimate.</td>
</tr>
</tbody>
</table>

- CPT® 76805 and CPT® 76810 should only be used once per pregnancy per practice/facility unless the mother changes to a new medical caregiver at a new practice/facility and there is a new medical indication for ultrasound.
- Follow-up studies to CPT® 76805/CPT® 76810 should be coded as CPT® 76815 or CPT® 76816.
OB-28.4: Required Elements for a Detailed Fetal Anatomic Evaluation Ultrasound

CPT® Code Guidance

- Detailed fetal anatomy scan (CPT® 76811 and CPT® 76812 for each additional fetus) is generally performed by those with special skills to perform this study, such as Maternal Fetal Medicine specialists (Perinatologists), or Radiologists (with advanced training in fetal imaging).

- CPT® 76811 and CPT® 76812 are defined in CPT® as including all of the requirements listed for CPT® 76805 and CPT® 76810. In addition, the report must document detailed anatomic evaluation of the following elements:
  - **Head, face, and neck:** 3rd and 4th ventricles; Lateral ventricles; Cerebellar lobes, vermis, and cisterna magna; Corpus callosum; Integrity and shape of cranial vault; Brain parenchyma; Neck; Profile; Coronal face (nose/lips/lenses); Palate, maxilla, mandible, and tongue; Ear position and size; Orbits
  - **Chest/Heart:** Aortic arch; Superior and inferior vena cava; 3-vessel view; 3-vessel and trachea view; Lungs; Integrity of diaphragm; Ribs
  - **Abdomen:** Small and large bowel; Adrenal glands; Gallbladder; Liver; Renal arteries; Spleen; Integrity of abdominal wall
  - **Spine:** Integrity of spine and overlying soft tissue; Shape and curvature
  - **Extremities:** Number: architecture and position; Hands; Feet; Digits: number and position
  - **Genitalia:** Gender
  - **Placenta:** Masses; Placental cord insertion; Accessory/succenturiate lobe with location of connecting vascular supply to primary placenta
  - **Biometry:** Cerebellum; Inner and outer orbital diameters; Nuchal thickness (16 to 20 wk); Nasal bone measurement (15 to 22 wk); Humerus; Ulna/radius; Tibia/fibula
  - **Maternal Anatomy:** Cervix (transvaginal if cervical length is ≤3.6 cm); Uterus; Adnexa

- CPT® 76811 and CPT® 76812 should only be used once per pregnancy per practice/facility unless the mother changes to a new medical caregiver at a new facility and there is a new medical indication for ultrasound.

- Follow-up studies to CPT® 76811/CPT® 76812 should be coded as CPT® 76815 or CPT® 76816.

- In circumstances where the individual is deemed to have an increased risk for a fetal abnormality and does not have access to a provider who can perform the more desirable fetal and maternal ultrasound with detailed fetal anatomic examination (CPT® 76811) due to geographic or other constraints, a standard (after first trimester) fetal and maternal ultrasound (CPT® 76805) may be authorized instead.
OB-28.5: Fetal Nuchal Translucency

**CPT® Code Guidance**

- CPT® 76813 and CPT® 76814 (for each additional fetus) describe ultrasound measurement of the clear (translucent) space at the back of the fetal neck.
  - The first trimester screening is typically done between 11 and 13 6/7 weeks but can be performed if the crown rump length (CRL) measures between 44-83 mm regardless of gestational age (range 10 4/7 to 14 weeks).
- Abnormal Fetal Nuchal Translucency scan (≥3 mm) suggests an increased risk for aneuploidy. An NT ≥3 mm with normal aneuploidy testing may be a marker for cardiac defects, abdominal wall defects, diaphragmatic hernia, and genetic syndromes in euploid fetuses during current pregnancy.
- The sonographer performing the study and/or the physician interpreting the study must be credentialed by the Maternal Fetal Medicine Foundation or Nuchal Translucency Quality Review Program (NTQR).
- The use of ultrasound codes (CPT® 76801/CPT® 76802) should be indication driven and should not be routinely done whenever an ultrasound for nuchal translucency (CPT® 76813/CPT® 76814) is requested. In cases where there is either a maternal and/or fetal indication, then the CPT® 76801 code can be billed along with the nuchal translucency screening (CPT® 76813/CPT® 76814).

**Practice Note**

- **Required elements of the CPT® 76813 ultrasound code include:**
  - Fetal crown-rump measurement
  - Observation of fetal cardiac activity
  - Observation of the embryo at high magnification until the embryonic neck is in a neutral position and spontaneous embryonic movement allows for differentiation between the outer edge of the nuchal skin and the amnion
  - Measurement of the largest distance between the inner borders of the fetal nuchal translucency
OB-28.6: Limited and Follow-up Studies

CPT® Code Guidance

- **CPT® 76815** describes a limited or “quick look” study used to report one or more of the elements listed in the code definition, i.e. “fetal heartbeat”, placental location, for viability/dating (when indicated), or fluid check (re: modified BPP which is NST with CPT® 76815)
  - Reported only once, regardless of the number of fetuses, and only once per date of service
  - CPT® 76815 should never be reported with complete studies CPT® 76801/CPT® 76802 and CPT® 76805/CPT® 76810 (or with CPT® 76816 or BPP).
- **CPT® 76816** describes a follow-up ultrasound (eg, re-evaluation of fetal size by measuring standard growth parameters and amniotic fluid volume, re-evaluation of organ system(s) suspected or confirmed to be abnormal on a previous scan), trans-abdominal approach, per fetus.
  - The use of this CPT code is reserved for subsequent follow up ultrasound only; i.e. complete ultrasound (CPT® 76801, CPT® 76805 or CPT® 76811) must have been performed previously.
  - Components include: Focused assessment of fetal biometry, amniotic fluid volume and/or a detailed re-examination of a specific organ or system known or suspected to be abnormal on prior ultrasound.
  - CPT® 76816 should be reported once per fetus evaluated in follow-up.
  - CPT® 76816 should never be reported with complete studies (CPT® 76801, CPT® 76802 and CPT® 76805, CPT® 76810) or with a limited study (CPT® 76815).
  - CPT® 76816 should not be performed prior to a CPT® 76801 and/or an anatomy scan CPT® 76805 (normal pregnancy) or Detailed anatomy scan CPT® 76811 (high risk pregnancy).

OB-28.7: Obstetric Transvaginal Ultrasound

CPT® Code Guidance

- **CPT® 76817** is used to report an obstetrical transvaginal ultrasound and may be used to report TV cervical length assessment (when indicated), or in certain circumstances with poor visualization by transabdominal US assessment.
- **CPT® 76817** is reported only once regardless of the number of fetuses.
OB-28.8: Biophysical Profile (BPP)

**CPT® Code Guidance**
- CPT® 76818 includes non-stress testing.
- CPT® 76819 does not include the non-stress testing portion.
- BPPs, performed on more than one fetus, should be reported separately.

**Practice Note**
- The BPP is designed to predict the presence or absence of fetal asphyxia and, ultimately the risk of fetal death. The following parameters are evaluated:
  - Fetal breathing movements
  - Gross fetal body movements
  - Fetal tone
  - Amniotic fluid volume, at least one vertical pocket 2 x 2 cm
  - Reactive FHR (non-stress testing portion)
- CPT® 76815 is used to bill a modified BPP which is NST with AFI
- Typically all components of the BPP, such as breathing, are not present until ≥26 weeks gestation. However, modified BPP may be utilized sooner in certain HR cases but should not be done prior to viability (23 weeks).
- If BPP ≤6, repeat BPP in ≤24 hours

OB-28.9: Fetal Doppler

**CPT® Code Guidance**
- CPT® 76820 describes Doppler velocimetry of the umbilical artery (UA Doppler)
  - Utilized for known FGR; See OB-20.1: Fetal Growth Restriction Current Pregnancy and known oligohydramnios See OB-17.1: Amniotic Fluid Abnormalities, and is typically performed ≥23 weeks gestation (viability).
  - May also be indicated with known twin to twin transfusion or known discordant twins (See OB-11: Multiple Gestations).
  - Its use to predict preeclampsia, and stillbirth is considered investigational.
- CPT® 76821 describes Doppler velocimetry of the middle cerebral artery (MCA Doppler).
  - Performed as a substitute for amniocentesis to evaluate a fetus at risk for anemia due to Rhesus isoimmunization/alloimmunization, Twin anemia polycythemia sequence and non-immune hydrops caused by parvovirus B19 infection or any other known acquired or congenital cause of fetal anemia. See OB-16.1: Alloimmunization/Rh Isoimmunization, 16.4: Other Fetal Hydrops/NonImmune Hydrops; and OB-11: Multiple Gestations

**Practice Notes**
- SMFM suggest that ductus venosus, middle cerebral artery, or uterine artery Doppler use for routine clinical management of early- or late-onset FGR is not recommended (GRADE 2A).
OB-28.10: Duplex Scan

- A Duplex scan describes an ultrasonic scanning procedure for characterizing the pattern and direction of blood flow in arteries and veins. It produces real-time images integrating a B-mode two dimensional vascular structure, Doppler spectral analysis, and color flow Doppler imaging.

- **CPT® 93976** describes a limited duplex scan and is used during pregnancy to report uterine artery Doppler studies (done to report fetal umbilical-placental flow evaluation, accreta or other placental or cord abnormalities).
  - **CPT® 93975** describes a complete duplex scan. This code is **NOT** used in obstetrical imaging.
  - The minimal use of color Doppler alone, when performed for anatomical structure identification, during a standard ultrasound procedure, is not separately reimbursable.

_PRACTICE NOTE_

- SMFM state that uterine artery Doppler has limited diagnostic accuracy and clinical utility in predicting FGR, SGA birth, and perinatal mortality. As such, its use for screening in high risk groups is not recommended (GRADE 2A).

OB-28.11: Fetal Echocardiography

<table>
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<td>CPT® 76825 describes a complete fetal echocardiography.</td>
</tr>
<tr>
<td>CPT® 76827 describes a complete Doppler echocardiography, fetal, pulsed wave and/or continuous wave with spectral display</td>
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</tbody>
</table>
  - It is usually billed along with CPT® 76825 |
| CPT® 76826 describes a follow-up or repeat fetal echocardiogram |
  - It should never be billed with CPT® 76825 or more than once per fetus on any date of service |
| CPT® 76828 is a follow-up or repeat Doppler fetal echocardiogram |
| Procedure code (CPT® 76827 or CPT® 76828) includes the evaluation of veins, arteries, and valves, and covers Doppler evaluation of the ductus venosus, ductus arteriosus, and PR Interval measurement as well as other vessels. Guidelines do not support the additional billing of CPT® 76820 and/or CPT® 76821. |
  - It is inappropriate to report codes CPT® 76825 – CPT® 76828 for the routine monitoring of fetal heart tones using a hand-held or any Doppler device that does not create a hard-copy output. Such fetal heart tone monitoring is considered part of the physical examination and is not separately billable. |
| CPT® 93325 is used to report color mapping in conjunction with fetal echocardiography procedures CPT® 76825 – CPT® 76828. |
  - The use of color Doppler (CPT® 93325) alone, when performed for anatomical structure identification, during a standard ultrasound procedure, is not separately reimbursable. |
OB-28.12: 3D and 4D Rendering

There is currently insufficient data to generate appropriateness criteria for the use of 3D and 4D rendering in conjunction with Obstetrical ultrasound imaging.

- Per ACOG, despite the technical advantages of 3-dimensional ultrasonography, proof of a clinical advantage of 3-dimensional ultrasonography in prenatal diagnosis, in general, is still lacking.

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<td>Abbreviation</td>
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<tr>
<td>ACTH</td>
<td>adrenocorticotropic hormone</td>
</tr>
<tr>
<td>AFP</td>
<td>alpha-fetoprotein</td>
</tr>
<tr>
<td>betaHCG</td>
<td>beta human chorionic gonadotropin</td>
</tr>
<tr>
<td>CA 125</td>
<td>cancer antigen 125 test</td>
</tr>
<tr>
<td>CA 19-9</td>
<td>cancer antigen 19-9</td>
</tr>
<tr>
<td>CA 15-3</td>
<td>cancer antigen 15-3</td>
</tr>
<tr>
<td>CA 27-29</td>
<td>cancer antigen 27-29</td>
</tr>
<tr>
<td>CBC</td>
<td>complete blood count</td>
</tr>
<tr>
<td>CEA</td>
<td>carcinoembryonic antigen</td>
</tr>
<tr>
<td>CR</td>
<td>complete response</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>DCIS</td>
<td>ductal carcinoma in situ</td>
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<tr>
<td>DLBCL</td>
<td>diffuse large B cell lymphomas</td>
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<tr>
<td>DRE</td>
<td>digital rectal exam</td>
</tr>
<tr>
<td>EGD</td>
<td>esophagogastroduodenoscopy</td>
</tr>
<tr>
<td>ENT</td>
<td>ear, nose, throat</td>
</tr>
<tr>
<td>EOT</td>
<td>end of therapy</td>
</tr>
<tr>
<td>ERCP</td>
<td>endoscopic retrograde cholangiopancreatography</td>
</tr>
<tr>
<td>ESR</td>
<td>erythrocyte sedimentation rate</td>
</tr>
<tr>
<td>EUA</td>
<td>exam under anesthesia</td>
</tr>
<tr>
<td>EUS</td>
<td>endoscopic ultrasound</td>
</tr>
<tr>
<td>FDG</td>
<td>fluorodeoxyglucose</td>
</tr>
<tr>
<td>FNA</td>
<td>fine needle aspiration</td>
</tr>
<tr>
<td>FUO</td>
<td>fever of unknown origin</td>
</tr>
<tr>
<td>GE</td>
<td>gastroesophageal</td>
</tr>
<tr>
<td>GI</td>
<td>gastrointestinal</td>
</tr>
<tr>
<td>GU</td>
<td>genitourinary</td>
</tr>
<tr>
<td>GTR</td>
<td>gross total resection</td>
</tr>
<tr>
<td>HG</td>
<td>high grade</td>
</tr>
<tr>
<td>HIV</td>
<td>human immunodeficiency disease</td>
</tr>
<tr>
<td>HRPC</td>
<td>hormone refractory prostate cancer</td>
</tr>
<tr>
<td>hypermet</td>
<td>hypermetabolic</td>
</tr>
<tr>
<td>IFRT</td>
<td>Involved field radiation therapy</td>
</tr>
<tr>
<td>inv</td>
<td>invasive</td>
</tr>
<tr>
<td>LAR</td>
<td>low anterior resection</td>
</tr>
<tr>
<td>LCIS</td>
<td>lobular carcinoma in situ</td>
</tr>
<tr>
<td>LDH</td>
<td>lactate dehydrogenase</td>
</tr>
<tr>
<td>LFT</td>
<td>liver function tests</td>
</tr>
<tr>
<td>LND</td>
<td>Lymph node dissection</td>
</tr>
<tr>
<td>MALT</td>
<td>mucosa associated lymphoid tissue</td>
</tr>
<tr>
<td>maint</td>
<td>maintenance</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>MEN</td>
<td>multiple endocrine neoplasia</td>
</tr>
<tr>
<td>MGUS</td>
<td>monoclonal gammopathy of unknown significance</td>
</tr>
<tr>
<td>MIBG</td>
<td>I-123 metaiodobenzylguanidine scintigraphy</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MUGA</td>
<td>‘multiple gated acquisition’ cardiac nuclear scan</td>
</tr>
<tr>
<td>MWA</td>
<td>microwave ablation</td>
</tr>
<tr>
<td>NaF</td>
<td>Sodium Fluoride</td>
</tr>
<tr>
<td>NET</td>
<td>Neuroendocrine tumor</td>
</tr>
<tr>
<td>NCCN®</td>
<td>National Comprehensive Cancer Network</td>
</tr>
<tr>
<td>NHL</td>
<td>non-Hodgkin’s lymphoma</td>
</tr>
<tr>
<td>NPC</td>
<td>nasopharyngeal carcinoma</td>
</tr>
<tr>
<td>NSABP</td>
<td>National Surgical Adjuvant Breast and Bowel Project</td>
</tr>
<tr>
<td>NSAIDS</td>
<td>nonsteroidal anti-inflammatory drugs</td>
</tr>
<tr>
<td>NSCLC</td>
<td>non-small cell lung cancer</td>
</tr>
<tr>
<td>NSGCT</td>
<td>non-seminomatous germ cell tumor</td>
</tr>
<tr>
<td>PA</td>
<td>posteroanterior</td>
</tr>
<tr>
<td>PCI</td>
<td>prophylactic cranial irradiation</td>
</tr>
<tr>
<td>PET</td>
<td>positron emission tomography</td>
</tr>
<tr>
<td>PSA</td>
<td>prostate specific antigen</td>
</tr>
<tr>
<td>RFA</td>
<td>radiofrequency ablation</td>
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<tr>
<td>RPLND</td>
<td>retroperitoneal lymph node dissection</td>
</tr>
<tr>
<td>SqCCa</td>
<td>squamous cell carcinoma</td>
</tr>
<tr>
<td>SCLC</td>
<td>small cell lung cancer</td>
</tr>
<tr>
<td>SIADH</td>
<td>syndrome of inappropriate secretion of antidiuretic hormone</td>
</tr>
<tr>
<td>TCC</td>
<td>transitional cell carcinoma</td>
</tr>
<tr>
<td>TLH</td>
<td>total laparoscopic hysterectomy</td>
</tr>
<tr>
<td>TNM</td>
<td>tumor node metastasis staging system</td>
</tr>
<tr>
<td>TSH</td>
<td>thyroid-stimulating hormone</td>
</tr>
<tr>
<td>TURBT</td>
<td>trans-urethral resection of bladder tumor</td>
</tr>
<tr>
<td>VIPoma</td>
<td>vasoactive intestinal polypeptide</td>
</tr>
<tr>
<td>WLE</td>
<td>wide local incision</td>
</tr>
<tr>
<td>WB-MRI</td>
<td>whole body MRI</td>
</tr>
<tr>
<td>WM</td>
<td>Waldenstrom’s macroglobulinemia</td>
</tr>
<tr>
<td>WBXRT</td>
<td>Whole brain radiation therapy</td>
</tr>
</tbody>
</table>
## ONC-1: General Guidelines

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
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<tbody>
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<td>ONC-1.1</td>
<td>Key Principles</td>
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<tr>
<td>ONC-1.2</td>
<td>Phases of Oncology Imaging and General Phase-Related Considerations</td>
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<tr>
<td>ONC-1.3</td>
<td>Nuclear Medicine (NM) Imaging in Oncology</td>
</tr>
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<td>ONC-1.4</td>
<td>PET Imaging in Oncology</td>
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<td>ONC-1.5</td>
<td>Unlisted Procedure Codes in Oncology</td>
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<td>ONC-1.6</td>
<td>Predisposition Syndromes</td>
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</table>
ONC-1.1: Key Principles

### AGE APPROPRIATE GUIDELINES

<table>
<thead>
<tr>
<th>Age of Individual</th>
<th>Appropriate Imaging Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>≥ 18 years old at initial diagnosis</td>
<td>Adult Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section</td>
</tr>
<tr>
<td>&lt; 18 years old at initial diagnosis</td>
<td>Pediatric Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section</td>
</tr>
<tr>
<td>15 to 39 years old at initial diagnosis (defined as Adolescent and Young Adult (AYA) oncology individuals)</td>
<td>When unique guidelines for a specific cancer type exist only in either Oncology or Pediatric Oncology, AYA individuals should be imaged according to the guideline section for their specific cancer type, regardless of the individual’s age. When unique guidelines for a specific cancer type exist in both Oncology and Pediatric Oncology, AYA individuals should be imaged according to the age rule in the previous bullet</td>
</tr>
</tbody>
</table>

- A recent clinical evaluation (within 60 days) (history and physical examination, laboratory studies, non-advanced imaging studies) or meaningful contact (telephone call, electronic mail or messaging) should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled off therapy surveillance evaluation or cancer screening. The clinical evaluation may include a relevant history and physical examination, including biopsy, appropriate laboratory studies, and non-advanced imaging modalities.

- Advanced imaging is not indicated for monitoring disease in individuals who choose not to receive standard oncologic therapy, but may be receiving alternative therapies or palliative care and/or hospice. All advanced imaging indicated for initial staging of the specific cancer type can be approved once when the patient is considering initiation of a standard therapeutic approach (surgery, chemotherapy, or radiation therapy).

- Conventional Imaging (mostly CT, sometimes MRI or bone scan) of the affected area(s) drives much of initial and re-staging and surveillance. PET is not indicated for surveillance imaging unless specifically stated in the diagnosis-specific guideline sections.

- Routine imaging of brain, spine, neck, chest, abdomen, pelvis, bones, or other body areas is not indicated except where explicitly stated in a diagnosis-specific guideline section, or if one of the following applies:
  - Known prior disease involving the requested body area
  - New or worsening symptoms or physical exam findings involving the requested body area (including non-specific findings such as ascites or pleural effusion)
  - New finding on basic imaging study such as plain x-ray or ultrasound
  - New finding on adjacent body area CT/MRI study (i.e., pleural effusion observed on CT abdomen)
Brain imaging is performed for signs or symptoms of brain disease
- MRI Brain without and with contrast (CPT® 70553) is the recommended study for evaluation of suspected or known brain metastases. If a non-contrast CT head shows suspicious lesion, MRI brain may be obtained to further characterize the lesion
- CT without and with contrast (CPT® 70470) can be approved when MRI is contraindicated or not available, or if there is skull bone involvement
- Certain malignancies including, but not limited to melanoma, lung cancer and renal cell cancer have indications for brain imaging for asymptomatic patients
- If stage IV disease is demonstrated elsewhere or if systemic disease progression is noted, refer to disease specific guidelines
- Initiation of angiogenesis therapy is not an indication for advanced imaging of the brain in asymptomatic patients (Avastin/Bevacizumab; < 3% risk of bleeding and < 1% risk of serious bleeding)

Bone scan supplemented by plain x-rays are the initial imaging modalities for suspected malignant bone pain. For specific imaging indications, see also:
- **ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology**
- **ONC-31.5: Bone (including Vertebral) Metastases**
- **ONC-31.6: Spinal Cord Compression**
- **ONC-31.7: Carcinoma of Unknown Primary Site**

Patients receiving cardiotoxic chemotherapy (such as doxorubicin, trastuzumab, pertuzumab, mitoxantrone, etc.) may undergo cardiac evaluation – at baseline and for monitoring while on active therapy.
- eviCore guidelines support using Echocardiography (CPT® 93306, CPT® 93307, or CPT® 93308) rather than MUGA scan for determination of LVED and/or wall motion EXCEPT in one of the circumstances described previously in **CD-3.4: MUGA Study – Cardiac Indications**.
- The timeframe should be determine by the provider, but no more often than baseline and at every 6 weeks.
- May repeat every 4 weeks if cardiotoxic chemotherapeutic drug is withheld for significant left ventricular cardiac dysfunction.
- If the LVED is < 50% on echocardiogram than follow up can be done with MUGA at appropriate intervals.
- See also: **CD-12.1: Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)**

Adults (≥18 years) with a diagnosis of Li-Fraumeni Syndrome (LFS) may be screened for malignancy with a Whole Body MRI (CPT® 76498) on an annual basis. Annual Brain MRI (CPT® 70553) may be performed as part of Whole Body MRI or as a separate exam. Due to lack of standardization of technique, interpretation, and availability of Whole Body MRI, individuals with LFS are encouraged to participate in clinical trials.

CTA or MRA of a specific anatomic region is indicated when requested for surgical planning when there is suspected vascular proximity to proposed resection margin.
Use of Contrast

- CT imaging should be performed with contrast for known or suspected body regions, unless contraindicated.
  - Shellfish allergy is not a contraindication to contrast. Patients with known shellfish allergy do not have contrast reaction any more often than other atopic individuals or patients with other food allergies.
  - For iodinated contrast dye allergy, either CT scans without contrast or MRI scans without and with contrast are indicated.
  - If CT scanning is considered strongly indicated in a patient with known contrast allergy, CT with contrast may be considered to be safely performed following prednisone premedication over a 24 hour period prior to the study.

- For patients with renal insufficiency which precludes contrast use, CT without contrast appropriate disease-specific areas should be offered. Further imaging (such as MRI) may be indicated if noncontrast CT results are inconclusive.

- Severe renal insufficiency, i.e. an eGFR less than 30, is a contraindication for an MRI using a gadolinium-based contrast agent (GBCA) as well. In patients with eGFR greater than 40, GBCA administration can be safely performed. GBCA administered to patients with acute kidney injury or severe chronic kidney disease can result in a syndrome of nephrogenic systemic fibrosis (NSF), but GBCAs are not considered nephrotoxic at dosages approved for MRI.

- Gadolinium deposition has been found in patients with normal renal function following the use of gadolinium based contrast agents (GBCAs).
  - The U.S. Food and Drug Administration (FDA) is investigating the risk of brain deposits following repeated use of GBCAs.
  - The FDA has noted that, “It is unknown whether these gadolinium deposits are harmful or can lead to adverse health effects.” and have recommended:
    - To reduce the potential for gadolinium accumulation, health care professionals should consider limiting GBCA use to clinical circumstances in which the additional information provided by the contrast is necessary.
    - Health care professionals are also urged to reassess the necessity of repetitive GBCA MRIs in established treatment protocols.

Radiation Exposure

- The use of MRI in place of CT scans to reduce risk of secondary malignancy is not supported by the peer-reviewed literature. Unless otherwise specified in the Guidelines, MRI in place of CT scans for this purpose alone is not indicated. In some instances (i.e., testicular cancer surveillance), MRI may be considered inferior to CT scans.
# ONC-1.2: Phases of Oncology Imaging and General Phase-Related Considerations

<table>
<thead>
<tr>
<th>Phases of Oncology Imaging</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Screening</td>
<td>Imaging requested for patients at increased risk for a particular cancer in the absence of known clinical signs or symptoms</td>
</tr>
<tr>
<td>Suspected Diagnosis</td>
<td>Imaging requested to evaluate a suspicion of cancer, prior to histological confirmation</td>
</tr>
<tr>
<td>Initial work-up and Staging</td>
<td>Imaging requested after biopsy confirmation and prior to starting specific treatment</td>
</tr>
<tr>
<td>Treatment response or Interim Restaging</td>
<td>Imaging performed during active treatment with chemotherapy, endocrine therapy or maintenance therapy</td>
</tr>
<tr>
<td>Restaging of locally treated lesions</td>
<td>Imaging performed to evaluate primary or metastatic lesions with ablation using radiofrequency, radioactive isotope, microwave or chemotherapy</td>
</tr>
<tr>
<td>Restaging / Suspected Recurrence</td>
<td>Imaging requested when there is suspicion for progression or recurrence of known cancer based on clinical signs/symptoms, laboratory tests or basic imaging studies</td>
</tr>
<tr>
<td>Surveillance</td>
<td>Imaging performed in patients who are asymptomatic or have chronic stable symptoms, and are not receiving active treatment</td>
</tr>
</tbody>
</table>

### General phase-related considerations:

- Conventional imaging performed prior to diagnosis should not be repeated unless there is a delay of at least 6 weeks since previous imaging and treatment initiation or there are new or significantly worsening clinical signs or symptoms.
- Repeat PET/CT requests should be forwarded for Medical Director review.

<table>
<thead>
<tr>
<th>Phase</th>
<th>Imaging Timeframe</th>
</tr>
</thead>
<tbody>
<tr>
<td>After definitive local therapy of primary tumor (surgery or radiation therapy)</td>
<td>Follow surveillance guidelines</td>
</tr>
<tr>
<td>During adjuvant chemotherapy</td>
<td>Follow surveillance guidelines</td>
</tr>
<tr>
<td>After ablative therapy</td>
<td>See disease-specific guidelines</td>
</tr>
<tr>
<td>During chemotherapy or immunotherapy for measurable disease</td>
<td>Every 2 cycles (generally every 6 to 8 weeks)</td>
</tr>
<tr>
<td>During endocrine/hormonal therapy</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Measurable metastatic disease being monitored off therapy</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Minimal metastatic disease on maintenance therapy</td>
<td>Every 3 months</td>
</tr>
<tr>
<td>Surveillance for history of metastatic disease with complete response and being observed off-therapy</td>
<td>Imaging typically not indicated beyond 5 years from completion of treatment for metastatic disease</td>
</tr>
</tbody>
</table>
ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology

- This section does not apply to PET imaging. PET imaging considerations can be found in ONC-1.4: PET Imaging in Oncology.

- **Bone Scan:**
  - Primarily used for evaluation of bone metastases in patients with solid malignancies.
  - Indications for bone scan in patients with history of malignancy include – bone pain, rising tumor markers, elevated alkaline phosphatase or in patients with primary bone tumor.
  - For evaluation of suspected or known bony metastases, CPT® 78306 (Nuclear bone scan whole body), may be approved.
  - Radiopharmaceutical Localization scan SPECT (CPT® 78803 or CPT® 78831) or SPECT/CT (CPT® 78830 or CPT® 78832) may be approved as an add-on test for further evaluation of a specific area of interest.
  - CPT® codes 78300 (Nuclear bone scan limited), 78305 (Nuclear bone scan multiple areas) or 78315 do not have any indications in oncology nuclear medicine imaging.

- **Octreotide scan:**
  - Specific for low and intermediate grade neuroendocrine tumors which express specific cell surface somatostatin receptors. See cancer specific guidelines for recommended use.
  - One of the following codes may be approved when Octreotide scan is requested:
    - CPT® 78802 (Radiopharmaceutical localization of tumor whole body single day study)
    - CPT® 78804 (Radiopharmaceutical localization of tumor whole body two or more days)
  - In addition to one of the above CPT codes, CPT® 78803 (Radiopharmaceutical localization of tumor SPECT), SPECT CPT® 78831, or hybrid SPECT/CT (CPT® 78830 or 78832) may be approved as an add-on test for further evaluation of a specific area of interest.

- **Bone marrow imaging:**
  - This study is rarely performed for evaluation of the entire bone marrow in conditions like myeloproliferative disorders, sickle cell bone infarct or ischemia, avascular necrosis or myeloma.
  - The correct CPT code for this study is CPT® 78104 (Diagnostic Nuclear Medicine Procedures on the Hematopoietic, Reticuloendothelial and Lymphatic System).

- **Brain imaging SPECT with Technetium-99m or thallium-201 (CPT® 78803):**
  - Immunocompromised patients with mass lesion detected on CT or MRI for differentiation between lymphoma and infection.
  - In distinguishing recurrent brain tumor from radiation necrosis.

- **Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s):**
- CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78804, CPT® 78803, CPT® 78831 (SPECT), or CPT® 78830 or CPT® 78832 (SPECT/CT)
- For evaluation of fever of unknown origin and osteomyelitis
- For suspected infections such as infected central lines, grafts or shunts

- Gallium Isotope Scan:
  - Radiopharmaceutical Localization of tumor (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804), SPECT CPT® 78831, or hybrid SPECT/CT CPT® 78830 or 78832
  - This may be rarely used in place of PET/CT scan when PET/CT scan not available and PET/CT is indicated by guidelines for lymphoma, sarcoma, melanoma or myeloma
ONC-1.4: PET Imaging in Oncology

CPT codes:
- PET imaging in oncology should use PET/CT fusion imaging (CPT® 78815 or CPT® 78816). Unbundling PET/CT imaging into separate PET and diagnostic CT codes is otherwise not supported.
- The decision whether to use skull base to mid-femur ("eyes to thighs") procedure code for PET (CPT® 78812 or CPT® 78815) or whole body PET (CPT® 78813 or CPT® 78816) is addressed in the diagnosis-specific guideline sections.
- 'Limited area' protocol is done infrequently, but may be considered, and is reported with PET (CPT® 78811) or for PET/CT, (CPT® 78814) and should be forwarded for Medical Director review.

Radiotracers:
- Unless specified otherwise, the term “PET” refers to 18F-FDG-PET and PET/CT fusion studies.
- Indications for PET/CT imaging using non-FDG radiotracers are listed in diagnosis-specific guidelines. The indications may be as follows:
  - Covered:
    - 18F-FDG
    - 68Gallium DOTATATE (NETSPOT®) for low grade neuroendocrine tumors for localization of somatostatin receptor positive neuroendocrine tumors in adult and pediatric population
    - 11C Choline for prostate cancer
    - 18F-Fluciclovine (AXUMIN®) for prostate cancer
  - Not covered:
    - 18F-Na Fluoride PET bone scan
    - 68Ga PSMA PET scan
    - PET/CT imaging using isotopes other than those specified above
Unless specified in diagnosis-specific guideline section PET/CT Imaging is NOT indicated for:

- Infection, inflammation, trauma, post-operative healing, granulomatous disease, rheumatological conditions
- Concomitantly with separate diagnostic CT studies
- Distant or diffuse metastatic disease
- Metastatic disease in the central nervous system (CNS)
- Lesions less than 8 mm in size
- Follow up after localized therapy (i.e. radiofrequency ablation, embolization, stereotactic radiation, etc.)
- Rare malignancies, due to lack of available evidence regarding the diagnostic accuracy of PET in rare cancers
- Surveillance
  - Serial monitoring of FDG avidity until resolution.
  - PET/CT avidity in a residual mass at the end of planned therapy is not an indication for PET/CT imaging during surveillance.
  - Residual mass that has not changed in size since the last conventional imaging does not justify PET imaging
- Unless otherwise specified for a specific cancer type, once PET has been documented to be negative for a given patient’s cancer or all PET-avid disease has been surgically resected, PET should not be used for continued disease monitoring or surveillance.

<table>
<thead>
<tr>
<th>CPT/HCPCS Code</th>
<th>Code Description</th>
<th>Brand or common name</th>
<th>FDA approved?</th>
<th>Code reviewed by eviCore?</th>
</tr>
</thead>
<tbody>
<tr>
<td>A9552</td>
<td>fluorine-18 (F-18) fluorodeoxyglucose (FDG), diagnostic, per study dose, up to 45 millicuries</td>
<td>FDG</td>
<td>Yes, to assess abnormal glucose metabolism</td>
<td>No</td>
</tr>
<tr>
<td>A9580</td>
<td>Sodium fluoride f-18, diagnostic, per study dose, up to 30 millicuries</td>
<td>N/A</td>
<td>Yes, for bone imaging</td>
<td>No</td>
</tr>
<tr>
<td>A9587</td>
<td>Gallium GA-68, dotatate, diagnostic, 0.1 millicurie</td>
<td>NETSPOT®</td>
<td>Yes, for localization of somatostatin receptor positive neuroendocrine tumors in adult and pediatric population</td>
<td>No</td>
</tr>
<tr>
<td>C9461</td>
<td>Choline C 11, diagnostic, per study dose</td>
<td>N/A</td>
<td>Yes, for suspected prostate cancer recurrence</td>
<td>No</td>
</tr>
<tr>
<td>A9588</td>
<td>$^{18}$F-Fluciclovine</td>
<td>AXUMIN®</td>
<td>Yes, for suspected prostate cancer recurrence</td>
<td>No</td>
</tr>
</tbody>
</table>
PET/CT may be indicated if:
- Conventional imaging (CT, MRI or bone scan) reveals findings that are inconclusive or negative, with continued suspicion for recurrence
- The patient is undergoing salvage treatment for a recurrent solid tumor with residual measurable disease on conventional imaging and confirmed repeat negative PET imaging will allow the patient to transition from active treatment to surveillance.
- PET/CT may be considered prior to biopsy in order to determine a more favorable site for biopsy when a prior biopsy was nondiagnostic or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt.

PET/CT for rare malignancies is not covered by eviCore guidelines due to lack of available evidence regarding diagnostic accuracy of PET/CT in the majority of rare cancers. Conventional imaging studies should be used for initial staging and treatment response for these diagnoses. PET/CT can be approved if all of the following apply:
- Conventional imaging (CT, MRI or bone scan) reveals equivocal or suspicious findings
- No other specific metabolic imaging (MIBG, octreotide, technetium, etc.) is appropriate for the disease type
- The submitted clinical information describes a specific decision regarding the patient’s care that will be made based on the PET/CT results
- These requests will be forwarded for Medical Director review

Delay PET/CT for at least 12 weeks after completion of radiation treatment, unless required sooner for imminent surgical resection. PET/CT requests < 12 weeks from completion of radiation treatment should be forwarded for Medical Director review.

PET mammography (PEM, generally reported with CPT® 78811) is considered experimental and investigational at this time.
**ONC-1.5: Unlisted Procedure Codes in Oncology**

- eviCore does not routinely authorize requests for PET associated with image-directed biopsy or radiation therapy treatment planning.

- There is often no unique procedure code for a service performed solely for treatment planning purposes. AMA instructions in the CPT state that if no specific code exists for a particular service, the service is reported with an unlisted code.

- Advanced imaging being used for radiation therapy treatment planning should not be authorized using any of the diagnostic imaging codes for CT, MRI or PET. Advanced imaging performed in support of radiation therapy treatment planning should be reported with:
  - **CPT® 76498 for Unlisted MRI** – when MRI will be used for treatment planning of radiation therapy to be delivered ONLY to the brain, prostate and cervix. The use of this code for radiation treatment planning of any other cancers/body parts not listed above, may be reviewed on a case-by-case basis and should be sent for Medical Director Review.
  - **CPT® 76497 for Unlisted CT** – may NOT be used for radiation treatment planning. CT imaging performed in support of radiation therapy treatment planning is bundled with the concurrent radiation treatment authorization codes and a separate authorization for treatment planning is not required.
  - **CPT® 78999 for Unlisted procedure, nuclear medicine (PET)** – eviCore does not perform prior authorization for this CPT code. This code may not be reviewed or offered as an alternative recommendation to the provider.

- Imaging associated with image-directed biopsy should be reported with the corresponding interventional codes. See also: Preface-4.2: CT-, MR-, or Ultrasound-Guided Procedures.

- For advanced imaging used solely for the purpose of Surgical planning, see Preface-4.3: Unlisted Procedures/Therapy treatment planning.
ONC-1.6: Predisposition Syndromes
For predisposition syndrome screening in adult patients, see PEDONC-2: Screening Imaging in Cancer Predisposition Syndromes
References


### ONC-2: Primary Central Nervous System Tumors

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<tr>
<th>Section</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>ONC-2.1: Primary Central Nervous System Tumors – General Considerations</td>
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</tr>
<tr>
<td>ONC-2.2: Low Grade Gliomas</td>
<td></td>
</tr>
<tr>
<td>ONC-2.3: High Grade Gliomas</td>
<td></td>
</tr>
<tr>
<td>ONC-2.4: Medulloblastoma and Supratentorial Primitive Neuroectodermal Tumors (sPNET)</td>
<td></td>
</tr>
<tr>
<td>ONC-2.5: Ependymoma</td>
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</tr>
<tr>
<td>ONC-2.6: Central Nervous System Germ Cell Tumors</td>
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<tr>
<td>ONC-2.7: CNS Lymphoma (also known as Microglioma)</td>
<td></td>
</tr>
<tr>
<td>ONC-2.8: Meningiomas (Intracranial and Intraspinal)</td>
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</tr>
<tr>
<td>ONC-2.9: Spinal Cord Tumors (Benign and Malignant)</td>
<td></td>
</tr>
<tr>
<td>ONC-2.10: Choroid Plexus Tumors</td>
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</tbody>
</table>
This guideline section applies to primary CNS tumors only. For imaging guidelines in metastatic brain cancer, see the appropriate diagnosis-specific section or **ONC-31.3: Brain Metastases** for imaging guidelines.

**ONC-2.1: Primary Central Nervous System Tumors – General Considerations**

- Primary brain tumors presenting only with uncomplicated headache are very uncommon. Most primary brain tumors present with specific CNS symptoms.
- Histologic confirmation is critical. Therapeutic decisions should not be made on radiographic findings alone, except for the following:
  - Medically fragile patients for whom attempted biopsy carries excess medical risk, as stated in writing by both the attending physician and surgeon.
  - Brain stem tumors or other sites where the imaging findings are pathognomonic and the risk of permanent neurological damage is excessive with even a limited biopsy attempt.
- For suspected brain tumors in neurofibromatosis, see: **PEDONC-2: Screening Imaging in Cancer Predisposition Syndromes**
- Rare tumors occurring more commonly in the pediatric population should be imaged according to the imaging guidelines in: **PEDONC-4: Pediatric Central Nervous System Tumors**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
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<tbody>
<tr>
<td>Characterization and follow up of all brain tumors</td>
<td>MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>CT Head without and with contrast (CPT® 70470)</td>
</tr>
<tr>
<td></td>
<td>can be approved when MRI is contraindicated or not available, or there is skull bone involvement</td>
</tr>
<tr>
<td></td>
<td>CT Head (contrast as requested) can be approved for preoperative planning when requested by the operating surgeon</td>
</tr>
<tr>
<td>Preoperative planning or to clarify inconclusive findings on MRI or CT</td>
<td>MRA Head (CPT® 70544) or CTA Head (CPT® 70496)</td>
</tr>
<tr>
<td>Within 24 to 72 hours following brain tumor surgery</td>
<td>MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td>Clinical deterioration or development of new neurological features</td>
<td>MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
</tbody>
</table>
**MR Spectroscopy in Brain Tumors (MRS, CPT® 76390)**

- MRS is only supported for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature
  - See diagnosis-specific guidelines for MRS indications
- MRS is considered investigational/experimental for all other histologies and indications not listed in a diagnosis-specific guideline section. These requests should be forwarded for Medical Director review

**PET Brain Imaging (CPT® 78608 and CPT® 78609)**

- PET Brain Metabolic Imaging (CPT® 78608) is only supported for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature
  - See diagnosis-specific guidelines for PET indications below.
  - According to Medicare NCD 220.6.17, FDG-PET may be approved once for initial treatment strategy and three times for subsequent treatment strategy for brain tumors. See: **ONC-32.3: Brain PET** for details.
- PET Brain metabolic imaging (CPT® 78608) is considered investigational/experimental for all other histologies and indications not listed in a diagnosis-specific guideline section and should be forwarded for Medical Director review
- PET Brain perfusion imaging (CPT® 78609) is not indicated in the evaluation or management of primary CNS tumors, and is nationally non-covered by Medicare per NCD 220.6.17.
- Body PET studies (CPT® 78811, CPT® 78812, and CPT® 78813) and fusion PET/CT studies (CPT® 78814, CPT® 78815, or CPT® 78816) are not indicated in the evaluation or management of primary CNS tumors
ONC-2.2: Low Grade Gliomas
These tumors are defined as having a WHO histologic grade of I or II (out of IV), can occur anywhere in the CNS, and includes the following tumors:

- Pilocytic Astrocytoma
- Fibrillary (or Diffuse) Astrocytoma
- Optic Pathway Gliomas
- Pilomyxoid Astrocytoma
- Oligodendroglial
- Oligoastrocytoma
- Oligodendrocytoma
- Subependymal Giant Cell Astrocytoma (SEGA)
- Ganglioglioma
- Gangliocytoma
- Dysembryoplastic infantile astrocytoma (DIA)
- Dysembryoplastic infantile ganglioglioma (DIG)
- Dysembryoplastic neuroepithelial tumor (DNT)
- Tectal plate gliomas
- Cervicomedullary gliomas
- Pleomorphic xanthoastrocytoma (PXA)
- Any other glial tumor with a WHO grade of I or II
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging</strong></td>
<td>✷ MRI Brain without and with contrast (CPT® 70553) if not already done</td>
</tr>
<tr>
<td></td>
<td>✷ MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)</td>
</tr>
<tr>
<td></td>
<td>✷ MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain</td>
</tr>
<tr>
<td><strong>After initial resection or other treatment (XRT, etc.)</strong></td>
<td>✷ MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td><strong>For patients undergoing chemotherapy treatment</strong></td>
<td>✷ MRI Brain without and with contrast (CPT® 70553) every 2 cycles</td>
</tr>
<tr>
<td></td>
<td>✷ Patients with spinal cord involvement at diagnosis can have MRI without and with contrast of the involved spinal region on the same schedule as MRI brain</td>
</tr>
<tr>
<td><strong>One of the following:</strong></td>
<td>✷ PET Brain metabolic imaging (CPT® 78608)</td>
</tr>
<tr>
<td>◆ Determine need for biopsy when transformation to high grade glioma is suspected based on clinical symptoms or recent MRI findings</td>
<td></td>
</tr>
<tr>
<td>◆ Evaluate a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed</td>
<td></td>
</tr>
<tr>
<td><strong>One of the following:</strong></td>
<td>✷ MR Spectroscopy (CPT® 76390)</td>
</tr>
<tr>
<td>◆ Distinguish low grade from high grade gliomas</td>
<td></td>
</tr>
<tr>
<td>◆ Evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed</td>
<td></td>
</tr>
<tr>
<td>◆ Distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy</td>
<td></td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>✷ MRI Brain without and with contrast (CPT® 70553) every 3 months for 2 years, then every 6 months for 3 years, then annually</td>
</tr>
<tr>
<td></td>
<td>✷ Patients with spinal cord involvement at diagnosis can have MRI spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) on the same schedule as MRI Brain</td>
</tr>
</tbody>
</table>
Oncology Imaging

ONC-2.3: High Grade Gliomas
These tumors are defined as having a WHO histologic grade of III or IV (out of IV can occur anywhere in the CNS (though the majority occur in the brain), and include the following tumors:

- Anaplastic astrocytoma
- Glioblastoma multiforme
- Diffuse intrinsic pontine glioma (DIPG, or “brainstem glioma”)
- Gliomatosis cerebri
- Gliosarcoma
- Anaplastic oligodendroglioma
- Anaplastic ganglioglioma
- Anaplastic mixed glioma
- Anaplastic mixed ganglioneuronal tumors
- Any other glial tumor with a WHO grade of III or IV

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Staging</td>
<td>- MRI Brain without and with contrast (CPT® 70553) if not already done</td>
</tr>
<tr>
<td></td>
<td>- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)</td>
</tr>
<tr>
<td></td>
<td>- MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain</td>
</tr>
<tr>
<td>Immediately following partial or complete resection</td>
<td>- MRI Brain without and with (CPT® 70553)</td>
</tr>
<tr>
<td>Immediately following radiation therapy (XRT)</td>
<td>- MRI Brain without and with contrast (CPT® 70553) once within 2 to 6 weeks following completion of treatment, and then go to surveillance imaging</td>
</tr>
<tr>
<td>For patients undergoing chemotherapy treatment</td>
<td>- MRI Brain without and with contrast (CPT® 70553) every 2 cycles</td>
</tr>
<tr>
<td></td>
<td>- Patients with spinal cord involvement at diagnosis can have MRI without and with contrast of the involved spinal region on the same schedule as MRI brain</td>
</tr>
<tr>
<td>Indication</td>
<td>Imaging Study</td>
</tr>
<tr>
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<td>--------------</td>
</tr>
<tr>
<td>One of the following:</td>
<td>MR Spectroscopy (CPT® 76390)</td>
</tr>
<tr>
<td>✦ Distinguish low grade from high grade gliomas</td>
<td></td>
</tr>
<tr>
<td>✦ Evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed</td>
<td></td>
</tr>
<tr>
<td>✦ Distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy</td>
<td></td>
</tr>
<tr>
<td>One of the following:</td>
<td>PET Brain metabolic imaging (CPT® 78608)</td>
</tr>
<tr>
<td>✦ Distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy</td>
<td>PET Brain is not indicated in gliomas occurring in the brain stem due to poor uptake and lack of impact on patient outcomes</td>
</tr>
<tr>
<td>✦ Evaluate inconclusive MRI findings when the PET findings will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance</td>
<td></td>
</tr>
<tr>
<td>✦ Evaluate a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed</td>
<td></td>
</tr>
<tr>
<td>Surveillance</td>
<td>MRI Brain without and with contrast (CPT® 70553) every 3 months for 3 years and every 6 months thereafter</td>
</tr>
<tr>
<td></td>
<td>Patients with spinal cord involvement at diagnosis can have MRI spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) on the same schedule as MRI Brain</td>
</tr>
</tbody>
</table>
ONC-2.4: Medulloblastoma and Supratentorial Primitive Neuroectodermal Tumors (sPNET)

Medulloblastoma and sPNET imaging indications in adult patients are identical to those for pediatric patients. See PEDONC-4.4: Medulloblastoma (MDB), Supratentorial Primitive Neuroectodermal Tumors (sPNET), and Pineoblastoma for imaging guidelines.
**ONC-2.5: Ependymoma**

Ependymoma imaging indications in adult patients are identical to those for pediatric patients. See **PEDONC-4.8: Ependymoma** for imaging guidelines.
**ONC-2.6: Central Nervous System Germ Cell Tumors**

Central nervous system germ cell tumor imaging indications in adult patients are identical to those for pediatric patients. See **PEDONC-4.7: CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT)** for imaging guidelines.
# ONC-2.7: CNS Lymphoma (also known as Microglioma)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Staging</td>
<td>All of the following are indicated:</td>
</tr>
<tr>
<td></td>
<td>- MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>- MRI Cervical spine without and with contrast (CPT® 72156)</td>
</tr>
<tr>
<td></td>
<td>- MRI Thoracic spine without and with contrast (CPT® 72157)</td>
</tr>
<tr>
<td></td>
<td>- MRI Lumbar spine without and with contrast (CPT® 72158)</td>
</tr>
<tr>
<td>Extra-neural evaluation to confirm CNS primary</td>
<td>Any or all of the following are indicated:</td>
</tr>
<tr>
<td>*Patients with CNS Lymphoma that is metastatic should be imaged according to:</td>
<td></td>
</tr>
<tr>
<td>- <strong>ONC-27: Non-Hodgkin Lymphomas</strong> for patients age ≥ 18 years</td>
<td></td>
</tr>
<tr>
<td>- <strong>PEDONC-5.3: Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL)</strong> for patients age ≤ 17 years</td>
<td></td>
</tr>
<tr>
<td>Treatment Response</td>
<td>MRI without and with contrast of all positive disease sites every 2 cycles</td>
</tr>
<tr>
<td>Surveillance</td>
<td>MRI without and with contrast of all positive disease sites every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter</td>
</tr>
</tbody>
</table>
## ONC-2.8: Meningiomas (Intracranial and Intraspinal)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging of Intracranial Meningioma</strong></td>
<td>Any or all of the following are indicated:</td>
</tr>
<tr>
<td></td>
<td>- MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>- CT Head (contrast as requested)</td>
</tr>
<tr>
<td><strong>Initial staging of Intraspinal Meningioma</strong></td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>- MRI without and with contrast of appropriate spinal region (Cervical, Thoracic and Lumbar)</td>
</tr>
<tr>
<td></td>
<td>- CT without and with contrast of the appropriate spinal region (Cervical, Thoracic and Lumbar)</td>
</tr>
<tr>
<td><strong>Treatment Response</strong></td>
<td>MRI without and with contrast of all positive disease sites every 2 cycles</td>
</tr>
<tr>
<td><strong>Surveillance for Grade I (low grade) and Grade II (atypical) meningioma (completely resected, partially resected and unresected)</strong></td>
<td><strong>Intracranial Meningioma:</strong> MRI Brain without and with contrast (CPT® 70553) at 3, 6, and 12 months, then annually for 5 years</td>
</tr>
<tr>
<td></td>
<td><strong>Intraspinal Meningioma:</strong> MRI without and with contrast CPT® 72156 (Cervical spine), CPT® 72157 (Thoracic spine), CPT® 72158 (lumbar spine) OR CT without and with contrast CPT® 72127 (Cervical spine), CPT® 72130 (Thoracic spine), CPT® 72133 (Lumbar spine) of the involved spinal level at 3, 6 and 12 months, and then annually for 5 years</td>
</tr>
<tr>
<td><strong>Surveillance for Grade III (malignant or anaplastic) meningioma</strong></td>
<td><strong>Intracranial Meningioma:</strong> MRI Brain without and with contrast (CPT® 70553) every 3 months for 3 years, and then every 6 months thereafter</td>
</tr>
<tr>
<td></td>
<td><strong>Intraspinal Meningioma:</strong> MRI or CT without and with contrast of the involved spinal region every 3 months for 3 years and then every 6 months thereafter</td>
</tr>
</tbody>
</table>
ONC-2.9: Spinal Cord Tumors (Benign and Malignant)

- See also: **ONC-2.2: Low Grade Gliomas** and **ONC-2.3: High Grade Gliomas** for imaging guidelines of low grade and high grade gliomas of the spinal cord
- See also: **PEDONC-4.9: Malignant Tumors of the Spinal Cord** for imaging guidelines for other malignant spinal cord tumors
- See also: **PEDPN-2.1: Neurofibromatosis 1** and **PEDPN-2.2: Neurofibromatosis 2** for spinal tumors in patients with Neurofibromatosis 1 or 2
- See also: **ONC-31.6: Spinal Cord Compression** for known secondary malignancy involving the spine/spinal canal/spinal cord
**ONC-2.10: Choroid Plexus Tumors**

Choroid Plexus Tumor imaging indications in adult patients are identical to those for pediatric patients. See **PEDONC-4.13: Choroid Plexus Tumors** for imaging guidelines.
References

1. National Comprehensive Cancer Network (NCCN) Guidelines Version 1.2019 – March 5, 2019 Central Nervous System Cancers, available at: https://www.nccn.org/professionals/physician_gls/pdf/cns.pdf. Referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Central Nervous System Tumors Cancer V1.2019. – March 5, 2019 ©2019 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.


<table>
<thead>
<tr>
<th>ONC-3.0: Squamous Cell Carcinomas of the Head and Neck – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-3.1: Squamous Cell Carcinomas of the Head and Neck – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-3.2: Squamous Cell Carcinomas of the Head and Neck – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-3.3: Squamous Cell Carcinomas of the Head and Neck – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-3.4: Squamous Cell Carcinomas of the Head and Neck – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-3.0: Squamous Cell Carcinomas of the Head and Neck –
General Considerations

➢ Patients with esthesioneuroblastoma should be imaged according to this guideline section

➢ For evaluation of squamous cell carcinoma from an unknown primary to the cervical lymph nodes, CT Neck (CPT® 70491) and CT Chest (CPT® 71260) are indicated. CT scans of the abdomen and pelvis are not routinely indicated, unless there are signs/symptoms related to these areas.

➢ Imaging of the CNS (head, spine) is indicated only to evaluate specific signs or symptoms or if concern for base of skull invasion suggesting spread to those areas

➢ Stage III/IV disease encompasses any primary tumor larger than 4 cm or documented lymph node positive disease
ONC-3.1: Squamous Cell Carcinomas of the Head and Neck – Suspected/Diagnosis

- See also: **NECK-5.1 – Neck Masses - Imaging** for imaging guidelines for evaluation of suspected malignancy in the neck

- PET may be considered prior to biopsy in order to determine a more favorable site for biopsy when a prior biopsy was nondiagnostic or a relatively inaccessible site is contemplated which would require invasive surgical intervention for biopsy attempt
## ONC-3.2: Squamous Cell Carcinomas of the Head and Neck – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| All Stages of Disease                                                     | - CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck (OFN) without and with contrast (CPT® 70543)  
- CT Chest with contrast (CPT® 71260)  
- Lymph system imaging (lymphoscintigraphy, CPT® 78195) is indicated for sentinel lymph node evaluation when nodes are not clinically positive |
| Nasal cavity and paranasal sinuses (bony erosion or skull base and intracranial involvement) | One of the following studies is indicated:  
- CT Maxillofacial with contrast (CPT® 70487)  
- CT Neck with contrast (CPT® 70491)  
- MRI Orbits/Face/Neck without and with contrast (CPT® 70543) |
| Nasopharyngeal (NPC) Cancer                                              | - MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is the preferred study  
- CT Neck (CPT® 70491) and/or CT Maxillofacial (CPT® 70487) with contrast can be approved if contraindication to MRI  
- Chest x-ray or CT Chest with contrast (CPT® 71260) |
| For any of the following:                                                 | - PET/CT (CPT® 78815)  
- Known stage III or IV disease  
- Prior to start of primary chemoradiotherapy and have not undergone definitive surgical resection  
- Nasopharyngeal primary site  
- Inconclusive findings on conventional imaging (CT, MRI)  
- In order to direct laryngoscopy/exam under anesthesia for biopsy  
- Pulmonary nodule(s) ≥ 8 mm in size  
- Cervical lymph node biopsy positive for squamous cell carcinoma and no primary site identified on CT or MRI of neck and chest  
- Inconclusive findings suggestive of disease outside the head and neck area |
| Signs or symptoms of abdominal metastatic disease, including elevated liver function tests | - CT Abdomen with contrast (CPT® 74160) |
| Any head and neck cancer with neurological findings or suspicion of skull base invasion | - MRI Brain without and with contrast (CPT® 70553) |
### ONC-3.3: Squamous Cell Carcinomas of the Head and Neck – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Following complete resection and/or radical neck dissection</td>
<td>See (ONC-3.4: Surveillance/Follow-up)</td>
</tr>
</tbody>
</table>
| Following primary chemoradiotherapy or radiation therapy in individuals who have not undergone surgical resection of primary tumor or neck dissection | Any one of the following:  
  - CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  - PET/CT scan (CPT® 78815), no sooner than 12 weeks (3 months) post completion of radiation therapy.  
  - If post-treatment PET/CT scan is negative, further surveillance imaging is not routinely indicated. |
| Induction chemotherapy response                                           | CT neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  - PET not indicated to assess response to induction chemotherapy |
| Suspected local recurrence                                                | CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  - CT Chest with contrast (CPT® 71260) |
| Biopsy proven local recurrence                                           | Either one of the following:  
  - PET/CT (CPT® 78815)  
  **OR**  
  - CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  **AND**  
  - CT Chest with contrast (CPT® 71260) |
| Inconclusive conventional imaging (CT or MRI)                             | PET/CT (CPT® 78815)                                                          |
| If new symptoms or chest previously involved                              | CT Chest with contrast (CPT® 71260)                                           |
## ONC-3.4: Squamous Cell Carcinomas of the Head and Neck – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indications</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Individuals treated with surgical resection of primary site and/or neck dissection | Once within 6 months of completing all treatment:  
  - CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  - CT with contrast of any other involved body area |
| Individuals treated with radiation therapy or combined chemoradiation |  
  - PET/CT scan (CPT® 78815), no sooner than 12 weeks (3 months) post completion of radiation therapy (see ONC-3.3: Restaging/Recurrence).  
  - If post-treatment PET/CT scan is negative, further surveillance imaging is not routinely indicated. |
| After initial post-treatment study, for any of the following:  
  - Nasopharyngeal primary site  
  - Physical exam unable to visualize deep-seated primary site | Annually for 3 years:  
  - CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  - CT Chest is not indicated for surveillance. Individuals with smoking history may undergo annual low dose CT cancer screening if criteria are met (See CH-33: Lung Cancer Screening in the Chest Imaging Guidelines) |
References
<table>
<thead>
<tr>
<th>ONC-4: Salivary Gland Cancers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONC-4.0:</strong> Salivary Gland Cancers – General Considerations</td>
</tr>
<tr>
<td><strong>ONC-4.1:</strong> Salivary Gland Cancers – Suspected/Diagnosis</td>
</tr>
<tr>
<td><strong>ONC-4.2:</strong> Salivary Gland Cancers – Initial Work-up/Staging</td>
</tr>
<tr>
<td><strong>ONC-4.3:</strong> Salivary Gland Cancers – Restaging/Recurrence</td>
</tr>
<tr>
<td><strong>ONC-4.4:</strong> Salivary Gland Cancers – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-4.0: Salivary Gland Cancers – General Considerations

- Salivary gland tumors may originate within the parotid, submandibular, sublingual or minor salivary glands in the mouth.
- Histological subtypes include mucoepidermoid, acinic, adenocarcinoma, adenoid cystic carcinoma, malignant myoepithelial tumors and squamous cell carcinoma. Lymphoma and metastatic squamous carcinoma can also occur in the parotid gland.
- Over 80% of parotid gland tumors are benign. A bilateral parotid tumor is most likely Warthin’s tumor.
- The role of PET in salivary gland tumors has yet to be established.
ONC-4.1: Salivary Gland Cancers – Suspected/Diagnosis
See NECK-11 and NECK-5.1 for evaluation of salivary gland masses, salivary gland stones and neck masses.
# ONC-4.2: Salivary Gland Cancers – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopsy-proven malignancy (only if none of these imaging studies has already been done)</td>
<td>One of the following can be approved:</td>
</tr>
<tr>
<td></td>
<td>- MRI Orbits/Face/Neck without and with contrast (CPT® 70543)</td>
</tr>
<tr>
<td></td>
<td>- CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td></td>
<td>- CT Neck without contrast (CPT® 70490)</td>
</tr>
<tr>
<td>Skull base invasion</td>
<td>- MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td>Abnormalities on chest x-ray or if lymphadenopathy in neck</td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Pulmonary nodule(s) ≥ 8mm in size</td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
## ONC-4.3: Salivary Gland Cancers – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Patients with unresected disease receiving systemic therapy (chemotherapy)| One of the following may be approved every 2 cycles:  
  - CT Neck with contrast (CPT® 70491) and any other sites of disease  
  - MRI Orbits/Face/Neck without and with contrast (CPT® 70543) and any other sites of disease                                                                 |
| Recurrence or progression suspected based on new or worsening signs or symptoms | One of the following may be approved:  
  - CT Neck with contrast (CPT® 70491)  
  - MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  In addition, for all patients:  
  - CT Chest with contrast (CPT® 71260)                                                                                                      |
| All other patients                                                       | No routine advanced imaging indicated                                                                                                                                  |
### ONC-4.4: Salivary Gland Cancers – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total surgical resection</td>
<td>No routine advanced imaging indicated</td>
</tr>
<tr>
<td>Unresectable or partially resected disease, including those treated with XRT</td>
<td>Either CT Neck (CPT® 70491) or MRI Orbits/Face/Neck (CPT® 70543) once within 6 months of completion of treatment</td>
</tr>
</tbody>
</table>
References
<table>
<thead>
<tr>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-5.0: Melanoma – General Considerations</td>
</tr>
<tr>
<td>ONC-5.1: Melanoma – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-5.2: Melanoma – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-5.3: Melanoma – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-5.4: Melanoma – Surveillance/Follow-up</td>
</tr>
<tr>
<td>ONC-5.5: Non-Melanoma Skin Cancers – General Considerations</td>
</tr>
<tr>
<td>ONC-5.6: Non-Melanoma Skin Cancers – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-5.7: Non-Melanoma Skin Cancers – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-5.8: Non-Melanoma Skin Cancers – Surveillance/Follow-up</td>
</tr>
<tr>
<td>ONC-5.9: Ocular Melanoma</td>
</tr>
</tbody>
</table>
Oncology Imaging

ONC-5.0: Melanoma – General Considerations

- Melanomas can metastasize in an unpredictable fashion.
- Primary mucosal melanomas (i.e., gastrointestinal or sinus mucosa) are considered (and should be managed as) Stage III (i.e., node positive) at initial diagnosis.
**ONC-5.1: Melanoma – Suspected/Diagnosis**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>* Imaging is not indicated until histologic diagnosis is confirmed *</td>
</tr>
</tbody>
</table>
**ONC-5.2: Melanoma – Initial Work-up/Staging**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0 or Ia (in situ or disease &lt; 1 mm)</td>
<td>◇ Routine advanced imaging is not indicated</td>
</tr>
<tr>
<td>◇ Stage Ib (≤ 1 mm with ulceration or high mitotic rate)</td>
<td>◇ CT with contrast or MRI without and with contrast of specific areas, only if signs or symptoms indicate need for further evaluation</td>
</tr>
<tr>
<td>◇ Stage II (lesions &gt; 1 mm thick, but node negative)</td>
<td>◇ Lymph system imaging (lymphoscintigraphy, CPT® 78195) is indicated for sentinel lymph node (SLN) evaluation</td>
</tr>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>◇ Stage III (sentinel node positive, palpable regional nodes)</td>
<td>◇ PET/CT (CPT® 78815 or CPT® 78816) OR</td>
</tr>
<tr>
<td>◇ Stage IV (metastatic)</td>
<td>◇ CT Chest with contrast (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>◇ Mucosal melanoma</td>
<td>◇ MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td>◇ Head or neck primary site</td>
<td></td>
</tr>
<tr>
<td>◇ Palpable lymphadenopathy in the neck</td>
<td>◇ CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>◇ Primary site of melanoma is unknown and CT Chest and Abdomen/Pelvis are negative</td>
<td>◇ PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
</tbody>
</table>
# ONC-5.3: Melanoma – Restaging/Recurrence

All recurrences should be confirmed histologically, except when excessive morbidity from a biopsy may occur, such as a biopsy requiring craniotomy.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients receiving chemotherapy, with measurable disease</td>
<td>✴ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast every 2 cycles (commonly every 6 to 8 weeks)</td>
</tr>
<tr>
<td>All in situ recurrences</td>
<td>✴ Restaging imaging is not needed after adequate aggressive local therapy (see Surveillance below)</td>
</tr>
<tr>
<td>Documented or clinically suspected (see top of page regarding biopsy morbidity) recurrence at:</td>
<td>✴ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast ✴ MRI Brain without and with contrast (CPT® 70553) ✴ PET/CT (CPT® 78815 or CPT® 78816) if inconclusive conventional imaging or isolated metastatic based on results of conventional imaging, initially</td>
</tr>
<tr>
<td>Brain imaging is indicated for:</td>
<td>✴ MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td>✴ New discovery of metastatic disease or progression of metastatic disease ✴ Signs or symptoms of CNS disease ✴ If considering Interleukin (IL-2) therapy</td>
<td></td>
</tr>
</tbody>
</table>
### ONC-5.4: Melanoma – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0, IA, IB and IIA Melanomas</td>
<td>No routine advanced imaging indicated</td>
</tr>
<tr>
<td>Stage IIB, IIC, IIIA and IIB Melanomas</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast every 6 months for 2 years, then annually for 3 years</td>
</tr>
<tr>
<td>Stage IIIC and IV Melanomas</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast every 3 months for 2 years, then every 6 months for 3 years MRi Brain without and with contrast (CPT® 70553) annually for 3 years</td>
</tr>
</tbody>
</table>
| Mucosal Melanoma                    | Once within 6 months of completing all treatment:  
  - CT Neck with contrast (CPT® 70491) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543)  
  - CT with contrast of any other involved body area |
| Liver metastases treated with focal therapy | See also: [ONC-31.2: Liver Metastases](#) |

Liver metastases treated with focal therapy

See also: [ONC-31.2: Liver Metastases](#)
ONC-5.5: Non-Melanoma Skin Cancers – General Considerations

- Advanced Imaging is generally not indicated for basal cell and squamous cell skin cancers
- PET/CT scan is not indicated for evaluation of non-melanoma skin cancers unless specified within the guidelines below (e.g. Merkel cell carcinoma)
- Merkel cell carcinoma is an unusual skin cancer with neuroendocrine-like histologic features, which has a high propensity (25% to 33%) for regional lymph node spread and occasionally, metastatic spread to lungs.
- Merkel cell carcinoma may present as a primary cancer or as a skin metastasis from a noncutaneous primary neuroendocrine carcinoma (i.e., small cell lung cancer), therefore conventional imaging is indicated initially to confirm the absence of metastasis prior to considering PET scan.
### ONC-5.6: Non-Melanoma Skin Cancers – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body area with unexplained signs or symptoms</td>
<td>CT with contrast of that body area</td>
</tr>
<tr>
<td>Perineural invasion or local regional extension (i.e. bone; deep soft tissue) involvement</td>
<td>One of the following may be approved of the primary site: holdout with contrast or without and with contrast</td>
</tr>
<tr>
<td>Healed skin lesion may be a dermal metastasis from distant primary</td>
<td>CT Chest (CPT® 71260) and Abdomen/Pelvis (CPT® 74177) with contrast PET/CT (CPT® 78815 or 78816) is indicated if conventional imaging (CT or MRI) is unable to identify a primary site</td>
</tr>
<tr>
<td>Squamous cell carcinoma head or neck skin with regional lymphadenopathy</td>
<td>CT Neck (CPT® 70491) and CT Chest (CPT® 71260) with contrast</td>
</tr>
<tr>
<td>Merkel Cell carcinoma</td>
<td>CT Chest with contrast (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177) CT with contrast of other involved body area(s) PET/CT (CPT® 78815 or 78816) if inconclusive conventional imaging Lymph system imaging (lymphoscintigraphy, CPT® 78195) or sentinel lymph node evaluation MRI Brain with and without contrast (CPT® 70553)</td>
</tr>
</tbody>
</table>
### ONC-5.7: Non-Melanoma Skin Cancers – Restaging/Recurrence

All recurrences should be confirmed histologically, except when excessive morbidity from a biopsy may occur, such as a biopsy requiring craniotomy.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrence where planned therapy is more extensive than simple wide local excision</td>
<td>✤ CT with contrast of the primary and recurrent site(s)</td>
</tr>
<tr>
<td>Recurrence of Merkel cell carcinoma</td>
<td>✤ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>✤ MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>✤ PET/CT (CPT® 78815 or 78816) if no metastatic disease on any of the previous imaging studies</td>
</tr>
</tbody>
</table>
### ONC-5.8: Non-Melanoma Skin Cancers – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Merkel cell cancer – only if node positive</td>
<td>❯ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast every 6 months for 5 years</td>
</tr>
<tr>
<td></td>
<td>❯ Add CT Neck with contrast (CPT® 70491) if known prior neck disease or scalp/facial/neck disease</td>
</tr>
<tr>
<td>All others</td>
<td>❯ Routine advanced imaging for surveillance is not indicated</td>
</tr>
<tr>
<td></td>
<td>❯ Imaging indicated only for signs and symptoms of recurrent disease</td>
</tr>
</tbody>
</table>
ONC-5.9: Ocular Melanoma

General Considerations

- Approximately 95% of ocular melanomas arise from the uvea (iris, ciliary body and choroid) and 5% arise from the conjunctiva or orbit.
- Treatment is directed to the affected eye with systemic therapy reserved only for known metastatic disease.
- The most common site of metastatic disease is the liver.
- Surveillance of the affected eye is with clinical examination only; advanced imaging is supported for surveillance of systemic metastatic disease based on individual risk factors. See Risk categories below for surveillance recommendations.

<table>
<thead>
<tr>
<th>Ocular Melanoma Risk Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Low Risk</strong></td>
</tr>
<tr>
<td>T1</td>
</tr>
<tr>
<td>Class IA</td>
</tr>
<tr>
<td>Spindle cell histology</td>
</tr>
<tr>
<td>No extraocular extension</td>
</tr>
<tr>
<td>No ciliary body involvement</td>
</tr>
<tr>
<td>Chromosome mutations: Disomy 3 EIF1AX mutation Gain of chromosome 6p</td>
</tr>
<tr>
<td>Indication</td>
</tr>
<tr>
<td>----------------------------------------</td>
</tr>
<tr>
<td>Initial staging</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Neurological signs/symptoms</td>
</tr>
<tr>
<td>Restaging/Suspected Recurrence</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Surveillance for Low Risk disease</td>
</tr>
<tr>
<td>Surveillance for Medium Risk disease</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Surveillance for High Risk disease</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
References


### ONC-6: Thyroid Cancer

<table>
<thead>
<tr>
<th>ONC-6.0: Thyroid Cancer – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-6.1: Thyroid Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-6.2: Thyroid Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-6.3: Thyroid Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-6.4: Thyroid Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>

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ONC-6.0: Thyroid Cancer – General Considerations

- PET for initial staging for anaplastic thyroid cancer is currently not recommended before conventional imaging since recommendations for PET are derived from observational studies and clinical trials with other methodological limitations.

- Patients with measurable metastatic disease that are RAI refractory may be followed with conventional imaging, PET-CT scan is reserved for inconclusive findings.

- Whole body thyroid nuclear scan is coded with CPT® 78018. If CPT® 78018 is obtained and found to be positive, CPT® 78020 may be approved as an add-on test to evaluate the degree of iodine uptake.

- Single photon emission computed tomography (SPECT) imaging – Radiopharmaceutical Localization of Tumor SPECT (CPT® 78803, or 78831) or SPECT/CT Hybrid study (CPT® 78830, or 78832) may complement planar and pinhole imaging and can be approved as an add-on wherever radioiodine scans are indicated.
ONC-6.1: Thyroid Cancer – Suspected/Diagnosis

See NECK-8.1: Thyroid Nodule for imaging guidelines for suspected thyroid malignancies
### ONC-6.2: Thyroid Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Follicular, Papillary and Hürthle Cell Carcinomas</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the following:</td>
<td>One of the following:</td>
</tr>
<tr>
<td>✦ Fixation suggested by clinical exam and/or ultrasound</td>
<td>✦ MRI Neck without contrast (CPT® 70540)</td>
</tr>
<tr>
<td>✦ Substernal or bulky disease</td>
<td>✦ MRI Neck without and with contrast (CPT® 70543)</td>
</tr>
<tr>
<td>✦ Disease precluding full ultrasound examination</td>
<td>✦ CT Neck without contrast (CPT® 70490)</td>
</tr>
<tr>
<td></td>
<td>✦ CT Neck with contrast (CPT® 70491) can be approved if contrast study is necessary for complete pre-operative assessment and use of IV contrast will not delay post-operative use of RAI therapy.</td>
</tr>
</tbody>
</table>

**Post-thyroidectomy to assess thyroid remnant and to look for iodine-avid metastases for one of the following:**

<table>
<thead>
<tr>
<th>Post-thyroidectomy to assess thyroid remnant and to look for iodine-avid metastases for one of the following:</th>
<th>Whole body thyroid nuclear scan (CPT® 78018)</th>
</tr>
</thead>
<tbody>
<tr>
<td>✦ Extent of thyroid remnant cannot be accurately ascertained from the surgical report or neck ultrasound</td>
<td>The following may be approved as an add-on test:</td>
</tr>
<tr>
<td>✦ When the results may alter the decision to treat</td>
<td>❖ CPT® 78020 to evaluate the degree of iodine uptake</td>
</tr>
<tr>
<td>✦ Prior to administration of RAI therapy</td>
<td>❖ SPECT (CPT® 78803, or 78831), or SPECT/CT Hybrid study (CPT® 78830, or 78832)</td>
</tr>
</tbody>
</table>

**Skeletal pain**

<table>
<thead>
<tr>
<th>Skeletal pain</th>
<th>Bone scan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>See also: ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</td>
</tr>
<tr>
<td></td>
<td>Whole body nuclear thyroid scan (CPT® 78018)</td>
</tr>
<tr>
<td></td>
<td>The following may be approved as an add-on test:</td>
</tr>
<tr>
<td></td>
<td>❖ CPT® 78020 to evaluate the degree of iodine uptake</td>
</tr>
<tr>
<td></td>
<td>❖ SPECT (CPT® 78803, or 78831), or SPECT/CT Hybrid study (CPT® 78830, or 78832)</td>
</tr>
</tbody>
</table>

**Suspicious findings on CXR, US, or substernal extension of mass**

| Suspicious findings on CXR, US, or substernal extension of mass | CT Chest without contrast (CPT® 71250) |

**All other patients**

<table>
<thead>
<tr>
<th>All other patients</th>
<th>Routine preoperative advanced imaging is not indicated</th>
</tr>
</thead>
</table>
### Medullary Thyroid Carcinomas

| All patients with positive lymph nodes or calcitonin level > 500 pg/mL | Any or all of the following:  
- CT Neck with contrast (CPT® 70491)  
- CT Chest with contrast (CPT® 71260)  
- CT Abdomen either with (CPT® 74160) or CT Abdomen without and with contrast (CPT® 74170)  
- Bone scan see also: [ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology](#) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Skeletal pain</td>
<td>Bone scan see also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a></td>
</tr>
<tr>
<td>Inconclusive finding on conventional imaging</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>

### Anaplastic Thyroid Carcinomas

| All | Any or all of the following:  
- CT Neck with contrast (CPT® 70491)  
- CT Chest with contrast (CPT® 71260)  
- CT Abdomen/Pelvis with contrast (CPT® 74177)  
- MRI Brain without and with contrast (CPT® 70553)  
- Bone scan see also: [ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology](#) |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Skeletal pain</td>
<td>Bone scan see also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a></td>
</tr>
<tr>
<td>Inconclusive finding on conventional imaging</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
</tbody>
</table>
### ONC-6.3: Thyroid Cancer – Restaging/Recurrence

#### Follicular, Papillary and Hürthle Cell Carcinomas

<table>
<thead>
<tr>
<th>Imaging Study</th>
<th>Within 2 weeks (ideally 7 to 10 days) following the administration of Radioactive Iodine therapy dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole body thyroid nuclear scan (CPT® 78018)</td>
<td>The following may be approved as an add-on test:</td>
</tr>
<tr>
<td>CPT® 78020 to evaluate the degree of iodine uptake</td>
<td>SPECT (CPT® 78803, or 78831), or SPECT/CT Hybrid study (CPT® 78830, or 78832)</td>
</tr>
</tbody>
</table>

Any of the following:
- Recurrence documented by biopsy
- Increasing thyroglobulin level without Thyrogen® stimulation
- Thyroglobulin level > 2 ng/mL or higher than previous after Thyrogen® stimulation
- Anti-thyroglobulin antibody present
- Evidence of residual thyroid tissue on ultrasound or physical exam after thyroidectomy or ablation

Any or all of the following:
- Whole body thyroid nuclear scan (CPT® 78018)
- The following may be approved as an add-on test:
  - CPT® 78020 to evaluate the degree of iodine uptake
  - SPECT (CPT® 78803, or 78831), or SPECT/CT Hybrid study (CPT® 78830, or 78832)

- CT with contrast or MRI without and with contrast of any symptomatic body area

Any of the following:
- Negative radiiodine scan and rising thyroglobulin level
- Inconclusive findings on conventional imaging (including I-131 study)

PET/CT (CPT® 78815)

#### Medullary Thyroid Carcinoma

<table>
<thead>
<tr>
<th>Imaging Study</th>
<th>Medullary carcinoma with elevated calcitonin or CEA, or signs or symptoms of recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT Neck with contrast (CPT® 70491)</td>
<td>The following may be approved as an add-on test:</td>
</tr>
<tr>
<td>CT Chest with contrast (CPT® 71260)</td>
<td>Bone scan</td>
</tr>
<tr>
<td>CT Abdomen either with (CPT® 74160) or without and with contrast (CPT® 74170)</td>
<td>See also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a></td>
</tr>
<tr>
<td>Bone scan</td>
<td>Inconclusive conventional imaging with calcitonin ≥ 150 pg per mL</td>
</tr>
<tr>
<td>68Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
<td></td>
</tr>
</tbody>
</table>

Inconclusive conventional imaging with calcitonin ≥ 150 pg per mL
<table>
<thead>
<tr>
<th>Anaplastic Thyroid Carcinoma</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaplastic carcinoma with signs or symptoms of recurrence</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>▶ CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td></td>
<td>▶ CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>▶ Either CT Abdomen/Pelvis with contrast (CPT® 74177) OR MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Inconclusive conventional imaging</td>
<td>▶ PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-6.4: Thyroid Cancer – Surveillance/Follow-up

#### Follicular, Papillary and Hürthle Cell Carcinomas

<table>
<thead>
<tr>
<th>Imaging/Diagnostic Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
</tr>
<tr>
<td>- Neck ultrasound (CPT® 76536), chest x-ray, and laboratory studies every 6 months for the first year, then annually</td>
</tr>
<tr>
<td>For patients with any of the following:</td>
</tr>
<tr>
<td>- Node positive disease</td>
</tr>
<tr>
<td>- RAI-avid metastases</td>
</tr>
<tr>
<td>- Whole body thyroid nuclear scan annually (CPT® 78018)</td>
</tr>
<tr>
<td>- The following may be approved as an add-on test:</td>
</tr>
<tr>
<td>- CPT® 78020 to evaluate the degree of iodine uptake</td>
</tr>
<tr>
<td>- SPECT (CPT® 78803, or 78831), or SPECT/CT Hybrid study (CPT® 78830, or 78832)</td>
</tr>
</tbody>
</table>

#### Medullary Carcinomas

<table>
<thead>
<tr>
<th>Imaging/Diagnostic Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
</tr>
<tr>
<td>- CEA and calcitonin are required for monitoring medullary carcinomas</td>
</tr>
<tr>
<td>- Routine surveillance imaging is not indicated</td>
</tr>
</tbody>
</table>

#### Anaplastic Thyroid Carcinomas

<table>
<thead>
<tr>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
</tr>
<tr>
<td>- Every 3 months for 2 years:</td>
</tr>
<tr>
<td>- CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
</tbody>
</table>
References


8. Avram AM, Fig LM, Frey KA, Gross MD, Wong KK. Preablation $^{131}$I scans with SPECT/CT in postoperative thyroid cancer patients: what is the impact on staging? J Clin Endocrinol Metab. February 21, 2013 [Epub ahead of print].
### ONC-7: Small Cell Lung Cancer

<table>
<thead>
<tr>
<th>Section</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-7.0</td>
<td>Small Cell Lung Cancer – General Considerations</td>
</tr>
<tr>
<td>ONC-7.1</td>
<td>Small Cell Lung Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-7.2</td>
<td>Small Cell Lung Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-7.3</td>
<td>Small Cell Lung Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-7.4</td>
<td>Small Cell Lung Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-7.0: Small Cell Lung Cancer – General Considerations

- Combined histologies of Small and Non-Small cell are considered Small cell lung cancer. Use this guideline for imaging recommendations for small and large cell high-grade (poorly differentiated) neuroendocrine tumors of the lung.

- Imaging is presently guided by traditional staging of limited or extensive disease.
  - Extensive stage is either metastatic disease or an extent which cannot be encompassed by a single radiotherapy portal.
  - Limited staging is confined to one side of the chest.

- Patients treated curatively for SCLC are at increased risk for developing a second lung cancer. If new lung nodule is seen on imaging without any evidence of other systemic disease, follow ONC-31.1: Lung Metastases for work-up of nodule.

- For carcinoid (low grade neuroendocrine tumors) of the lung, see: ONC-15: Neuroendocrine Cancers and Adrenal Tumors
## ONC-7.1: Small Cell Lung Cancer – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal chest x-ray or clinical suspicion remains high despite a normal chest x-ray in symptomatic patient</td>
<td>CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Pulmonary nodule &lt; 8 mm in size noted on CT Chest</td>
<td>See: CH-16.2: Incidental Pulmonary Nodules Detected on CT Images</td>
</tr>
<tr>
<td>Pulmonary nodule 8 mm (0.8 cm) to 30 mm (3 cm) seen on CT Chest or MRI Chest</td>
<td>See CH-16.4: PET If PET is Positive: Qualifies as initial staging PET/CT</td>
</tr>
<tr>
<td>Mediastinal/Hilar Mass</td>
<td>See also: CH-2: Lymphadenopathy</td>
</tr>
<tr>
<td>Paraneoplastic syndrome suspected</td>
<td>See also: ONC-30.3: Paraneoplastic Syndromes</td>
</tr>
</tbody>
</table>
## ONC-7.2: Small Cell Lung Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial staging</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>- Bone scan, if PET/CT not being done (See also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a>)</td>
</tr>
<tr>
<td>Confirm limited stage (non-metastatic) disease if initial staging imaging (CT and MRI) shows disease limited to the thorax</td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
## ONC-7.3: Small Cell Lung Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment Response:</strong> &lt;br&gt;● After every 2 cycles of chemotherapy &lt;br&gt;● Following completion of chemoradiation</td>
<td>Any or all of the following: &lt;br&gt;● CT Chest with contrast (CPT® 71260) &lt;br&gt;● CT Abdomen/Pelvis with contrast (CPT® 74177) &lt;br&gt;● MRI Brain without and with contrast (CPT® 70553) for measurable brain metastases being treated with systemic therapy &lt;br&gt;● Bone scan (See also: <strong>ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</strong>) &lt;br&gt;● PET is not indicated for evaluation of treatment response in SCLC, but can be considered on a case-by-case basis. These cases should be forwarded for medical director review.</td>
</tr>
<tr>
<td><strong>Restaging (suspected recurrence)</strong></td>
<td>Any or all of the following: &lt;br&gt;● CT Chest with contrast (CPT® 71260) &lt;br&gt;● CT Abdomen/Pelvis with contrast (CPT® 74177) &lt;br&gt;● Brain MRI without and with contrast (CPT® 70553) &lt;br&gt;● Bone scan (See: <strong>ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</strong>) &lt;br&gt;● PET is not indicated for evaluation of recurrent SCLC, but can be considered on a case-by-case basis. These cases should be forwarded for Medical Director review.</td>
</tr>
<tr>
<td><strong>Complete or partial response to initial treatment, if prophylactic cranial irradiation (PCI) is planned.</strong></td>
<td>● MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
</tbody>
</table>
## ONC-7.4: Small Cell Lung Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Limited stage SCLC</strong></td>
<td>Every 3 months for one year, every 6 months for two years, and then annually:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- For new nodules, see: <a href="#">ONC-31.1: Lung Metastases</a></td>
</tr>
<tr>
<td><strong>Extensive stage SCLC</strong></td>
<td>Every 2 months for one year, every 4 months for two years, every 6 months for two years, and then annually:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- For new nodules, see: <a href="#">ONC-31.1: Lung Metastases</a></td>
</tr>
<tr>
<td><strong>Screening for brain metastases, regardless of PCI status</strong></td>
<td>MRI Brain without and with contrast (CPT® 70553) every 4 months for one year and then every 6 months for one year</td>
</tr>
</tbody>
</table>
References
**ONC-8: Non-Small Cell Lung Cancer**

<table>
<thead>
<tr>
<th>Section</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-8.0</td>
<td>Non-Small Cell Lung Cancer – General Considerations</td>
</tr>
<tr>
<td>ONC-8.1</td>
<td>Non-Small Cell Lung Cancer – Asymptomatic Screening</td>
</tr>
<tr>
<td>ONC-8.2</td>
<td>Non-Small Cell Lung Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-8.3</td>
<td>Non-Small Cell Lung Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-8.4</td>
<td>Non-Small Cell Lung Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-8.5</td>
<td>Non-Small Cell Lung Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-8.0: Non-Small Cell Lung Cancer – General Considerations

- Non-small cell lung cancer includes adenocarcinoma, squamous cell carcinoma, adenosquamous and large cell tumors.
- See ONC-15.6: Bronchopulmonary or Thymic Carcinoid – Initial Staging for evaluation of low-grade neuroendocrine tumors (carcinoid) of the lung.
- See ONC-7: Small Cell Lung Cancer for evaluation of high-grade small cell and large cell neuroendocrine tumors of the lung.
- PET/CT scan is generally not indicated for initial staging or restaging of NSCLC when multiple sites of extra-pulmonary metastases are found on conventional imaging (i.e., liver, bone and adrenal metastases, etc.).
- PET/CT may be considered to confirm solitary focus of extra-pulmonary metastatic disease (i.e., brain or adrenal) if the individual is being considered for an aggressive treatment for oligometastatic disease.
ONC-8.1: Non-Small Cell Lung Cancer – Asymptomatic Screening

See CH-33: Lung Cancer Screening for criteria for low-dose CT scan chest for lung cancer screening.
## ONC-8.2: Non-Small Cell Lung Cancer – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abnormal chest x-ray or clinical suspicion remains high despite a normal chest x-ray in symptomatic patient</td>
<td>CT Chest without contrast (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Pulmonary nodule &lt; 8 mm in size noted on CT Chest</td>
<td>See: <a href="#">CH-16.2: Incidental Pulmonary Nodules Detected on CT Images</a></td>
</tr>
<tr>
<td>Pulmonary nodule 8 mm (0.8 cm) to 30 mm (3 cm) seen on CT Chest or MRI Chest</td>
<td>PET/CT (CPT® 78815) See <a href="#">CH-16.4: PET</a></td>
</tr>
<tr>
<td>If PET is Positive: Qualifies as initial staging PET/CT</td>
<td></td>
</tr>
<tr>
<td>Pulmonary mass 31 mm (3.1 cm) or greater seen on CT or MRI</td>
<td>PET/CT (CPT® 78815) can be approved prior to biopsy if one or more of the following applies:</td>
</tr>
<tr>
<td>途</td>
<td>Definitive treatment with resection or radiation will be utilized instead of biopsy if PET confirms limited disease</td>
</tr>
<tr>
<td>途</td>
<td>Multiple possible biopsy options are present within the chest and PET findings will be used to determine the most favorable biopsy site</td>
</tr>
<tr>
<td></td>
<td>Biopsy is indicated prior to PET imaging for all other indications in pulmonary masses ≥ 31 mm (3.1 cm) in size</td>
</tr>
<tr>
<td>Mediastinal/Hilar Mass</td>
<td>See also: <a href="#">CH-2: Lymphadenopathy</a></td>
</tr>
<tr>
<td>Paraneoplastic syndrome suspected</td>
<td>See also: <a href="#">ONC-30.3: Paraneoplastic Syndromes</a></td>
</tr>
</tbody>
</table>
## ONC-8.3: Non-Small Cell Lung Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| All patients | Any or all of the following:  
- CT Chest (CPT® 71260) with contrast  
- CT Abdomen (CPT® 74160) with contrast  
  - CT Abdomen may be omitted if CT Chest report clearly documents upper abdomen through level of adrenals  
- Bone scan, if PET/CT not being done  
See also: **ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology** |
| Any of the following:  
- Stage I-IIIB  
- Stage IV confined to the chest region (including pleural/pericardial effusion)  
- Stage IV with oligometastatic disease on conventional imaging and patient is a candidate for aggressive surgical resection or other localized treatment of metastases with a curative intent  
- Conventional imaging is inconclusive | PET/CT (CPT® 78815) if not already completed prior to histological diagnosis |
| Any of the following:  
- All Stage II-IV disease  
- Stage I disease and considering surgical resection as primary therapy | MRI Brain without and with contrast (CPT® 70553) |
| Superior sulcus (Pancoast) tumor suspected | Any or all of the following:  
- MRI Chest without and with contrast (CPT® 71552)  
- MRI Cervical spine without and with contrast (CPT® 72156)  
- MRI Thoracic spine without and with contrast (CPT® 72157) |
## ONC-8.4: Non-Small Cell Lung Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I or II patients who undergo definitive local treatment with surgery, radiation, or radiosurgery</td>
<td>Restaging imaging is not indicated. See also: Surveillance <a href="#">ONC-8.5: Surveillance/Follow-up</a></td>
</tr>
</tbody>
</table>
| Measurable disease, undergoing active treatment | Any or all of the following every 2 cycles:  
- CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)  
- CT Abdomen with contrast (CPT® 74160)  
  - CT Abdomen/Pelvis with contrast (CPT® 74177) may be substituted for known pelvic disease or pelvic symptoms  
- MRI Brain without and with contrast (CPT® 70553) for measurable brain metastases being treated with systemic therapy |
| Any of the following:  
- Locally advanced (Stage III, non-metastatic, unresectable)  
- Inoperable tumor if chemotherapy or chemoradiation was the initial treatment modality  
- Inadequately resected disease  
- Suspected recurrence | Any or all of the following:  
- CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)  
- CT Abdomen with contrast (CPT® 74160)  
- CT Abdomen/Pelvis with contrast (CPT® 74177) may be substituted for known pelvic disease or pelvic symptoms |
| Determine resectability following neo-adjuvant therapy | MRI Chest without and with contrast (CPT® 71552) |
| Newly identified lung nodule(s) | See [ONC-31.1: Lung Metastases](#) for new nodule evaluation |
| Any of the following:  
- Suspected/biopsy proven recurrence localized to the chest cavity  
- Inconclusive findings conventional imaging  
- To differentiate tumor from radiation scar/fibrosis  
- Stage IV with oligometastatic disease on conventional imaging and patient is a candidate for aggressive surgical resection or other localized treatment of metastases with a curative intent | PET/CT (CPT® 78815) |
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td>MRI Brain without and with contrast</td>
</tr>
<tr>
<td>- Following a demonstrated adequate response to neoadjuvant therapy if</td>
<td>(CPT® 70553)</td>
</tr>
<tr>
<td>intracranial disease will preclude surgery</td>
<td></td>
</tr>
<tr>
<td>- Documented recurrence/progression</td>
<td></td>
</tr>
<tr>
<td>- New or worsening neurological signs or symptoms</td>
<td></td>
</tr>
</tbody>
</table>
## ONC-8.5: Non-Small Cell Lung Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I-II</td>
<td>✷ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) every 6 months for 2 years and then annually  &lt;br&gt; ***Patients treated with radiation therapy and residual abnormality on imaging may undergo CT Chest every 3 months for the first year after therapy, every 6 months in year 2, annually thereafter</td>
</tr>
<tr>
<td>Stage III-IV (metastatic sites treated with definitive intent)</td>
<td>✷ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) every 3 months for 2 years, every 6 months for 3 years and then annually</td>
</tr>
<tr>
<td>New lung nodule</td>
<td>See: <strong>ONC-31.1: Lung Metastases</strong></td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-9: Esophageal and GE Junction Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-9.0: Esophageal and GE Junction Cancer – General Considerations</td>
</tr>
<tr>
<td>ONC-9.1: Esophageal and GE Junction Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-9.2: Esophageal and GE Junction Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-9.3: Esophageal and GE Junction Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-9.4: Esophageal and GE Junction Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
**ONC-9.0: Esophageal and GE Junction Cancer – General Considerations**

- Clinicians must describe esophageal cancer by cell type and in which third of the esophagus it occurs.
- Cancers of the upper and middle third are usually squamous cell and are highly associated with tobacco and alcohol abuse.
- Cancers of the gastroesophageal (GE) junction are treated as lower third cancers. Lower third cancers are usually adenocarcinomas; 62% of these arise in the setting of Barrett’s esophagus, a condition associated with high body mass index (BMI).
ONC-9.1: Esophageal and GE Junction Cancer – Suspected/Diagnosis

See also: NECK-3.1: Dysphagia for imaging guidelines for evaluation of suspected esophageal malignancy
### ONC-9.2: Esophageal and GE Junction Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biopsy proven</td>
<td>• CT Chest (CPT® 71260) and CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td></td>
<td>• CT Abdomen/Pelvis with contrast (CPT® 74177) may be approved instead of CT Abdomen if there are pelvic signs or symptoms</td>
</tr>
<tr>
<td>Upper 1/3 or neck mass</td>
<td>• CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>If no evidence of metastatic disease by conventional imaging</td>
<td>• PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-9.3: Esophageal and GE Junction Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>After primary chemoradiation therapy prior to surgery</td>
<td>CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast</td>
</tr>
<tr>
<td>Post-surgical resection</td>
<td>See Surveillance ONC-9.4: Surveillance/Follow-up</td>
</tr>
<tr>
<td>◆ If conventional imaging is inconclusive or</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>◆ Salvage surgical candidate with recurrence and no metastatic disease documented by conventional imaging</td>
<td>▪ PET imaging can be done as early as 6 weeks after completion of XRT if recent CT findings are inconclusive and PET findings will alter immediate care decision making</td>
</tr>
<tr>
<td>For any of the following:</td>
<td>CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast</td>
</tr>
<tr>
<td>◆ Signs or symptoms of recurrence</td>
<td></td>
</tr>
<tr>
<td>◆ Biopsy proven on follow-up endoscopy</td>
<td></td>
</tr>
<tr>
<td>◆ Recurrence suggested by other imaging (i.e. CXR or barium swallow)</td>
<td></td>
</tr>
<tr>
<td>If previously involved or new signs or symptoms</td>
<td>CT Pelvis with contrast (CPT® 72193) and/or CT Neck with contrast (CPT® 70491)</td>
</tr>
</tbody>
</table>
## ONC-9.4: Esophageal and GE Junction Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 0-IA (Tis, T1a) disease</td>
<td>No routine advanced imaging indicated</td>
</tr>
<tr>
<td>Stage IB (T1b) disease</td>
<td>CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast annually for 3 years</td>
</tr>
<tr>
<td>Stage II-III disease</td>
<td>CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast every 6 months for 3 years</td>
</tr>
<tr>
<td>Stage IV disease</td>
<td>See: ONC-1.2: Phases of Oncology Imaging and General Phase-Related Considerations</td>
</tr>
</tbody>
</table>
References


## ONC-10: Other Thoracic Tumors

| ONC-10.1: Malignant Pleural Mesothelioma – Suspected/Diagnosis |
| ONC-10.2: Malignant Pleural Mesothelioma – Initial Work-up/Staging |
| ONC-10.3: Malignant Pleural Mesothelioma – Restaging |
| ONC-10.4: Malignant Pleural Mesothelioma – Surveillance |
| ONC-10.5: Thymoma and Thymic Carcinoma – Suspected/Diagnosis |
| ONC-10.6: Thymoma and Thymic Carcinoma – Initial Work-up/Staging |
| ONC-10.7: Thymoma and Thymic Carcinoma – Restaging |
| ONC-10.8: Thymoma and Thymic Carcinoma – Surveillance |
ONC-10.1: Malignant Pleural Mesothelioma – Suspected/Diagnosis

- See CH-9.1: Asbestos Exposure for imaging guidelines for evaluation of suspected mesothelioma
### ONC-10.2: Malignant Pleural Mesothelioma – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Cytologically or pathologically proven | - CT Chest (CPT® 71260) **and** CT Abdomen (CPT® 74160) with contrast  
- CT Abdomen/Pelvis with contrast (CPT® 74177) may be approved instead of CT Abdomen if there are pelvic signs or symptoms  
- PET/CT (CPT® 78815) if no evidence of metastatic disease or inconclusive conventional imaging |
| Preoperative planning             | - MRI Chest without and with contrast (CPT® 71552)                           |
## ONC-10.3: Malignant Pleural Mesothelioma – Restaging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs or symptoms of recurrence</td>
<td>✷ CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast</td>
</tr>
<tr>
<td></td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177) may be approved instead of CT Abdomen if there are pelvic signs or symptoms</td>
</tr>
<tr>
<td>Treatment with chemotherapy</td>
<td><strong>Every 2 cycles:</strong></td>
</tr>
<tr>
<td></td>
<td>✷ CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast</td>
</tr>
<tr>
<td></td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177) may be approved instead of CT Abdomen if there are pelvic signs or symptoms</td>
</tr>
<tr>
<td>Following induction chemotherapy prior to surgical resection</td>
<td>✷ CT Chest (CPT® 71260) and CT Abdomen (CPT® 74160) with contrast</td>
</tr>
<tr>
<td></td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177) may be approved instead of CT Abdomen if there are pelvic signs or symptoms</td>
</tr>
<tr>
<td></td>
<td>✷ PET/CT (CPT® 78815) if no evidence of metastatic disease</td>
</tr>
<tr>
<td>Inconclusive Chest CT</td>
<td>✷ MRI Chest without and with contrast (CPT® 71552)</td>
</tr>
</tbody>
</table>
### ONC-10.4: Malignant Pleural Mesothelioma – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>CT Chest with contrast (CPT® 71260) and previously involved regions every 3 months for 2 years, then annually thereafter</td>
</tr>
</tbody>
</table>
ONC-10.5: Thymoma and Thymic Carcinoma – Suspected/Diagnosis

- See CH-20.1: Mediastinal Mass for imaging guidelines for evaluation of suspected thymic malignancies
- See ONC-15.6: Bronchopulmonary or Thymic Carcinoid – Initial Staging for imaging guidelines for thymic carcinoid
### ONC-10.6: Thymoma and Thymic Carcinoma – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Encapsulated or invasive limited disease</td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Extensive mediastinal involvement on Chest CT</td>
<td>CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td></td>
<td>CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>Inconclusive finding on CT</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td></td>
<td>MRI Chest without and with contrast (CPT® 71552)</td>
</tr>
<tr>
<td>Preoperative planning</td>
<td>MRI Chest without and with contrast (CPT® 71552)</td>
</tr>
<tr>
<td>Thymic Carcinomas</td>
<td>Image according to <strong>ONC-8: Non-Small Cell Lung Cancer</strong></td>
</tr>
</tbody>
</table>

*Cardiology and Radiology Imaging Guidelines V4.0*
### ONC-10.7: Thymoma and Thymic Carcinoma – Restaging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adjuvant therapy following surgical resection</td>
<td>- Follow surveillance imaging</td>
</tr>
<tr>
<td>For suspected recurrence</td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Recurrence with extensive mediastinal involvement on chest CT</td>
<td>- CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td></td>
<td>- CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>Thymic carcinomas</td>
<td>See <a href="#">ONC-8: Non-Small Cell Lung Cancer</a></td>
</tr>
<tr>
<td>Inconclusive finding on CT</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td></td>
<td>- MRI Chest without and with contrast (CPT® 71552)</td>
</tr>
<tr>
<td>Metastatic disease on chemotherapy</td>
<td>- CT Neck (CPT® 70491), CT Chest (CPT® 71260), and CT Abdomen (CPT® 74160) with contrast, every 2 cycles of therapy</td>
</tr>
<tr>
<td></td>
<td>- Following induction chemotherapy prior to surgical resection, PET/CT (CPT® 78815) if no evidence of metastatic disease</td>
</tr>
</tbody>
</table>
**ONC-10.8: Thymoma and Thymic Carcinoma – Surveillance**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thymoma</td>
<td>CT Chest with contrast (CPT® 71260) and previously involved regions every 6 months for 2 years, then annually for next 10 years</td>
</tr>
<tr>
<td>Thymic carcinomas</td>
<td>CT Chest with contrast (CPT® 71260) every 6 months for 2 years and then annually for 5 years</td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-11: Breast Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONC-11.0</strong>: Breast Cancer – General Considerations</td>
</tr>
<tr>
<td><strong>ONC-11.1</strong>: Breast Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td><strong>ONC-11.2</strong>: Breast Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td><strong>ONC-11.3</strong>: Breast Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td><strong>ONC-11.4</strong>: Breast Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-11.0: Breast Cancer – General Considerations

- Advanced imaging to evaluate for distant metastases is not indicated for pre-invasive or in-situ breast cancer (histologies such as DCIS and LCIS). Bone scan has a high concordance rate with PET for detecting bone metastases.

- Scintimammography and Breast Specific Gamma Imaging (BSGI) are considered experimental and investigational.

- PET is not indicated for the following:
  - Non-invasive breast cancers
  - Prior to lymph node sampling in a patient with clinical stage I, II, or operable IIIA disease
  - Obvious multi-organ metastatic disease is present on CT or MRI
ONC-11.1: Breast Cancer – Suspected/Diagnosis
See BR-5: Breast MRI Indications for imaging guidelines for evaluation of suspected breast cancer
# ONC-11.2: Breast Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>◦ Biopsy proven invasive breast cancer or carcinoma in-situ</td>
<td>◦ Bilateral Breast MRI (CPT® 77049)</td>
</tr>
<tr>
<td>◦ Adenocarcinoma in axillary lymph node</td>
<td></td>
</tr>
<tr>
<td>Operable disease (stage I and II)</td>
<td>◦ No advanced imaging needed</td>
</tr>
<tr>
<td></td>
<td>◦ For planned sentinel lymph node (SLN) biopsy: Lymph system imaging (lymphoscintigraphy, CPT® 78195)</td>
</tr>
<tr>
<td>Clinical Stage III and Stage IV disease or for signs or symptoms of systemic disease (including elevated liver function tests or tumor markers)</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>◦ CT Chest with contrast (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>◦ Bone scan</td>
</tr>
<tr>
<td></td>
<td>See also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a></td>
</tr>
<tr>
<td>Inconclusive CT and bone scan</td>
<td>◦ PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>Bone pain</td>
<td>◦ Bone scan (see: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a>)</td>
</tr>
<tr>
<td></td>
<td>◦ See also: <a href="#">ONC-31.5: Bone (including Vertebral) Metastases</a></td>
</tr>
<tr>
<td></td>
<td>◦ See also: <a href="#">ONC-31.6: Spinal Cord Compression</a></td>
</tr>
</tbody>
</table>
# ONC-11.3: Breast Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td>Bilateral MRI Breast without and with contrast (CPT® 77049)</td>
</tr>
<tr>
<td>- Biopsy proven local recurrence</td>
<td></td>
</tr>
<tr>
<td>- Suspicion of recurrence with inconclusive mammogram and/or ultrasound</td>
<td></td>
</tr>
<tr>
<td>(BIRADS 0)</td>
<td></td>
</tr>
<tr>
<td>- Mammogram and ultrasound conflicts with physical exam</td>
<td></td>
</tr>
<tr>
<td>- End of planned neoadjuvant chemotherapy to determine resectability</td>
<td></td>
</tr>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>- Elevated LFTs</td>
<td></td>
</tr>
<tr>
<td>- Rising tumor markers</td>
<td></td>
</tr>
<tr>
<td>- Signs or symptoms of recurrence</td>
<td></td>
</tr>
<tr>
<td>- Biopsy proven recurrence</td>
<td></td>
</tr>
<tr>
<td>Any or all of the following:</td>
<td>Any or all of the following for patients being treated with chemotherapy, every 2 cycles:</td>
</tr>
<tr>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>- Bone scan (See also: ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)</td>
<td>- Bone scan (see also: ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)</td>
</tr>
<tr>
<td>Treatment response in patients with metastatic disease and measurable</td>
<td>Any or all of the following for patients being treated with endocrine/hormonal therapy, every 3 months:</td>
</tr>
<tr>
<td>disease on imaging</td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>Inconclusive CT, MRI, and/or bone scan for suspected recurrence, and</td>
<td>- Bone scan (See ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)</td>
</tr>
<tr>
<td>further characterization is needed to make treatment decisions</td>
<td></td>
</tr>
<tr>
<td>PET/CT (CPT® 78815)</td>
<td></td>
</tr>
<tr>
<td>Any of the following:</td>
<td>Neither PET nor CT are indicated for systemic restaging after neoadjuvant chemotherapy or after surgery</td>
</tr>
<tr>
<td>- Assessing for residual disease after surgery</td>
<td></td>
</tr>
<tr>
<td>- Assessing response to neoadjuvant chemotherapy</td>
<td></td>
</tr>
<tr>
<td>- After lumpectomy or mastectomy, prior to adjuvant therapy</td>
<td></td>
</tr>
<tr>
<td>Bone metastasis as the only site of stage IV disease (excluding brain</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>metastases) and a prior bone scan has not been performed for serial</td>
<td></td>
</tr>
<tr>
<td>comparison</td>
<td></td>
</tr>
</tbody>
</table>
## ONC-11.4: Breast Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measurable metastatic disease on maintenance therapy or being monitored off therapy</td>
<td>Any or all of the following, every 3 months:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>- Bone scan (see also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a>)</td>
</tr>
<tr>
<td>Asymptomatic non-metastatic disease</td>
<td>- No advanced imaging indicated</td>
</tr>
<tr>
<td>Breast imaging surveillance, including after bilateral mastectomy</td>
<td>- See <a href="#">BR-5: Breast MRI Indications</a> for imaging guidelines</td>
</tr>
</tbody>
</table>
References


## ONC-12: Sarcomas – Bone, Soft Tissue and GIST

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-12.1.</td>
<td>Bone and Soft Tissue Sarcomas – General Considerations</td>
</tr>
<tr>
<td>ONC-12.2.</td>
<td>Soft Tissue Sarcomas – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-12.3.</td>
<td>Soft Tissue Sarcomas – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-12.4.</td>
<td>Soft Tissue Sarcomas – Surveillance/Follow-up</td>
</tr>
<tr>
<td>ONC-12.5.</td>
<td>Gastrointestinal Stromal Tumor (GIST)</td>
</tr>
<tr>
<td>ONC-12.6.</td>
<td>Bone Sarcomas – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-12.7.</td>
<td>Bone Sarcomas – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-12.8.</td>
<td>Bone Sarcomas – Surveillance/Follow-up</td>
</tr>
<tr>
<td>ONC-12.9.</td>
<td>Benign Bone Tumors – General Considerations</td>
</tr>
<tr>
<td>ONC-12.10.</td>
<td>Benign Bone Tumors – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-12.11.</td>
<td>Benign Bone Tumors – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-12.12.</td>
<td>Benign Bone Tumors – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-12.1: Bone and Soft Tissue Sarcomas – General Considerations

Sarcomas are tumors of mesenchymal origin, classified as high-, intermediate-, and low-grade (G) tumors (sometimes described as "spindle cell" cancers). They can arise in any bony, cartilaginous, smooth muscle, skeletal muscle, or cardiac muscle tissue.

Sarcomas occur in both adult and pediatric patients, but some are more common in one age group than the other. Unless specified below, patients age ≥ 18 years old should be imaged according to this guideline section.

Exceptions include:

- Rhabdomyosarcoma patients of all ages should be imaged according to guidelines in PEDONC-8.2: Rhabdomyosarcoma
- Osteogenic sarcoma (Osteosarcoma) patients of all ages should be imaged according to guidelines in PEDONC-9.3: Osteogenic Sarcoma (OS)
- Ewing sarcoma and Primitive Neuroectodermal Tumor patients of all ages should be imaged according to guidelines in PEDONC-9.4: Ewing Sarcoma and Primitive Neuroectodermal Tumors (ESFT)
- Kaposi’s sarcoma patients of all ages should be imaged according to guidelines in ONC-31.10: Kaposi’s Sarcoma
### ONC-12.2: Soft Tissue Sarcomas – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Retroperitoneal or intraabdominal primary site</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>- Either CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>- MRI without and with contrast of involved area</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>- MRI without and with contrast of involved area</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>- Either CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Myxoid round cell liposarcoma</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>- MRI without and with contrast of involved area</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>- Either CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td></td>
<td>- MRI Cervical/Thoracic/Lumbar spine without and with contrast (CPT® 72156, CPT® 72157, and CPT® 72158)</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Indication</td>
<td>Imaging Study</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>- Grade of tumor in doubt following biopsy</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>- Conventional imaging suggests solitary metastasis amenable to surgical resection</td>
<td></td>
</tr>
<tr>
<td>Desmoid Tumors</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT without contrast or with contrast of the affected body part</td>
</tr>
<tr>
<td></td>
<td>- MRI without contrast or without and with contrast of the affected body part</td>
</tr>
<tr>
<td></td>
<td>- Imaging of lung, lymph node, and metastatic site for these tumors is not indicated</td>
</tr>
<tr>
<td>Dermatofibrosarcoma Protuberans (DFSP)</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT without contrast or with contrast of the affected body part</td>
</tr>
<tr>
<td></td>
<td>- MRI without contrast or without and with contrast of the affected body part</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for</td>
</tr>
<tr>
<td></td>
<td>- pulmonary symptoms</td>
</tr>
<tr>
<td></td>
<td>- abnormal chest x-ray</td>
</tr>
<tr>
<td></td>
<td>- sarcomatous differentiation</td>
</tr>
</tbody>
</table>
## ONC-12.3: Soft Tissue Sarcomas – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Any of the following:</strong></td>
<td></td>
</tr>
<tr>
<td>◆ After preoperative radiotherapy</td>
<td>MRI without and with contrast of affected body area</td>
</tr>
<tr>
<td>◆ After surgical resection</td>
<td>CT without contrast or with contrast can be added if demonstrated bone involvement</td>
</tr>
<tr>
<td>◆ After adjuvant radiotherapy</td>
<td>Chest or lymph node imaging is not indicated if no abnormality on previous imaging</td>
</tr>
<tr>
<td><strong>Any of the following:</strong></td>
<td></td>
</tr>
<tr>
<td>◆ Differentiate tumor from radiation or surgical fibrosis</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>◆ Determine response to neoadjuvant therapy</td>
<td></td>
</tr>
<tr>
<td>◆ Confirm oligometastatic disease prior to curative intent surgical resection</td>
<td></td>
</tr>
<tr>
<td><strong>Chemotherapy response for patients with measurable disease</strong></td>
<td>CT with contrast or MRI without and with contrast of affected body area every 2 cycles</td>
</tr>
<tr>
<td><strong>Local recurrence suspected</strong></td>
<td>Repeat all imaging for initial workup of specific histology and/or primary site</td>
</tr>
<tr>
<td><strong>Preoperative planning prior to resection</strong></td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td>◆ MRI without contrast or without and with contrast of involved area</td>
<td></td>
</tr>
<tr>
<td>◆ CT (contrast as requested) of involved area</td>
<td></td>
</tr>
<tr>
<td><strong>Dermatofibrosarcoma Protuberans (DFSP)</strong></td>
<td>One of the following:</td>
</tr>
<tr>
<td>◆ CT without contrast or with contrast of the affected body part</td>
<td></td>
</tr>
<tr>
<td>◆ MRI without contrast or without and with contrast of the affected body part</td>
<td></td>
</tr>
<tr>
<td>◆ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for:</td>
<td></td>
</tr>
<tr>
<td>◦ pulmonary symptoms</td>
<td></td>
</tr>
<tr>
<td>◦ abnormal chest x-ray</td>
<td></td>
</tr>
<tr>
<td>◦ sarcomatous differentiation</td>
<td></td>
</tr>
</tbody>
</table>
## ONC-12.4: Soft Tissue Sarcomas Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Retroperitoneal/intra-abdominal primary site                               | Any or all of the following every 3 months for 2 years, then every 6 months for 2 more years, then annually:  
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)  
  - CT Abdomen/Pelvis with contrast (CPT® 74177)  
  - CT with contrast or MRI without and with contrast of any other involved body areas |
| Extremity, trunk, or Head/Neck primary site, low grade Stage I disease     | Any or all of the following every 6 months for 2 years, then annually until year 10:  
  - Chest x-ray  
    - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated for new findings on CXR or new/worsening pulmonary signs/symptoms  
  - CT with contrast, MRI without contrast, or MRI without and with contrast of primary site if primary site not easily evaluated by physical exam |
| Extremity, trunk, or Head/Neck primary site, Stages II-IV disease.          | Any or all of the following every 3 months for 2 years, then every 6 months for 2 more years, then annually:  
  - CT with contrast, MRI without contrast, or MRI without and with contrast of primary site  
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)  
  - CT with contrast or MRI without and with contrast of any other involved body areas |
| Desmoid tumors                                                             | One of the following every 6 months for 3 years, then annually:  
  - CT without contrast or with contrast of the affected body part  
  - MRI without contrast or without and with contrast of the affected body part |
| Dermatofibrosarcoma Protuberans                                            | No routine imaging unless clinical signs/symptoms of recurrence |
### ONC-12.5: Gastrointestinal Stromal Tumor (GIST)

#### General Considerations
GISTs are mesenchymal neoplasms of the gastrointestinal (GI) tract, mostly found in the stomach and upper small bowel, commonly metastasizing to the liver and abdominal cavity and primarily treated with surgery.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Suspected/Diagnosis</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>Initial Work-up/Staging</td>
<td>✷ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>✷ MRI Abdomen without and with contrast (CPT® 74183) is indicated for evaluation of liver lesions that are equivocal on CT imaging or for preoperative assessment of liver</td>
</tr>
<tr>
<td></td>
<td>✷ PET is indicated for evaluation of inconclusive findings on conventional imaging</td>
</tr>
<tr>
<td>Restaging/Recurrence</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>✷ CT Chest with contrast (CPT® 71260) if prior evidence of chest disease or signs or symptoms of chest disease</td>
</tr>
<tr>
<td></td>
<td>✷ PET is indicated for evaluation of inconclusive findings on conventional imaging</td>
</tr>
<tr>
<td>Treatment Response</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>✷ CT Chest with contrast (CPT® 71260) if prior evidence of chest disease or signs or symptoms of chest disease</td>
</tr>
<tr>
<td></td>
<td>✷ PET is indicated for evaluation of inconclusive findings on conventional imaging</td>
</tr>
<tr>
<td>Surveillance/Follow-up</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177) every 6 months for 5 years, then annually</td>
</tr>
</tbody>
</table>
## ONC-12.6: Bone Sarcomas – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chondrosarcoma</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>ː MRI without contrast or without and with contrast of involved area</td>
</tr>
<tr>
<td></td>
<td>ː CT (contrast as requested) of involved area</td>
</tr>
<tr>
<td></td>
<td>ː CT Chest with (CPT® 71260) or without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>Chordoma</td>
<td>Any or all of the following:</td>
</tr>
<tr>
<td></td>
<td>ː MRI without contrast or without and with contrast of involved area</td>
</tr>
<tr>
<td></td>
<td>ː CT (contrast as requested) of involved area</td>
</tr>
<tr>
<td></td>
<td>ː CT Chest with (CPT® 71260) or without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>ː CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>ː MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast</td>
</tr>
<tr>
<td></td>
<td>ː Bone scan (see also: ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)</td>
</tr>
<tr>
<td></td>
<td>ː PET may be approved for inconclusive conventional imaging</td>
</tr>
</tbody>
</table>
### ONC-12.7: Bone Sarcomas – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Chondrosarcoma | Any or all of the following, after completion of radiotherapy or every 2 cycles of chemotherapy:  
- MRI without contrast or without and with contrast of involved area  
- CT (contrast as requested) of involved area  
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) |
| Chordoma | Any or all of the following, after completion of radiotherapy or every 2 cycles of chemotherapy:  
- MRI without contrast or without and with contrast of involved area  
- CT (contrast as requested) of involved area  
- Bone scan (see also: **ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology**)  
- PET may be approved for inconclusive conventional imaging |
## ONC-12.8: Bone Sarcomas – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>❖ Grade I Chondrosarcoma</td>
<td>Any or all of the following every 6 months for 2 years, then annually for 10 years:</td>
</tr>
<tr>
<td>❖ Intracompartmental Chondrosarcoma</td>
<td>Plain x-ray of primary site</td>
</tr>
<tr>
<td></td>
<td>▪ MRI without and with contrast is indicated for new findings on plain x-ray or new/worsening clinical symptoms.</td>
</tr>
<tr>
<td></td>
<td>Chest x-ray</td>
</tr>
<tr>
<td></td>
<td>▪ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.</td>
</tr>
<tr>
<td>❖ Grade II or III Chondrosarcoma</td>
<td>Any or all of the following every 6 months for 5 years, then annually for 10 years:</td>
</tr>
<tr>
<td>❖ Clear Cell Chondrosarcoma</td>
<td>Plain x-ray of primary site</td>
</tr>
<tr>
<td>❖ Extracompartmental Chondrosarcoma</td>
<td>▪ MRI without and with contrast is indicated for new findings on plain x-ray or new/worsening clinical symptoms.</td>
</tr>
<tr>
<td></td>
<td>Chest x-ray or CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>❖ Chordoma</td>
<td>Any or all of the following every 6 months for 5 years, then annually until year 10:</td>
</tr>
<tr>
<td></td>
<td>Plain x-ray of primary site</td>
</tr>
<tr>
<td></td>
<td>▪ MRI without and with contrast is indicated for new findings on plain x-ray or new/worsening clinical symptoms.</td>
</tr>
<tr>
<td></td>
<td>Chest x-ray</td>
</tr>
<tr>
<td></td>
<td>▪ CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.</td>
</tr>
</tbody>
</table>
ONC-12.9: Benign Bone Tumors – General Considerations

- Variety of diagnoses, including osteoid osteochondroma, chondroblastoma, desmoplastic fibroma, Paget’s disease, osteoid osteoma and others
- Plain x-ray appearance is diagnostic for many benign bone tumors and advanced imaging is generally unnecessary except for preoperative planning
- MRI without and with contrast is the primary modality for advanced imaging of bone tumors, and can be approved to help narrow differential diagnoses and determine whether biopsy is indicated
- Some benign bone tumor types carry a risk of malignant degeneration over time, but routine advanced imaging surveillance has not been shown to improve outcomes for these patients
- MRI without and with contrast can be approved to evaluate new findings on plain x-ray new/worsening clinical symptoms not explained by a recent plain x-ray
- There are no data to support the use of PET/CT in the evaluation of benign bone tumors, and PET requests should not be approved without biopsy confirmation of a malignancy
- Other benign bone tumor patients of all ages should be imaged according to guidelines in PEDONC-9.2: Benign Bone Tumors
## ONC-12.10: Benign Bone Tumors – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Giant Cell Tumor of Bone (GCTB)   | Any or all of the following:  
                                 | - MRI without contrast or without and with contrast of involved area  
                                 | - CT (contrast as requested) of involved area  
                                 | - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)  
                                 | - Bone scan (see also: **ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology**) |
| Enchondroma                        | - MRI without contrast or without and with contrast of primary site            |
### ONC-12.11: Benign Bone Tumors – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant Cell Tumor of Bone (GCTB)</td>
<td>Any or all of the following, after completion of radiotherapy or every 2 cycles of chemotherapy:</td>
</tr>
<tr>
<td></td>
<td>✦ MRI without contrast or without and with contrast of involved area</td>
</tr>
<tr>
<td></td>
<td>✦ CT (contrast as requested) of involved area</td>
</tr>
<tr>
<td></td>
<td>✦ Bone scan (see also: <a href="#">ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology</a>)</td>
</tr>
<tr>
<td>Enchondroma</td>
<td>Generally no indication for this benign tumor unless symptoms</td>
</tr>
</tbody>
</table>
## ONC-12.12: Benign Bone Tumors – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Giant Cell Tumor of Bone (GCTB)</td>
<td>Any or all of the following every 6 months for 2 years, then annually thereafter:</td>
</tr>
<tr>
<td></td>
<td>- Plain x-ray of primary site</td>
</tr>
<tr>
<td></td>
<td>- MRI without and with contrast is indicated for new findings on plain x-ray or new/worsening clinical symptoms.</td>
</tr>
<tr>
<td></td>
<td>- Chest x-ray</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.</td>
</tr>
<tr>
<td>Enchondroma</td>
<td>Plain films of primary site</td>
</tr>
</tbody>
</table>
References


## ONC-13: Pancreatic Cancer

| ONC-13.0: Pancreatic Cancer – General Considerations |
| ONC-13.1: Pancreatic Cancer – Screening Studies for Pancreatic Cancer |
| ONC-13.2: Pancreatic Cancer – Suspected/Diagnosis |
| ONC-13.3: Pancreatic Cancer – Initial Work-up/Staging |
| ONC-13.4: Pancreatic Cancer – Restaging/Recurrence |
| ONC-13.5: Pancreatic Cancer – Surveillance/Follow-up |
ONC-13.0: Pancreatic Cancer – General Considerations

- This guideline refers only to adenocarcinoma of the exocrine pancreas, which accounts for over 90% of pancreatic malignancies. This guideline may also be used for cancer of the Ampulla of Vater.

- Neuroendocrine and carcinoid tumors of the pancreas are not included in this guideline, see: ONC-15: Neuroendocrine Cancers and Adrenal Tumors
**ONC-13.1: Pancreatic Cancer – Screening Studies for Pancreatic Cancer**

- Detailed history of any known inherited syndrome in the patient and detailed family history in first and second degree relatives, including the age and lineage, is essential to guide screening recommendations. See table below for age- and risk-specific screening recommendations.

- New onset of diabetes in patients older than 50 has been recognized as a potential indicator of the development of pancreatic cancer. Approximately 1% of patients in this category are diagnosed with cancer within 3 years. A prediction model has been established which identifies those patients at greatest risk for pancreatic malignancy. The scoring system, known as ENDPAC (Enriching New-Onset Diabetes for Pancreatic Cancer) is based on 3 discriminatory factors, including change in blood glucose, change in weight, and age of onset at the time of the new diagnosis of diabetes. A score of > 3 imparts an elevated risk of pancreatic cancer (3.6%), and these patients should be screened. Screening is not indicated at this time for scores of 0-2.

<table>
<thead>
<tr>
<th>Indications</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age 50 or 10 years earlier than the youngest affected family member when BOTH of the following are met:</td>
<td>MRI Abdomen without and with contrast (CPT® 74183) at baseline, repeat annually</td>
</tr>
<tr>
<td>◆ First- or second-degree relative affected with pancreatic cancer <strong>AND</strong></td>
<td></td>
</tr>
<tr>
<td>◆ Known mutation carrier of one of the following genes:</td>
<td></td>
</tr>
<tr>
<td>1. Lynch Syndrome</td>
<td></td>
</tr>
<tr>
<td>2. BRCA1, BRCA2 (Familial Breast and Ovarian syndrome)</td>
<td></td>
</tr>
<tr>
<td>3. PALB2 mutation</td>
<td></td>
</tr>
<tr>
<td>4. ATM (Ataxia-Telangiectasia)</td>
<td></td>
</tr>
<tr>
<td>Age 50 or 10 years earlier than the youngest affected family member for ANY of the following:</td>
<td>MRI Abdomen without and with contrast (CPT® 74183) at baseline, repeat annually</td>
</tr>
<tr>
<td>◆ Individuals with 2 relatives with pancreatic adenocarcinoma where one is a first-degree relative</td>
<td></td>
</tr>
<tr>
<td>◆ Individuals with 3 or more relatives with pancreatic cancer</td>
<td></td>
</tr>
<tr>
<td>◆ Familial Atypical Multiple Melanoma and Mole Syndrome (FAMM-mutations in CDKN2A gene, p16, or multiple tumor suppressor-1 gene)</td>
<td>MRI Abdomen without and with contrast (CPT® 74183) at baseline, repeat annually</td>
</tr>
<tr>
<td>◆ Hereditary Pancreatitis (PRSS1 Gene)</td>
<td></td>
</tr>
<tr>
<td>Peutz-Jeghers Syndrome</td>
<td>MRI Abdomen without and with contrast (CPT® 74183) starting at age 30, repeat annually</td>
</tr>
<tr>
<td>Indications</td>
<td>Imaging Study</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Screening MRI reveals cystic lesion of the pancreas</td>
<td>☆ Repeat MRI Abdomen without and with contrast (CPT® 74183) in 6 months</td>
</tr>
<tr>
<td>Screening MRI reveals indeterminate solid lesion</td>
<td>☆ Repeat MRI Abdomen without and with contrast (CPT® 74183) in 3 months</td>
</tr>
<tr>
<td>Screening MRI reveals pancreatic stricture</td>
<td>☆ Repeat MRI Abdomen without and with contrast (CPT® 74183) in 3 months</td>
</tr>
<tr>
<td>For any of the following:</td>
<td></td>
</tr>
<tr>
<td>♦ Familial Adenomatous Polyposis Syndrome (APC gene)</td>
<td></td>
</tr>
<tr>
<td>♦ Hereditary pancreatic neuroendocrine tumors (Multiple Endocrine Neoplasia Type I [MEN-1])</td>
<td></td>
</tr>
<tr>
<td>♦ Von Hippel-Lindau disease</td>
<td></td>
</tr>
<tr>
<td>♦ Neurofibromatosis Type 1</td>
<td></td>
</tr>
<tr>
<td>♦ Tuberous sclerosis</td>
<td></td>
</tr>
<tr>
<td>♦ Li-Fraumeni syndrome</td>
<td>♦ Advanced imaging is not routinely indicated for screening for pancreatic cancer</td>
</tr>
<tr>
<td>New onset diabetes in adults with ENDPAC score of ≥3</td>
<td>♦ CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) at baseline; if negative, can be repeated once after 6 months</td>
</tr>
</tbody>
</table>
## ONC-13.2: Pancreatic Cancer – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>For any suspected symptoms only</td>
<td>Ultrasound (CPT® 76700 or CPT® 76705)</td>
</tr>
<tr>
<td>Symptoms and abnormal lab(s), or physical exam findings, or abnormal ultrasound/ERCP</td>
<td>CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>Preoperative studies for potentially resectable tumors without confirmed histologic diagnosis</td>
<td>See also: <a href="#">ONC-13.3: Pancreatic Cancer – Initial Work-up/Staging</a></td>
</tr>
</tbody>
</table>

See also: [ONC-13.3: Pancreatic Cancer – Initial Work-up/Staging](#)
## ONC-13.3: Pancreatic Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with (CPT® 74177) or CT</td>
</tr>
<tr>
<td></td>
<td>Abdomen/Pelvis without and with contrast (CPT®</td>
</tr>
<tr>
<td></td>
<td>74178)</td>
</tr>
<tr>
<td></td>
<td>- EUS</td>
</tr>
<tr>
<td>Preoperative planning or CT</td>
<td>- MRI Abdomen without and with contrast (CPT®</td>
</tr>
<tr>
<td>insufficient to determine resectability</td>
<td>74183)</td>
</tr>
<tr>
<td>No evidence of metastatic disease on CT or MRI</td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
**ONC-13.4: Pancreatic Cancer – Restaging/Recurrence**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>For any of the following:</td>
<td></td>
</tr>
<tr>
<td>- After neoadjuvant chemoradiation</td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>- Post-operative baseline</td>
<td>CT Abdomen/Pelvis with (CPT® 74177) or CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td>- Suspected recurrence</td>
<td>CT with contrast of other involved or symptomatic areas</td>
</tr>
<tr>
<td></td>
<td>PET/CT (CPT® 78815) for inconclusive conventional imaging post chemoradiation</td>
</tr>
<tr>
<td>Unresectable disease or metastatic disease on chemotherapy</td>
<td>Every 2 cycles of treatment (commonly every 6 to 8 weeks):</td>
</tr>
<tr>
<td></td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis with (CPT® 74177) or CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>CT with contrast of other involved or symptomatic areas</td>
</tr>
<tr>
<td>Unexplained elevated liver enzymes or inconclusive recent CT abnormality</td>
<td>MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>If complete surgical resection was initial therapy</td>
<td>See also: <strong>ONC-13.5: Pancreatic Cancer – Surveillance/Follow-up</strong> for surveillance imaging</td>
</tr>
</tbody>
</table>
## ONC-13.5: Pancreatic Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| All patients | Every 3 months for 2 years, then annually:  
  - CT Abdomen/Pelvis with contrast (CPT® 74177)  
  - CT Chest with contrast (CPT® 71260) |
References


## ONC-14: Upper GI Cancers

<table>
<thead>
<tr>
<th>ONC-14.1: Hepatocellular Carcinoma (HCC) – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-14.2: Hepatocellular Carcinoma (HCC) – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-14.3: Hepatocellular Carcinoma (HCC) – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-14.4: Hepatocellular Carcinoma (HCC) – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-14.5: Hepatocellular Carcinoma (HCC) – Surveillance/Follow-up</td>
</tr>
<tr>
<td>ONC-14.6: Gallbladder and Biliary Tumors – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-14.7: Gallbladder and Biliary Tumors – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-14.8: Gallbladder and Biliary Tumors – Surveillance/Follow-up</td>
</tr>
<tr>
<td>ONC-14.9: Gastric Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-14.10: Gastric Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-14.11: Gastric Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-14.1: Hepatocellular Carcinoma (HCC) – General Considerations

- Diagnosis: A biopsy is not always required for the diagnosis of Hepatocellular carcinoma (HCC). A dedicated triple-phase CT or MRI may be obtained. MRI with contrast is the test of choice for the evaluation of liver masses and offers soft tissue contrast resolution superior to CT as well as the possibility of using two different contrast agents, one of which if more blood flow based and the other which also is blood flow based and demonstrates hepatobiliary function (Eovist). Classical imaging findings include:
  - Arterial phase hyperenhancement
  - Venous phase washout appearance
  - Capsule appearance
  - Threshold growth

- For patients who are high risk for developing HCC (cirrhosis, chronic Hepatitis B or current or prior HCC), if the liver lesion is > 1 cm with 2 classic enhancements on triple-phase CT or MRI, the diagnosis is confirmatory and biopsy is not needed.

- For lesions less than 1 cm or with less than 2 classical enhancements or for any liver lesions in patients who are not high risk, a biopsy is needed for histological confirmation.

- PET/CT scan is not indicated for diagnosis or staging of Hepatocellular carcinoma.
ONC-14.2: Hepatocellular Carcinoma (HCC) – Suspected/Diagnosis

➤ See AB-26.1: Chronic Liver Disease, Cirrhosis and Screening for HCC
➤ See AB-29.1: Liver Lesion Characterization
### ONC-14.3: Hepatocellular Carcinoma (HCC) – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>✷ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td><strong>One of the following:</strong></td>
</tr>
<tr>
<td></td>
<td>✷ CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td></td>
<td>✷ CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>✷ CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>✷ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
</tbody>
</table>
### ONC-14.4: Hepatocellular Carcinoma (HCC) – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>One of the following:</td>
<td>▶ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>After initial therapy</td>
<td>One of the following:</td>
</tr>
<tr>
<td>For suspected recurrence or new liver lesions</td>
<td>▶ CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td>Individuals receiving systemic therapy (every 2 cycles)</td>
<td>▶ CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>▶ CT Abdomen/Pelvis with contrast (CPT® 74177), or CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>▶ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Hepatocellular Carcinoma treated with embolization</td>
<td>▶ CTA Abdomen (CPT® 74175) can be approved immediately prior to embolization</td>
</tr>
<tr>
<td></td>
<td>One of the following, immediately prior to and 1 month post-ablation:</td>
</tr>
<tr>
<td></td>
<td>▶ MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td></td>
<td>▶ CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td>Hepatocellular Carcinoma awaiting liver transplant</td>
<td>See also ONC-31.2 for imaging studies indicated prior to and post-embolization</td>
</tr>
<tr>
<td></td>
<td>See <strong>AB-42.1: Liver Transplant, Pre-Transplant</strong> for imaging guidelines</td>
</tr>
</tbody>
</table>
### ONC-14.5: Hepatocellular Carcinoma (HCC) – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hepatocellular Carcinoma:</td>
<td>Every 3 months for 2 years, then annually:</td>
</tr>
<tr>
<td>- Treated with surgical resection</td>
<td>- CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>- Treated with embolization</td>
<td><strong>And ONE of the following:</strong></td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen and Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Hepatocellular Carcinoma treated with liver transplant</td>
<td>See <strong>AB-42.3: Liver Transplant, Post-transplant</strong></td>
</tr>
</tbody>
</table>
### OCN-14.6: Gallbladder and Biliary Tumors – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>• CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td></td>
<td>• CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>• CT Abdomen and Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>• MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td>• PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-14.7: Gallbladder and Biliary Tumors – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td>• CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>• After initial therapy</td>
<td>• CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td>• For suspected recurrence or new liver lesions</td>
<td>• CT Abdomen and Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>• Patients receiving systemic chemotherapy (every 2 cycles)</td>
<td>• MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td>• PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
## ONC-14.8: Gallbladder and Biliary Tumors – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td><strong>Annually for 5 years:</strong>&lt;br&gt;❖ CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250)&lt;br&gt;&lt;br&gt;&lt;b&gt;And ONE of the following:**&lt;br&gt;❖ CT Abdomen with contrast (CPT® 74160)&lt;br&gt;❖ CT Abdomen without and with contrast (CPT® 74170)&lt;br&gt;❖ CT Abdomen and Pelvis with contrast (CPT® 74177)&lt;br&gt;❖ MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Biliary carcinoma treated with liver transplant</td>
<td>See <strong>AB-42.3: Liver Transplant, Post-transplant</strong></td>
</tr>
</tbody>
</table>
### ONC-14.9: Gastric Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| All patients                                                              | ♦ CT Chest with contrast (CPT® 71260)  
♦ CT Abdomen/Pelvis with contrast (CPT® 74177) |
| Gastric cancer ≥ T2 or higher with no metastatic disease by conventional imaging | ♦ PET/CT (CPT® 78815)                                |
## ONC-14.10: Gastric Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>After initial therapy and any suspected recurrence</td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>New liver lesion(s) and primary site controlled</td>
<td>- CT Abdomen (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>One of the following:</td>
<td></td>
</tr>
<tr>
<td>- After neoadjuvant therapy for presumed surgically resectable disease or</td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>- Post curative chemoradiation being treated without surgery</td>
<td></td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
# ONC-14.11: Gastric Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I (treated with resection alone)</td>
<td>- No routine imaging unless clinical signs/symptoms of recurrence</td>
</tr>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>- Stage I treated with systemic therapy</td>
<td></td>
</tr>
<tr>
<td>- Stages II-III</td>
<td></td>
</tr>
<tr>
<td>- Stage IV - Metastatic disease (post definitive treatment of all measurable disease or being observed off therapy)</td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177) annually for 5 years</td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-15.1: General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-15.2: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-15.3: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-15.4: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-15.5: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Surveillance</td>
</tr>
<tr>
<td>ONC-15.6: Bronchopulmonary or Thymic Carcinoid – Initial Staging</td>
</tr>
<tr>
<td>ONC-15.7: Bronchopulmonary or Thymic Carcinoid – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-15.8: Bronchopulmonary or Thymic Carcinoid – Surveillance</td>
</tr>
<tr>
<td>ONC-15.9: Adrenal Tumors – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-15.10: Adrenal Tumors – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-15.11: Adrenal Tumors – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-15.12: Adrenal Tumors – Surveillance</td>
</tr>
<tr>
<td>ONC-15.13: Adrenocortical Carcinoma</td>
</tr>
</tbody>
</table>
ONC-15.1: General Considerations

This guideline includes low-grade or well-differentiated carcinoid and endocrine tumors of the lung, thymus, pancreas, gastrointestinal tract or unknown primary site; including insulinoma, glucagonoma, VIPoma, gastrinoma, somatostatinoma and others as well as catecholamine-secreting tumors of the adrenal gland such as pheochromocytoma, paraganglioma, adrenocortical carcinoma, and others.

- For poorly-differentiated or high-grade small cell or large cell neuroendocrine tumors arising outside the lung or from an unknown primary site see: **ONC-31.8: Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors**
- For poorly-differentiated or high grade neuroendocrine tumors of the lung, refer to **ONC-7: Small Cell Lung Cancer**
- Neuroblastoma, ganglioneuroblastoma, and ganglioneuroma occurring in adults should be imaged according to **PEDONC-6: Neuroblastoma**
- Many are associated with Multiple Endocrine Neoplasia (MEN) familial syndromes. – See **PEDONC-2.8: Multiple Endocrine Neoplasias (MEN)** for screening recommendations
- Somatostatin receptor-based imaging is more sensitive and specific for evaluation of well-differentiated neuroendocrine tumors and may be performed using $^{111}$In DTPA Octreotide scintigraphy or $^{68}$Gallium-labeled DOTATATE PET/CT scan. This study is not part of evaluation of poorly-differentiated or high grade neuroendocrine tumors, which are imaged according to: **ONC-31.8: Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors**
## ONC-15.2: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Systemic symptoms strongly suggestive of functioning neuroendocrine tumor | Any or all of the following:
| Suspicious findings on other imaging studies | CT Abdomen/Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178)
| Unexplained elevation in any of the following: | If CT inconclusive, MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast is indicated
| Chromogranin A | CT Chest with contrast (CPT® 71260) or CXR
| 5HIAA | CT with contrast or MRI without and with contrast of any other symptomatic body areas
| Insulin | | |
| VIP | | |
| Glucagon | | |
| Gastrin | | |
| Substance P | | |
| Serotonin | | |
| Somatostatin | | |
| Continued suspicion with negative/inconclusive CT scan or MRI | ONE of the following:
| | Octreotide scan (any one of the following):
| | CPT® 78802 (single day study - with add on CPT® 78803 or 78830)
| | CPT® 78804 (two day study - with add on CPT® 78831 or 78832)
| | 68Gallium-labeled DOTATATE PET/CT scan (CPT® 78815) |
### ONC-15.3: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinoid, pancreatic neuroendocrine tumors</td>
<td>If not already done:&lt;br&gt;CT Abdomen/Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178)&lt;br&gt;  - If CT inconclusive, MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast is indicated&lt;br&gt;CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Inconclusive CT or MRI scans</td>
<td>ONE of the following:&lt;br&gt;Octreotide scan (any one of the following):&lt;br&gt;  - CPT® 78802 (single day study - with add on CPT® 78803 or 78830)&lt;br&gt;  - CPT® 78804 (two day study - with add on CPT® 78831 or 78832)&lt;br&gt;  - ⁶⁸Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
<tr>
<td>Any of the following:&lt;br&gt;Markers fail to normalize after complete resection AND CT/MRI and somatostatin-receptor based study are negative&lt;br&gt;Biopsy-proven neuroendocrine tumor of unknown primary site AND CT/MRI and somatostatin-receptor based study are negative</td>
<td>FDG-PET/CT scan (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-15.4: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All after surgical resection</td>
<td>See: Surveillance below</td>
</tr>
<tr>
<td>Unresectable/metastatic disease on treatment with somatostatin analogues</td>
<td>CT of involved body area no more frequently than every 3 months</td>
</tr>
<tr>
<td>Unresectable/metastatic disease on treatment with chemotherapy</td>
<td>CT of involved body area every 2 cycles (6 to 8 weeks)</td>
</tr>
<tr>
<td>Progression of symptoms or elevation of tumor markers</td>
<td>CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Continued suspicion for recurrence with negative or inconclusive CT scan or MRI</td>
<td>ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>Octreotide scan (any one of the following):</td>
</tr>
<tr>
<td></td>
<td>CPT® 78802 (single day study - with add on CPT® 78803 or 78830)</td>
</tr>
<tr>
<td></td>
<td>CPT® 78804 (two day study - with add on CPT® 78831 or 78832)</td>
</tr>
<tr>
<td></td>
<td>68Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
<tr>
<td>To assess candidacy for peptide receptor radionuclide therapy (PRRT) with Lutetium $^{177}$Lu-dotatate</td>
<td>ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>Octreotide scan (any one of the following):</td>
</tr>
<tr>
<td></td>
<td>CPT® 78802 (single day study - with add on CPT® 78803 or 78830)</td>
</tr>
<tr>
<td></td>
<td>CPT® 78804 (two day study - with add on CPT® 78831 or 78832)</td>
</tr>
<tr>
<td></td>
<td>68Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-15.5: Gastrointestinal/Pancreatic Neuroendocrine Cancers – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>✦ Appendix carcinoid ≤2 cm, completely resected</td>
<td>Advanced imaging is not routinely indicated for surveillance</td>
</tr>
<tr>
<td>✦ Rectal carcinoid &lt;1 cm, completely resected</td>
<td></td>
</tr>
<tr>
<td>Rectal carcinoid 1-2 cm, completely resected</td>
<td>MRI Pelvis (CPT® 72197) without and with contrast once at 12 months post resection. If clear, no further surveillance imaging indicated</td>
</tr>
<tr>
<td>All other neuroendocrine tumors of the bowel (small/large)</td>
<td>CT Abdomen/Pelvis (CPT® 74177) once at 3 to 12 months postoperatively and annually for 3 years and then every 2 years up to year 10</td>
</tr>
<tr>
<td>Neuroendocrine tumors of the upper abdomen (i.e., pancreas, stomach)</td>
<td>CT Abdomen (CPT® 74160) once at 3 to 12 months postoperatively then annually for 3 years and then every 2 years up to 10</td>
</tr>
</tbody>
</table>
## ONC-15.6: Bronchopulmonary or Thymic Carcinoid – Initial Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial diagnosis</strong></td>
<td><strong>If not already done:</strong>  &lt;br&gt;  - CT Chest with contrast (CPT® 71260)  &lt;br&gt;  - CT Abdomen/Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178)  &lt;br&gt;  - If CT inconclusive, MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast is indicated</td>
</tr>
<tr>
<td><strong>Inconclusive CT or MRI scans</strong></td>
<td><strong>One of the following:</strong>  &lt;br&gt;  - Octreotide scan (any one of the following):  &lt;br&gt;  - CPT® 78802 (single day study - with add on CPT® 78803 or 78830)  &lt;br&gt;  - CPT® 78804 (two day study - with add on CPT® 78831 or 78832)  &lt;br&gt;  - $^{68}$Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
<tr>
<td><strong>Any of the following:</strong></td>
<td><strong>FDG-PET/CT scan (CPT® 78815)</strong></td>
</tr>
<tr>
<td>marker fail to normalize after complete resection AND CT/MRI and somatostatin-receptor based study are negative</td>
<td></td>
</tr>
<tr>
<td>biopsy-proven neuroendocrine tumor of unknown primary site AND CT/MRI and somatostatin-receptor based study are negative</td>
<td></td>
</tr>
</tbody>
</table>
**ONC-15.7: Bronchopulmonary or Thymic Carcinoid – Restaging/Recurrence**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All after surgical resection</td>
<td>◆ See: Surveillance below</td>
</tr>
<tr>
<td>Unresectable/metastatic disease on treatment with somatostatin analogues</td>
<td>◆ CT of involved body area no more frequently than every 3 months</td>
</tr>
<tr>
<td>Unresectable/metastatic disease on treatment with chemotherapy</td>
<td>◆ CT of involved body area every 2 cycles (6 to 8 weeks)</td>
</tr>
<tr>
<td>Progression of symptoms or elevation of tumor markers</td>
<td>◆ CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>◆ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>◆ CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>◆ MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Continued suspicion for recurrence with negative or inconclusive CT scan or MRI</td>
<td>ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>◆ Octreotide scan (any one of the following):</td>
</tr>
<tr>
<td></td>
<td>◇ CPT® 78802 (single day study - with add on CPT® 78803 or 78830)</td>
</tr>
<tr>
<td></td>
<td>◇ CPT® 78804 (two day study - with add on CPT® 78831 or 78832)</td>
</tr>
<tr>
<td></td>
<td>◆ $^{68}$Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
</tbody>
</table>
## ONC-15.8: Bronchopulmonary or Thymic Carcinoid – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinoid tumors of lung or thymus</td>
<td>CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) once at 3 to 12 months post resection and then annually for 3 years and then every 2 years up to year 10</td>
</tr>
</tbody>
</table>
ONC-15.9: Adrenal Tumors – Suspected/Diagnosis

See AB-16.1: Adrenal Cortical Lesions for imaging guidelines for evaluation of suspected adrenal malignancies

If concern for genetic predisposition syndrome such as MEN, neurofibromatosis, or Von Hippel-lindau disease, see screening recommendations in PEDONC-2: Screening Imaging and Cancer Predisposition Syndromes.
### ONC-15.10: Adrenal Tumors – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>For any of the following:</strong></td>
<td>If not already done:</td>
</tr>
<tr>
<td>Pheochromocytoma</td>
<td>- CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>Paraganglioma</td>
<td><strong>One of the following (if not already done):</strong></td>
</tr>
<tr>
<td>Paraganglioneuroma</td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast or MRI without and with contrast of any other symptomatic body areas</td>
</tr>
<tr>
<td><strong>Continued suspicion with negative/inconclusive CT scan or MRI</strong></td>
<td><strong>ONE of the following:</strong></td>
</tr>
<tr>
<td></td>
<td>- Octreotide scan (any one of the following):</td>
</tr>
<tr>
<td></td>
<td>- CPT® 78802 (single day study - with add on CPT® 78803 or 78830)</td>
</tr>
<tr>
<td></td>
<td>- CPT® 78804 (two day study - with add on CPT® 78831 or 78832)</td>
</tr>
<tr>
<td></td>
<td>- $^{68}$Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
<tr>
<td><strong>All above studies done and negative/inconclusive</strong></td>
<td>FDG-PET/CT scan (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-15.11: Adrenal Tumors – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>If surgery is primary therapy</td>
<td>• CT Abdomen (CPT® 74160) one time within first year post resection then go to surveillance recommendations</td>
</tr>
<tr>
<td>Recurrence, progression of symptoms, or elevation of tumor markers</td>
<td>• CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td><strong>ONE of the following:</strong></td>
</tr>
<tr>
<td></td>
<td>• CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>• CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>• MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Continued suspicion for recurrence with negative or inconclusive CT scan or MRI</td>
<td><strong>ONE of the following:</strong></td>
</tr>
<tr>
<td></td>
<td>• Octreotide scan (any one of the following):</td>
</tr>
<tr>
<td></td>
<td>• CPT® 78802 (single day study - with add on CPT® 78803 or 78830)</td>
</tr>
<tr>
<td></td>
<td>• CPT® 78804 (two day study - with add on CPT® 78831 or 78832)</td>
</tr>
<tr>
<td></td>
<td>• 68Gallium-labeled DOTATATE PET/CT scan (CPT® 78815)</td>
</tr>
<tr>
<td>All above studies done and negative/inconclusive</td>
<td>• FDG-PET/CT scan (CPT® 78815)</td>
</tr>
</tbody>
</table>
**ONC-15.12: Adrenal Tumors – Surveillance**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>CT Abdomen with contrast (CPT® 74160) and CT of other involved body areas with contrast annually for 10 years</td>
</tr>
</tbody>
</table>
# ONC-15.13: Adrenocortical Carcinoma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging</strong></td>
<td>CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260) &lt;br&gt;</td>
</tr>
<tr>
<td><strong>Suspected recurrence</strong></td>
<td>CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260) &lt;br&gt; ONE of the following:&lt;br&gt; CT Abdomen/Pelvis with contrast (CPT® 74177)&lt;br&gt; CT Abdomen/Pelvis without and with contrast (CPT® 74178)&lt;br&gt; MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>CT Abdomen with contrast (CPT® 74160) and CT of other involved body areas with contrast annually for 5 years</td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-16.0: Colorectal Cancer – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-16.1: Colorectal Cancer – Suspected/Diagnosis</td>
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<td>ONC-16.2: Colorectal Cancer – Initial Work-up/Staging</td>
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<td>ONC-16.3: Colorectal Cancer – Restaging/Recurrence</td>
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<tr>
<td>ONC-16.4: Colorectal Cancer – Surveillance/Follow-up</td>
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<td>ONC-16.5: Small Bowel Cancer - Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-16.6: Small Bowel Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-16.7: Small Bowel Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-16.0: Colorectal Cancer – General Considerations

- Neuroendocrine tumors of the bowel are covered in: **ONC-15: Neuroendocrine Cancers and Adrenal Tumors**
- Appendiceal adenocarcinoma (including pseudomyxoma peritonei) follows imaging guidelines for colorectal cancer
ONC-16.1: Colorectal Cancer – Suspected/Diagnosis

- See AB-22: GI Bleeding or AB-25.1: CT Colonography (CTC) for imaging guidelines for evaluation of suspected colorectal malignancies
- See AB-13.3 for advanced imaging to evaluate Abnormal Findings on Endoscopy/Colonoscopy
# ONC-16.2: Colorectal Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinoma within a polyp that is completely removed</td>
<td>♦ No advanced imaging needed</td>
</tr>
<tr>
<td>Invasive adenocarcinoma</td>
<td>♦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>Further evaluation of an inconclusive liver lesion seen on CT</td>
<td>♦ MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td><strong>One of the following:</strong></td>
<td>♦ PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>♦ Isolated metastatic lesion(s) on other imaging and patient is a candidate for aggressive surgical resection or other localized treatment to metastasis for curative intent</td>
<td></td>
</tr>
<tr>
<td>♦ Inconclusive conventional imaging</td>
<td></td>
</tr>
<tr>
<td>Rectal adenocarcinoma</td>
<td>In addition to above, for preoperative planning:</td>
</tr>
<tr>
<td></td>
<td>♦ Endorectal ultrasound (CPT® 76872)</td>
</tr>
<tr>
<td></td>
<td>♦ MRI Pelvis without and with contrast (CPT® 72197) or MRI Pelvis without contrast (CPT® 72195)</td>
</tr>
</tbody>
</table>
### ONC-16.3: Colorectal Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete resection</td>
<td>♦ See Surveillance below</td>
</tr>
<tr>
<td>Recurrence suspected</td>
<td>♦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>After completion of planned neoadjuvant therapy</td>
<td><strong>Patients without metastatic disease, when requested by operating surgeon for operative planning:</strong>&lt;br&gt;♦ CT with contrast or MRI without and with contrast of all operative sites&lt;br&gt;&lt;br&gt;<strong>All other patients:</strong>&lt;br&gt;♦ No advanced imaging since surgery is “planned”</td>
</tr>
<tr>
<td>Unresected primary disease or metastatic disease on chemotherapy</td>
<td><strong>Every 2 cycles of chemotherapy treatment and at the completion of chemoradiotherapy:</strong>&lt;br&gt;♦ CT Chest with contrast (CPT® 71260)&lt;br&gt;♦ CT Abdomen/Pelvis with contrast (CPT® 74177)&lt;br&gt;♦ CT with contrast of other involved or symptomatic areas</td>
</tr>
<tr>
<td>Further evaluation of an inconclusive liver lesion seen on CT</td>
<td>♦ MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>One of the following:</td>
<td>♦ PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>☑ Postoperative elevated or rising CEA or LFTs with negative recent conventional imaging</td>
<td></td>
</tr>
<tr>
<td>☑ Isolated metastatic lesion(s) on other imaging and patient is a candidate for aggressive surgical resection or other localized treatment to metastasis for curative intent</td>
<td></td>
</tr>
<tr>
<td>☑ Differentiate local tumor recurrence from postoperative and/or post-radiation scarring</td>
<td></td>
</tr>
<tr>
<td>New or worsening pelvic pain and recent CT imaging negative or inconclusive</td>
<td>♦ MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
</tbody>
</table>
### ONC-16.4: Colorectal Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging/Lab Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Colon and rectal adenocarcinoma:</strong></td>
<td></td>
</tr>
<tr>
<td>Stage I</td>
<td>No routine advanced imaging indicated</td>
</tr>
<tr>
<td>Colorectal adenocarcinoma: Stage II-III</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast after completion of surgery and then annually for 5 years</td>
</tr>
<tr>
<td>Colorectal adenocarcinoma: Stage IV - Metastatic disease (post definitive treatment of all measurable disease or being observed off therapy)</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast every 6 months for 2 years and then annually for 3 years</td>
</tr>
<tr>
<td>Rectal cancer treated with transanal excision alone</td>
<td>Endorectal ultrasound (CPT® 76872) every 6 months for 5 years</td>
</tr>
<tr>
<td></td>
<td>MRI Pelvis without and with contrast (CPT® 72197) may be obtained for:</td>
</tr>
<tr>
<td></td>
<td>- Abnormal findings on ultrasound</td>
</tr>
<tr>
<td></td>
<td>- Endorectal ultrasound is not feasible</td>
</tr>
<tr>
<td></td>
<td>- New signs/symptoms concerning for local recurrence</td>
</tr>
<tr>
<td>Pseudomyxoma peritonei</td>
<td>One of the following, every 3 months for first year, then every 6 months for 4 more years:</td>
</tr>
<tr>
<td></td>
<td>CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
</tbody>
</table>
### ONC-16.5: Small Bowel Cancer - Initial Work-up/Staging

This section provides imaging guidelines for small bowel adenocarcinoma arising from the duodenum, jejunum, and ileum.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging/Lab Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carcinoma within a polyp that is completely removed</td>
<td>• No advanced imaging needed</td>
</tr>
<tr>
<td>Invasive adenocarcinoma</td>
<td>• CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>▪ MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and</td>
</tr>
<tr>
<td></td>
<td>▪ with contrast (CPT® 72197) if CT is inconclusive or cannot be performed</td>
</tr>
</tbody>
</table>
**ONC-16.6: Small Bowel Cancer – Restaging/Recurrence**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complete resection</td>
<td>♦ See Surveillance below</td>
</tr>
<tr>
<td>Recurrence suspected</td>
<td>♦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>Unresected primary disease or metastatic disease on chemotherapy</td>
<td>Every 2 cycles of chemotherapy: ♦ CT Chest with contrast (CPT® 71260) ♦ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>Further evaluation of an inconclusive liver lesion seen on CT</td>
<td>♦ MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>One of the following:</td>
<td>♦ PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>♦ Postoperative elevated or rising CEA or LFTs with negative recent conventional imaging</td>
<td></td>
</tr>
<tr>
<td>♦ Isolated metastatic lesion(s) on other imaging and patient is a candidate for aggressive surgical resection or other localized treatment to metastasis for curative intent</td>
<td></td>
</tr>
</tbody>
</table>
### ONC-16.7: Small Bowel Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging/Lab Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I-III</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast after completion of surgery, and then annually for 5 years</td>
</tr>
<tr>
<td>Stage IV - Metastatic disease (post definitive treatment of all measurable disease, or being observed off therapy)</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast every 6 months for 2 years and then annually for 3 years</td>
</tr>
</tbody>
</table>
References


### ONC-17: Renal Cell Cancer (RCC)

<table>
<thead>
<tr>
<th>ONC-17.0: Renal Cell Cancer (RCC) – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-17.1: Renal Cell Cancer (RCC) – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-17.2: Renal Cell Cancer (RCC) – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-17.3: Renal Cell Cancer (RCC) – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-17.4: Renal Cell Cancer (RCC) – Surveillance</td>
</tr>
</tbody>
</table>
ONC-17.0: Renal Cell Cancer (RCC) – General Considerations

- PET is not routinely indicated for initial diagnosis, staging or restaging of renal cell cancer.

- Data is lacking on improvements in outcomes of renal cell cancer survivors based upon surveillance imaging schedules.

- A minority of adult patients with renal cell cancer (RCC) will have translocations in TFE3 or TFEB, which have a different natural history than “adult type” RCC. Patients of any age with TFE3 or TFEB translocated RCC should be imaged according to guidelines in PEDONC-7.4: Pediatric Renal Cell Carcinoma (RCC).

- Patients of any age with Wilms tumor should be imaged according to guidelines in section PEDONC-7.2: Unilateral Wilms Tumor (UWT) or PEDONC-7.3 Bilateral Wilms Tumor (BWT).
# ONC-17.1: Renal Cell Cancer (RCC) – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solitary renal mass suspicious for renal cell cancer</td>
<td>See <strong>AB-35.1: Indeterminate Renal Lesion</strong> for imaging guidelines for evaluation of suspected renal malignancies</td>
</tr>
<tr>
<td></td>
<td>Chest x-ray</td>
</tr>
<tr>
<td></td>
<td>CT chest with contrast with (CPT® 71260) or without contrast (CPT® 71250) may be obtained for one of the following:</td>
</tr>
<tr>
<td></td>
<td>New chest x-ray abnormalities</td>
</tr>
<tr>
<td></td>
<td>Pulmonary symptoms</td>
</tr>
<tr>
<td></td>
<td>Histologically confirmed renal cell cancer</td>
</tr>
</tbody>
</table>
## ONC-17.2: Renal Cell Cancer (RCC) – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| All patients | If not done previously:  
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250)  
- CT Abdomen/Pelvis, contrast as requested |
| Any of the following:  
- Extension of tumor into the vena cava by other imaging  
- Inconclusive findings on CT | MRI Abdomen without and with contrast (CPT® 74183) |
| Bone pain | Bone scan (See ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology) |
| Any of the following:  
- Signs/symptoms of brain metastases  
- IL-2 therapy being considered | MRI Brain without and with contrast (CPT® 70553) |
### ONC-17.3: Renal Cell Cancer (RCC) – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Unresectable disease or metastatic disease on systemic therapy | Every 2 cycles of treatment (commonly every 6 to 8 weeks):  
  - CT Chest with contrast (CPT® 71260)  
  - CT Abdomen/Pelvis with contrast (CPT® 74177)  
  - CT with contrast of other involved or symptomatic areas |
| Recurrence suspected                 | CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT®74177)                           |
## ONC-17.4: Renal Cell Cancer (RCC) – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I RCC, on active surveillance of renal mass &lt;1 cm</td>
<td>One of the following, once within 6 months of surveillance initiation and annually for 5 years:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>- MRI (CPT® 74183) Abdomen without and with contrast</td>
</tr>
<tr>
<td></td>
<td>- Also see <strong>AB-35.1: Indeterminate Renal Lesion</strong></td>
</tr>
<tr>
<td>Stage I RCC, on active surveillance of renal mass ≥1 cm</td>
<td>One of the following, every 3 months for year 1, every 6 months for years 2 and 3 and annually thereafter:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>Stage I or II RCC, post-ablation therapy</td>
<td>One of the following, at 3 to 6 months post-ablation and then annually for 5 years:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>Stage I RCC, after partial or radical nephrectomy</td>
<td>One of each of the following, 3 to 12 months post-resection:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with (CPT® 74160) or CT Abdomen without contract (CPT® 74150) or MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td></td>
<td>Annually for 3 years:</td>
</tr>
<tr>
<td></td>
<td>- Chest x-ray or CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast</td>
</tr>
<tr>
<td></td>
<td>- Abdominal imaging with any ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>- Abdominal ultrasound (CPT® 76770 or CPT® 76775)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with (CPT® 74160) or CT Abdomen without (CPT® 74150) contrast</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>Stage II RCC, post-nephrectomy</td>
<td>One of each of the following, 3 to 6 months post-resection:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with (CPT® 74160) or CT Abdomen without (CPT® 74150) contrast or MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td></td>
<td>One of each of the following, every 6 months for 3 years, then annually to year 5:</td>
</tr>
<tr>
<td></td>
<td>- Chest x-ray or CT Chest with (CPT® 71260) or CT Chest without (CPT® 71250) contrast</td>
</tr>
<tr>
<td></td>
<td>- Abdominal imaging with any ONE of the following:</td>
</tr>
<tr>
<td></td>
<td>- Abdominal ultrasound (CPT® 76770 or CPT® 76775)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with (CPT® 74160) or CT Abdomen without (CPT® 74150) contrast</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>Indication</td>
<td>Imaging Study</td>
</tr>
<tr>
<td>----------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>One of each of the following, 3 to 6 months post-resection:</td>
</tr>
<tr>
<td>◦ Stage III RCC, post-nephrectomy</td>
<td>◦ CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td>◦ Stage IV RCC, not receiving therapy, no measurable disease</td>
<td>◦ CT Abdomen with (CPT® 74160) or CT Abdomen without contrast (CPT® 74150) or MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td></td>
<td>One of each of the following, every 3 months for 3 years, then annually to year 5:</td>
</tr>
<tr>
<td></td>
<td>◦ CT Chest with (CPT® 71260) or CT Chest without contrast (CPT® 71250)</td>
</tr>
<tr>
<td></td>
<td>◦ CT Abdomen with (CPT® 74160) or CT Abdomen without contrast (CPT® 74150) or MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>Metastatic disease on a break from therapy with persistent measurable disease</td>
<td>Any or all of the following, every 3 months:</td>
</tr>
<tr>
<td></td>
<td>◦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>◦ CT with contrast of other involved or symptomatic areas</td>
</tr>
</tbody>
</table>
References
<table>
<thead>
<tr>
<th>ONC-18: Transitional Cell Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONC-18.0:</strong> Transitional Cell Cancer – General Considerations</td>
</tr>
<tr>
<td><strong>ONC-18.1:</strong> Transitional Cell Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td><strong>ONC-18.2:</strong> Transitional Cell Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td><strong>ONC-18.3:</strong> Transitional Cell Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td><strong>ONC-18.4:</strong> Transitional Cell Cancer – Surveillance/Follow-up</td>
</tr>
</tbody>
</table>
ONC-18.0: Transitional Cell Cancer – General Considerations

- Transitional cell cancers can include: tumors of the bladder, ureters, prostate, urethra, or renal pelvis. For primary cancer of the kidney, see ONC-17: Renal Cell Cancer (RCC).

- Most common histology of bladder cancer is transitional cell (TCC) or urothelial carcinoma (UCC). Rare histologies include squamous cell (imaged according to ONC-18: Transitional Cell Cancer) or small cell (imaged according to ONC-31.8: Extrathoracic Small Cell and Large Cell).

- Urachal cancer is a rare type of bladder cancer; the most common histology is adenocarcinoma. These are imaged according to muscle invasive bladder cancer.

- PET not routinely indicated in transitional cell cancer with exception noted below in ONC-18.2: Transitional Cell Cancer – Initial Work-up/Staging.
ONC-18.1: Transitional Cell Cancer – Suspected/Diagnosis
See AB-39: Hematuria and Hydronephrosis for imaging guidelines for evaluation of suspected transitional cell malignancies
## ONC-18.2: Transitional Cell Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis without and with contrast (CPT® 74178)</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast if contraindication to CT contrast</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis without contrast (CPT® 74176) with retrograde pyelogram or renal ultrasound (CPT® 76770 or CPT® 76775) in patients who cannot receive either CT or MRI contrast</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>CT Chest without (CPT® 71250) or CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>- Muscle invasive bladder carcinoma</td>
<td></td>
</tr>
<tr>
<td>- Urethral carcinoma</td>
<td></td>
</tr>
<tr>
<td>- Urothelial carcinoma of the prostate</td>
<td></td>
</tr>
<tr>
<td>Patients without metastatic disease, when requested by operating surgeon for operative planning</td>
<td>CT with contrast or MRI without and with contrast of all operative sites</td>
</tr>
<tr>
<td>To evaluate inconclusive findings on conventional imaging</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-18.3: Transitional Cell Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any stage &gt; T1 or treated with definitive surgery</td>
<td>“Baseline” CT Abdomen/Pelvis with contrast (CPT® 74177) or with and without contrast (CPT® 74178) after surgery if requested</td>
</tr>
</tbody>
</table>
| Recurrence suspicion                            | CT Abdomen/Pelvis with contrast (CPT® 74177) or with and without contrast (CPT® 74178)  
|                                                  | CT Chest with contrast (CPT® 71260) for any of the following:  
|                                                  |  - Signs/symptoms of pulmonary disease                     
|                                                  |  - Abnormal chest x-ray                                    
|                                                  |  - Prior involvement of the chest                          |
| After neoadjuvant therapy and before resection   | CT Chest with contrast (CPT® 71260) and CT Urogram (CPT® 74178)              |
| Monitoring therapy for metastatic disease        | Every 2 cycles of therapy:  
|                                                  |  - CT Abdomen/Pelvis with contrast (CPT® 74177)             
|                                                  |  - CT Chest with contrast (CPT® 71260) for any of the following:  
|                                                  |    - Signs/symptoms of pulmonary disease                     
|                                                  |    - Abnormal chest x-ray                                    
|                                                  |    - Prior involvement of the chest                          |
### ONC-18.4: Transitional Cell Cancer – Surveillance/Follow-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td>▶ Advanced imaging is not routinely indicated for surveillance</td>
</tr>
<tr>
<td>♦ Low grade lesions</td>
<td></td>
</tr>
<tr>
<td>♦ High grade Ta lesion ≤ 3 cm</td>
<td></td>
</tr>
<tr>
<td>♦ Papillary urothelial neoplasm of low malignant potential</td>
<td></td>
</tr>
<tr>
<td>Any of the following:</td>
<td>▶ CT Urogram (CPT® 74178) every 2 years for 10 years</td>
</tr>
<tr>
<td>♦ Recurrent high grade Ta lesions</td>
<td>▶ MR Urogram (CPT® 74183 and CPT® 72197) may be obtained for renal insufficiency or CT dye allergy</td>
</tr>
<tr>
<td>♦ Superficial and minimally invasive (Tis and T1) transitional cell carcinoma of the bladder or upper tracts</td>
<td></td>
</tr>
<tr>
<td>Minimally invasive transitional carcinoma of the bladder treated with cystectomy</td>
<td>▶ CT urogram (CPT® 74178) at 3 months post-cystectomy, and then annually for 5 years</td>
</tr>
<tr>
<td>Muscle invasive lower and upper genitourinary tumors</td>
<td>▶ MR Urogram (CPT® 74183 and CPT® 72197) may be obtained for renal insufficiency or CT dye allergy</td>
</tr>
<tr>
<td></td>
<td>▶ CT Abdomen/Pelvis with contrast (CPT® 74177) or without and with contrast (CPT® 74178) every 6 months for 2 years, then annually for 3 more years</td>
</tr>
<tr>
<td></td>
<td>▶ MR Urogram (CPT® 74183 and CPT® 72197) may be obtained for renal insufficiency or CT dye allergy</td>
</tr>
<tr>
<td></td>
<td>▶ Chest x-ray</td>
</tr>
<tr>
<td>Urethral cancers (high risk T1 or greater) and urothelial carcinoma of the prostate</td>
<td>▶ CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast every 6 months for 2 years and then annually</td>
</tr>
<tr>
<td></td>
<td>▶ MR Urogram (CPT® 74183 and CPT® 72197) may be obtained for renal insufficiency or CT dye allergy</td>
</tr>
<tr>
<td></td>
<td>▶ Chest x-ray</td>
</tr>
<tr>
<td></td>
<td>▶ CT Chest with contrast (CPT® 71260) if abnormal signs/symptoms of pulmonary disease or abnormal chest x-ray</td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-19: Prostate Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONC-19.0:</strong> Prostate Cancer – General Considerations</td>
</tr>
<tr>
<td><strong>ONC-19.1:</strong> Suspected Prostate Cancer</td>
</tr>
<tr>
<td><strong>ONC-19.2:</strong> Prostate Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td><strong>ONC-19.3:</strong> Prostate Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td><strong>ONC-19.4:</strong> Prostate Cancer – Follow-up On Active Surveillance</td>
</tr>
<tr>
<td><strong>ONC-19.5:</strong> Surveillance/Follow-up For Treated Prostate Cancer</td>
</tr>
</tbody>
</table>
ONC-19.0: Prostate Cancer – General Considerations

- The natural history of prostate cancer is highly variable. Therapeutic options may include surgery and radiation therapy along with Active Surveillance (also called expectant management or deferred treatment).

- PET/CT scans using $^{18}$F-FDG, $^{18}$F-Na Fluoride, and $^{68}$Ga PSMA radiotracers are considered investigational and experimental for all indications for prostate cancer.

- PET/CT scan using newer radiotracers such as $^{11}$C Choline and $^{18}$F-Fluciclovine (AXUMIN®) have emerging data in restaging previously treated prostate cancer. Performance of these PET/CT scans in detecting early recurrence is poor at low PSA values of <2 ng/mL. False positive rate is high and histological confirmation of positive sites is recommended. Hence, its use is restricted to the evaluation of a rising PSA after conventional imaging is negative.
  - Additionally, while detection of low-volume recurrence after treatment of prostate cancer may influence therapeutic decisions; there is lack of evidence on how this approach has any meaningful impact on overall survival.

- As laser prostate ablation is considered investigational and experimental at this time, advanced imaging for treatment planning and/or surveillance of laser prostate ablation is not indicated.

- As high intensity focused ultrasound prostate ablation is considered investigational and experimental at this time, and advanced imaging for treatment planning and/or surveillance of high intensity focused ultrasound prostate ablation is not indicated.

- MR Spectroscopy (CPT® 76390) is considered investigational and experimental in the evaluation of prostate cancer at this time.

- Based on the local extent of tumor, PSA level and Gleason score, prostate cancer patients can be classified into risk groups as below:

<table>
<thead>
<tr>
<th>Risk Category</th>
<th>T stage</th>
<th>Gleason score</th>
<th>PSA (ng/ml)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very low</td>
<td>T1c</td>
<td>≤ 6</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Low</td>
<td>T1-T2a</td>
<td>≤ 6</td>
<td>&lt; 10</td>
</tr>
<tr>
<td>Intermediate</td>
<td>T2b-T2c</td>
<td>7</td>
<td>10-20</td>
</tr>
<tr>
<td>High</td>
<td>T3a</td>
<td>8 to 10</td>
<td>&gt; 20</td>
</tr>
<tr>
<td>Very High</td>
<td>T3b-T4</td>
<td>8 to 10</td>
<td>&gt; 20</td>
</tr>
</tbody>
</table>
3D Rendering of MRI for MRI / Ultrasound Fusion Biopsy:

- When specific target lesion(s) is (are) detected on mpMRI prostate and classified as PIRADS 4 or 5, then 3D Rendering at independent workstation (CPT® 76377, 3D rendering requiring image post-processing on an independent workstation) for the radiologist to generate prostate segmentation data image set for target identification on MRI/TRUS fusion biopsy is approvable either as subsequent separate standalone request or as retrospective request for medical necessity.

- If there is no target lesion identified on MRI then 3D rendering and MRI/TRUS fusion biopsy is not generally indicated. The urologist may request MRI/TRUS fusion biopsy of a PIRADS 1-3 lesion. Then approval of 3D rendering at independent workstation (CPT® 76377) can be considered on a case-by-case basis. These cases should be referred for Medical Director review.

- The 3D rendering for the TRUS component of the fusion is a part of the UroNav Fusion Equipment Software and an additional 3D code CPT® 76376 or CPT® 76377 should not be approved.
# ONC-19.1: Suspected Prostate Cancer

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Age 45-75 years and ONE of the following:</td>
<td>Any of the following:</td>
</tr>
<tr>
<td>- PSA &gt;3 ng/ml</td>
<td>- Transrectal ultrasound (CPT® 76872)</td>
</tr>
<tr>
<td>- Very suspicious DRE</td>
<td>- TRUS-guided biopsy (CPT® 76942)</td>
</tr>
<tr>
<td>- Age &gt;75 years and ONE of the following:</td>
<td>- MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
<tr>
<td>- PSA ≥4 ng/ml</td>
<td>- MRI Pelvis without contrast (CPT® 72195)</td>
</tr>
<tr>
<td>- Very suspicious DRE</td>
<td>- MRI Pelvis without contrast (CPT® 72195) may be performed if an MR/US guided fusion biopsy is feasible/planned at the requesting facility</td>
</tr>
<tr>
<td>- At least one negative/non-diagnostic TRUS biopsy and any of the following:</td>
<td>- MRI/US fusion biopsy (CPT® 77021 and CPT® 76942)</td>
</tr>
<tr>
<td>- Continued increase in PSA</td>
<td></td>
</tr>
<tr>
<td>- Abnormal DRE</td>
<td></td>
</tr>
<tr>
<td>- Need for confirmatory MR/US fusion biopsy</td>
<td></td>
</tr>
<tr>
<td>- PIRADS 4 or 5 lesion identified on recent diagnostic MRI Pelvis (CPT® 72195 or CPT® 72197) and planning for biopsy to be done by MRI/TRUS fusion technique</td>
<td>3D Rendering (CPT® 76377)</td>
</tr>
<tr>
<td>- Multifocal (3 or more lesions) high-grade prostatic intraepithelial neoplasia (PIN)</td>
<td>CPT® 76376 should not be separately reimbursed (See Preface-4.1: 3D Rendering for additional details)</td>
</tr>
<tr>
<td>- Atypia on biopsy</td>
<td>Extended pattern rebiopsy within 6 months by TRUS-guided biopsy (CPT® 76942)</td>
</tr>
<tr>
<td>- Focal PIN (1-2 lesions)</td>
<td>One of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- MRI Pelvis without contrast (CPT® 72195)</td>
</tr>
<tr>
<td></td>
<td>- MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
<tr>
<td></td>
<td>- MRI/US fusion biopsy (CPT® 77021 and CPT® 76942)</td>
</tr>
<tr>
<td></td>
<td>- MRI guided biopsy (CPT® 77021)</td>
</tr>
</tbody>
</table>
**ONC-19.2: Prostate Cancer – Initial Work-up/Staging**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tumor not clinically palpable (T1a, T1b or T1c)</td>
<td>Advanced imaging is not routinely indicated for initial staging</td>
</tr>
<tr>
<td>T2a (palpable tumor limited to less than one half of one side)</td>
<td>MRI Pelvis without and with contrast (CPT® 72197) may be obtained if treatment is planned (surgery and/or radiation therapy)</td>
</tr>
<tr>
<td>Gleason score of 6 or less</td>
<td></td>
</tr>
<tr>
<td>Gleason Grade 1</td>
<td></td>
</tr>
<tr>
<td>PSA &lt;10 ng/ml</td>
<td></td>
</tr>
</tbody>
</table>

**Pelvic imaging for any one of the following:**

- Clinical stage T3 or T4 disease (palpable disease outside of the prostate capsule)
- Clinical stage T2b (tumor involving >50% of one lobe) or stage T2c (tumor involving both lobes)
- Gleason score ≥ 7
- PSA > 10 ng/ml
- Nomogram predicts >10% probability of pelvic lymph node involvement

**Abdominal imaging for any of the following:**

- PSA ≥ 20 ng/mL
- Gleason score ≥ 8
- Clinical stage ≥T3 or greater (palpable disease outside of the prostate capsule)
- At least 2 of the following are present:
  - Clinical stage T2b (tumor involving > 50% of one lobe) or stage T2c (tumor involving both lobes)
  - Gleason score ≥ 7
  - PSA > 10 ng/mL

**Any one of the following can be approved:**

- CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)
- CT Abdomen/Pelvis with contrast (CPT® 74177)

**Any of the following:**

- Bone pain
- Gleason score ≥ 7
- PSA ≥ 20 ng/ml
- Clinical stage ≥ T3 or greater (palpable disease outside of the prostate capsule)
- Clinical Stage T2b (tumor involving > 50% of one lobe) or stage T2c (tumor involving both lobes) and with PSA > 10 ng/ml

PET/CT scans with any radiotracers are considered experimental/investigational for initial evaluation of prostate cancer.
## ONC-19.3: Prostate Cancer – Restaging/Recurrence

### Indication

For any of the following:
- Obvious progression by DRE with plans for prostatectomy or radiation therapy
- Repeat TRUS biopsy for rising PSA shows progression to a higher Gleason’s score with plans for prostatectomy or radiation therapy
- New finding on most recent CT that was inconclusive

### Imaging Study

- MRI Pelvis without and with contrast (CPT® 72197)

### Patients with prior radical prostatectomy and any of the following:

- Palpable anastomotic recurrence
- PSA remains > 0.2 after at least 2 PSAs
- Initial undetectable PSA increasing on 2 consecutive PSAs

### Any of the following can be approved:

- CT Abdomen/Pelvis with contrast (CPT® 74177)
- Bone scan (See ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)
- Chest x-ray
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.

### Patients with prior Radiation Therapy and any of the following:

- Clinical suspicion of relapsed disease
- PSA increasing on at least 2 consecutive values above post-XRT baseline

### Any of the following can be approved:

- CT Abdomen/Pelvis with contrast (CPT® 74177)
- Bone scan (See ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)
- Chest x-ray
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.

### Patients treated with hormonal therapy:

- PSA rising on 2 consecutive measurements

### Any of the following can be approved:

- CT Abdomen/Pelvis with contrast (CPT® 74177)
- Bone Scan (See ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)
- Chest x-ray
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.

### ALL of the following:

- Prior treatment with prostatectomy and/or radiation therapy and
- Consecutive rise in PSA and
- PSA ≥2 ng/mL and
- Recent CT scan and bone scan are negative for metastatic disease

### ONE of the following:

- \(^{11}\)C Choline PET/CT scan (CPT® 78815 or CPT® 78816)
- \(^{18}\)F-Fluciclovine PET/CT scan (CPT® 78815 or CPT® 78816)
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hormone Refractory Prostate Cancer (HRPC):</td>
<td>• CT Abdomen/Pelvis with contrast (CPT® 74177) and CT scan of any involved body part every 2 cycles (6 to 8 weeks)</td>
</tr>
<tr>
<td>✷ Receiving treatment with chemotherapy</td>
<td>• CT Abdomen/Pelvis with contrast (CPT® 74177) and CT scan of any involved body part every 3 months</td>
</tr>
<tr>
<td>✷ Receiving anti-androgen therapy</td>
<td>• One time CT Chest/Abdomen/Pelvis with contrast (CPT® 71260 and CPT® 74177).</td>
</tr>
<tr>
<td>Prior to start of Xofigo (Radium-223) therapy</td>
<td></td>
</tr>
</tbody>
</table>
**ONC-19.4: Prostate Cancer – Follow-up On Active Surveillance**

Active surveillance is being increasingly utilized in prostate cancer. This therapeutic option involves regimented monitoring of an individual with known diagnosis of low risk prostate cancer for disease progression, without specific anticancer treatment. While being treated with active surveillance, an individual is generally considered a potential candidate for curative intent treatment approaches in the event that disease progression occurs.

It is important to distinguish active surveillance from watchful waiting (or observation), which is generally employed in patients with limited life expectancy. Watchful waiting involves cessation of routine monitoring and treatment is initiated only if symptoms develop.

Current active surveillance guidelines suggest the following protocol:

- PSA every 6 months
- Digital Rectal Exam (DRE) every 12 months
- Repeat TRUS-guided prostate biopsy every 12 months
- Repeat mpMRI (CPT® 72195 or CPT® 72197) no more often than every 12 months

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging/Lab Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Routine monitoring on active surveillance protocol</td>
<td>• MRI pelvis without (CPT® 72195) or without and with contrast (CPT® 72197) at initiation of active surveillance, and every 12 months thereafter</td>
</tr>
<tr>
<td>For any of the following:</td>
<td>• MRI Pelvis without (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
<tr>
<td>✷ Progression is suspected based on DRE changes or rising PSA and a recent TRUS biopsy was negative</td>
<td></td>
</tr>
<tr>
<td>✷ Repeat TRUS biopsy shows progression to a higher Gleason score</td>
<td></td>
</tr>
</tbody>
</table>
Oncology Imaging

### ONC-19.5: Surveillance/Follow-up For Treated Prostate Cancer

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| All Stages | • PSA and DRE every 6 months, even in patients with metastatic disease.  
• Advanced imaging is not routinely indicated for patients being monitored on or off therapy. |
References


### ONC-20: Testicular, Ovarian and Extragonadal Germ Cell Tumors

<table>
<thead>
<tr>
<th>ONC-20.0: Testicular, Ovarian and Extragonadal Germ Cell Tumors – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>ONC-20.2: Testicular, Ovarian and Extragonadal Germ Cell Tumors – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-20.3: Testicular, Ovarian and Extragonadal Germ Cell Tumors – Surveillance</td>
</tr>
</tbody>
</table>
ONC-20.0: Testicular, Ovarian and Extragonadal Germ Cell Tumors – General Considerations

This section applies to primary germ cell tumors occurring outside the central nervous system in patients age > 15 years at the time of initial diagnosis. Patients age ≤ 15 years at diagnosis should be imaged according to pediatric guidelines in: PEDONC-10: Pediatric Germ Cell Tumors

These guidelines are for germ cell tumors of the testicle, ovary and extragonadal sites as well as malignant sex cord stromal tumors (granulosa cell and Sertoli-Leydig cell tumors).

Requests for imaging must state the histologic type of the cancer being evaluated.

Classified as pure seminomas (dysgerminomas, 40%) or Non-seminomatous germ cell tumors (NSGCT, 60%).

Pure seminomas are defined as pure seminoma histology with a normal serum concentration of alpha fetoprotein (AFP). Seminomas with elevated AFP are by definition Mixed.

Required for TNM staging are the tumor marker levels indicated by “S” (TNMS)

Mixed tumors are treated as NSGCTs, as they tend to be more aggressive.

The NSGCT histologies include:

- Yolk-Sac tumors
- Immature (malignant) teratomas
- Choriocarcinomas (< 1%)
- Embryonal cell carcinomas (15% to 20%)
- Endodermal Sinus Tumors (ovarian)
- Combinations of all of the above (Mixed)

MRI in place of CT scans to reduce risk of secondary malignancy is not supported by the peer-reviewed literature. CT scans are indicated for surveillance and are the preferred modality of imaging to assess for recurrence.

PET/CT Scan is not indicated for evaluation of non-seminomatous germ cell tumors.
## ONC-20.1: Testicular, Ovarian and Extragonadal Germ Cell Tumors – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orchiectomy/oophorectomy is both diagnostic and therapeutic</td>
<td>All patients, following orchiectomy or oophorectomy: CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>For any of the following:</td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>- Non-seminoma histology</td>
<td></td>
</tr>
<tr>
<td>- Ovarian germ cell tumor</td>
<td></td>
</tr>
<tr>
<td>- Abdominal lymphadenopathy noted on CT scan</td>
<td></td>
</tr>
<tr>
<td>- Abnormal CXR or signs/symptoms suggestive of chest involvement</td>
<td></td>
</tr>
<tr>
<td>Extragonadal Germ Cell Tumor</td>
<td>CT Chest with contrast (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
</tbody>
</table>
## ONC-20.2: Testicular, Ovarian and Extrapelvic Germ Cell Tumors – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treatment response for stage II-IV patients with measurable disease on CT</td>
<td>✷ CT with contrast of previously involved body areas every 2 cycles</td>
</tr>
<tr>
<td>Seminoma with residual mass &gt; 3 cm after completion of chemotherapy</td>
<td>✷ PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>End of therapy evaluation for NSGCT post chemotherapy or post retroperitoneal lymph node dissection (RPLND)</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>Recurrence suspected, including increased tumor markers</td>
<td>✷ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>✷ Ultrasound (CPT® 76856 or CPT® 76857) of the remaining gonad if applicable</td>
</tr>
<tr>
<td>Unexplained pulmonary symptoms despite a negative CXR, or new findings on CXR</td>
<td>✷ CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>All others</td>
<td>✷ See Surveillance below</td>
</tr>
</tbody>
</table>
**Oncology Imaging**

### ONC-20.3: Testicular, Ovarian and Extragonadal Germ Cell Tumors – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I Seminoma treated with orchietomy alone (no radiotherapy or chemotherapy, also called active surveillance)</td>
<td>♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) at 3, 6 and 12 months post-orchietomy, then annually until year 5</td>
</tr>
<tr>
<td>Stage I Seminoma treated with radiotherapy and/or chemotherapy</td>
<td>♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) annually for 3 years</td>
</tr>
<tr>
<td>Stage IIA Seminomas treated with radiotherapy or chemotherapy</td>
<td>♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) once at 3 months then once at 6 to 12 months after completion of therapy, then annually until year 3</td>
</tr>
</tbody>
</table>
| Stage IIB, IIC, and III Seminomas treated with chemotherapy                | **For patients with ≤ 3 cm residual mass:** ♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) every 4 months for 1 year, every 6 months for 1 year and then annually for 2 additional years  
♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) at 6 and 12 months after completion of therapy, then annually until year 5  
**For patients with > 3 cm residual mass and negative PET scan:** ♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) at 6 and 12 months after completion of therapy, then annually until year 5  
**For patients with thoracic disease at diagnosis:** ♦ CT Chest with contrast (CPT® 71260) every 2 months for 1 year, then every 3 months for 1 year, then annually until year 5 |
<p>| Stage IA Non-Seminomatous germ cell tumors treated with orchietomy alone (no radiotherapy or chemotherapy, also called active surveillance) | ♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) at 6 and 12 months after orchietomy, then annually until year 3 |
| Stage IB Non-Seminomatous germ cell tumors treated with orchietomy alone (no radiotherapy or chemotherapy, also called active surveillance) | ♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) every 4 months for 1 year, then every 6 months for 2 years, then annually until year 4 |
| Stage IA/IB Non-Seminomatous germ cell tumors treated with chemotherapy    | ♦ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) annually for 2 years |</p>
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage II-III Non-Seminomatous germ cell tumors with complete response to chemotherapy +/- post-chemotherapy RPLND</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) once at 6, 12, 24 and 36 months after completion of therapy For patients with thoracic disease at diagnosis: ✷ CT Chest with contrast (CPT® 71260) every 6 months for 2 years, then annually until year 4</td>
</tr>
<tr>
<td>Stage IIA or IIB Non-Seminomatous germ cell tumors with post-primary RPLND complete resection +/- adjuvant chemotherapy</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177) or CT Abdomen with contrast (CPT® 74160) once at 3 to 4 months after completion of therapy</td>
</tr>
<tr>
<td>All ovarian germ cell tumors</td>
<td>✷ No routine imaging unless elevated tumor markers or clinical signs/symptoms of recurrence</td>
</tr>
<tr>
<td>❖ Dysgerminoma</td>
<td></td>
</tr>
<tr>
<td>❖ Embryonal tumor</td>
<td></td>
</tr>
<tr>
<td>❖ Endodermal sinus tumor</td>
<td></td>
</tr>
<tr>
<td>❖ Mature or immature teratoma</td>
<td></td>
</tr>
<tr>
<td>❖ Non-gestational choriocarcinoma</td>
<td></td>
</tr>
<tr>
<td>Sex cord stromal tumors (male and female)</td>
<td>✷ No routine advanced imaging indicated unless elevated tumor markers or clinical signs/symptoms of recurrence</td>
</tr>
<tr>
<td>Extragonadal germ cell tumors</td>
<td>✷ CT of the involved region every 3 months for one year and every 6 months for one year.</td>
</tr>
</tbody>
</table>
References
## ONC-21: Ovarian Cancer

<table>
<thead>
<tr>
<th>ONC-21.0: Ovarian Cancer – General Considerations</th>
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<tr>
<td>ONC-21.2: Ovarian Cancer – Suspected/Diagnosis</td>
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<tr>
<td>ONC-21.3: Ovarian Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-21.4: Ovarian Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-21.5: Ovarian Cancer – Surveillance</td>
</tr>
</tbody>
</table>
ONC-21.0: Ovarian Cancer – General Considerations

- Ovarian cancers include: epithelial ovarian cancers, ovarian cancers of low malignant potential and mixed Müllerian tumors, primary peritoneal and fallopian tube cancers.

- Germ cell tumors and sex cord stromal tumors (granulosa cell tumors), are imaged according to ONC-20: Testicular, Ovarian and Extragonadal Germ Cell Cancer.
## ONC-21.1: Screening for Ovarian Cancer

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging/Lab Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Risk Factors:</td>
<td>☐ Ovarian cancer screening is considered experimental &amp; investigational and is not recommended.</td>
</tr>
<tr>
<td>☐ Family history of BRCA 1 or BRCA 2 mutations</td>
<td>☐ Genetic counseling is recommended for women with an increased-risk family history (USPSTF, 2015)</td>
</tr>
<tr>
<td>☐ Family history of ovarian cancer</td>
<td></td>
</tr>
<tr>
<td>☐ Hereditary ovarian cancer syndrome that includes ovarian, breast, and/or endometrial and gastrointestinal cancers [Lynch II syndrome] in multiple members of two to four generations</td>
<td></td>
</tr>
<tr>
<td>☐ Low parity</td>
<td></td>
</tr>
<tr>
<td>☐ Decreased fertility</td>
<td></td>
</tr>
<tr>
<td>☐ Delayed childbearing</td>
<td></td>
</tr>
<tr>
<td>Known BRCA-1 or BRCA-2 mutation</td>
<td>☐ Transvaginal ultrasound (CPT® 76830), combined with CA-125 for ovarian cancer screening may be considered annually starting at age 30, until risk-reducing salpingo-oophorectomy is performed</td>
</tr>
</tbody>
</table>

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OVC-21.2: Ovarian Cancer – Suspected/Diagnosis

- See **PV-5.3: Complex Adnexal Masses** for imaging guidelines for evaluation of suspected ovarian malignancies.
- Staging of ovarian cancer is primarily surgical and routine imaging is not indicated pre-operatively, unless it is obtained to evaluate specific signs/symptoms.
- To differentiate the origin of pelvic masses that are not clearly of ovarian origin, see **PV-5.1: Suspected Adnexal Mass**.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging/Lab Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pelvic symptoms (pelvic pain, abdominal bloating)</td>
<td>Transvaginal (TV) ultrasound imaging (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) is the initial study of choice</td>
</tr>
<tr>
<td>Palpable pelvic mass</td>
<td><strong>Ultrasound shows a complex and/or solid adnexal mass</strong></td>
</tr>
<tr>
<td>Ultrasound shows complex and/or solid adnexal mass suspicious for ovarian malignancy AND any of the following signs/symptoms concerning for metastatic disease:</td>
<td><strong>CT Abdomen and Pelvis with contrast (CPT® 74177)</strong></td>
</tr>
<tr>
<td>Ascites</td>
<td><strong>CT Abdomen/Pelvis without and with contrast (CT Urogram – CPT® 74178) may be approved only for symptoms of obstructive uropathy</strong></td>
</tr>
<tr>
<td>Abdominal symptoms (distension, tenderness)</td>
<td></td>
</tr>
<tr>
<td>Elevated CA-125</td>
<td></td>
</tr>
<tr>
<td>Elevated LFTs</td>
<td></td>
</tr>
<tr>
<td>Obstructive uropathy**</td>
<td></td>
</tr>
</tbody>
</table>
# ONC-21.3: Ovarian Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical stage II disease or higher</td>
<td>• CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>• CT Chest with contrast (CPT® 71260) if abnormal signs/symptoms of pulmonary disease or abnormal chest x-ray</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>• PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>• Primary peritoneal disease with biopsy-proven malignancy consistent with ovarian carcinoma</td>
<td></td>
</tr>
<tr>
<td>• Elevated tumor markers with negative or inconclusive CT imaging</td>
<td></td>
</tr>
</tbody>
</table>
## ONC-21.4: Ovarian Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completely resected or definitively treated with chemotherapy and normal(ized) tumor markers</td>
<td>✷ No advanced imaging needed</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>✷ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>✷ Unresected disease</td>
<td>✷ CT Chest (CPT® 71260) for any of the following:</td>
</tr>
<tr>
<td>✷ Unknown preoperative markers</td>
<td>✷ Prior known thoracic disease</td>
</tr>
<tr>
<td>✷ Difficult or abnormal examination</td>
<td>✷ New or worsening thoracic signs/symptoms or CXR findings</td>
</tr>
<tr>
<td>✷ Elevated LFTs</td>
<td>✷ Rising CA-125/inhibin levels</td>
</tr>
<tr>
<td>✷ Rising tumor markers (CA-125, inhibin)</td>
<td></td>
</tr>
<tr>
<td>✷ Signs or symptoms of recurrence</td>
<td></td>
</tr>
<tr>
<td>✷ CT negative or inconclusive and CA-125 continues to rise or elevated LFTs</td>
<td>✷ PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>✷ Conventional imaging failed to demonstrate tumor or if persistent radiographic mass with rising tumor markers</td>
<td></td>
</tr>
</tbody>
</table>
### ONC-21.5: Ovarian Cancer – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stages I-III</td>
<td>✤ No advanced imaging needed</td>
</tr>
<tr>
<td>Locally advanced/Metastatic with measurable disease</td>
<td>✤ See: <a href="#">ONC-1.2: Phases of Oncology Imaging and General Phase-Related Considerations</a></td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-22: Uterine Cancer</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONC-22.0</strong>: Uterine Cancer – General Considerations</td>
</tr>
<tr>
<td><strong>ONC-22.1</strong>: Uterine Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td><strong>ONC-22.2</strong>: Uterine Cancer – Initial Work-up</td>
</tr>
<tr>
<td><strong>ONC-22.3</strong>: Uterine Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td><strong>ONC-22.4</strong>: Uterine Cancer – Surveillance</td>
</tr>
</tbody>
</table>
ONC-22.0: Uterine Cancer – General Considerations

- Gestational trophoblastic neoplasia (GTN) – see PV-16.1: Molar Pregnancy and Gestational Trophoblastic Neoplasia (GTN)
- Most common cell type is adenocarcinoma. Uterine sarcomas are also imaged according to this guideline.
- Staging of uterine cancer is primarily surgical. Advanced imaging is not routinely indicated pre-operatively for laparoscopic/minimally invasive surgery unless initial staging criteria are met. Pelvic and para-aortic lymphadenectomy can still be performed.
ONC-22.1: Uterine Cancer – Suspected/Diagnosis

- See PV-2.1: Abnormal Uterine Bleeding for imaging guidelines for evaluation of suspected uterine malignancies
## ONC-22.2: Uterine Cancer – Initial Work-up

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>▶ Extra-uterine disease suspected</td>
<td>▶ MRI Pelvis without and with contrast (CPT® 72197) or CT Pelvis with contrast (CPT® 72193)</td>
</tr>
<tr>
<td>▶ Bulky uterine tumor</td>
<td></td>
</tr>
<tr>
<td>▶ High grade (grade 3) tumor</td>
<td></td>
</tr>
<tr>
<td>Any of the following:</td>
<td>One of the following may be approved:</td>
</tr>
<tr>
<td>▶ Abdominal symptoms or abnormal examination findings</td>
<td>▶ CT Abdomen with contrast (CPT® 74160)</td>
</tr>
<tr>
<td>▶ Elevated LFTS</td>
<td>▶ CT Abdomen/Pelvis with contrast (CPT® 74177) if being completed in the same imaging session as CT Pelvis</td>
</tr>
<tr>
<td>▶ Other imaging studies suggest liver involvement</td>
<td></td>
</tr>
<tr>
<td>Any of the following histologies:</td>
<td>▶ CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>▶ Papillary serous</td>
<td></td>
</tr>
<tr>
<td>▶ Clear cell</td>
<td></td>
</tr>
<tr>
<td>▶ Carcinosarcoma</td>
<td></td>
</tr>
<tr>
<td>▶ Soft tissue sarcoma of the uterus</td>
<td></td>
</tr>
<tr>
<td>▶ Leiomyosarcoma</td>
<td></td>
</tr>
<tr>
<td>▶ Undifferentiated sarcoma</td>
<td></td>
</tr>
<tr>
<td>▶ Endometrial stromal sarcoma</td>
<td></td>
</tr>
<tr>
<td>▶ Poorly differentiated endometroid</td>
<td></td>
</tr>
<tr>
<td>Tumors detected incidently or incompletely staged surgically AND any of the following high risk features:</td>
<td>▶ CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>▶ Myoinvasion &gt; 50%</td>
<td></td>
</tr>
<tr>
<td>▶ Cervical stromal involvement</td>
<td></td>
</tr>
<tr>
<td>▶ Lymphovascular invasion</td>
<td></td>
</tr>
<tr>
<td>▶ Tumor &gt; 2 cm</td>
<td></td>
</tr>
<tr>
<td>Considering fertility sparing surgery for well-differentiated Stage IA (grade 1) uterine cancer</td>
<td>▶ MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
<tr>
<td></td>
<td>▶ Transvaginal ultrasound (CPT® 76830) if MRI is contraindicated</td>
</tr>
<tr>
<td></td>
<td>▶ Chest x-ray</td>
</tr>
<tr>
<td></td>
<td>▶ CT Chest with contrast (CPT® 71260) if chest x-ray is abnormal</td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td>▶ PET/CT scan (CPT® 78815)</td>
</tr>
</tbody>
</table>
# ONC-22.3: Uterine Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Unresectable, medically inoperable, or incompletely surgically staged patients | ◾ CT Chest with contrast (CPT® 71260)  
One of the following:  
◾ CT Abdomen/Pelvis with contrast (CPT® 74177) or  
◾ MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast |
| ◾ Unresected disease  
◾ Difficult or abnormal examination  
◾ Elevated LFTs or rising tumor markers  
◾ Signs or symptoms of recurrence | ◾ CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)                                  |
| ◾ Inconclusive findings on conventional imaging                           | ◾ PET/CT scan (CPT® 78815)                                                                               |
### ONC-22.4: Uterine Cancer – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All stages of uterine carcinoma</td>
<td>Advanced imaging is not routinely indicated for surveillance</td>
</tr>
<tr>
<td>All stages of uterine sarcoma:</td>
<td></td>
</tr>
<tr>
<td>- Soft tissue sarcoma of the uterus</td>
<td></td>
</tr>
<tr>
<td>- Leiomyosarcoma</td>
<td></td>
</tr>
<tr>
<td>- Adenosarcoma</td>
<td></td>
</tr>
<tr>
<td>- Carcinosarcoma</td>
<td></td>
</tr>
<tr>
<td>- Rhabdomyosarcoma</td>
<td></td>
</tr>
<tr>
<td>- Undifferentiated sarcoma</td>
<td></td>
</tr>
<tr>
<td>- Endometrial stromal sarcoma</td>
<td></td>
</tr>
<tr>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177) every 3 months for 2 years, every 6 months for 3 years, and then every 1-2 years until year 10</td>
<td></td>
</tr>
</tbody>
</table>
References


## ONC-23: Cervical Cancer

<table>
<thead>
<tr>
<th>ONC-23.0: Cervical Cancer – General Considerations</th>
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</thead>
<tbody>
<tr>
<td>ONC-23.1: Cervical Cancer – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-23.2: Cervical Cancer – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-23.3: Cervical Cancer – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-23.4: Cervical Cancer – Surveillance</td>
</tr>
</tbody>
</table>
ONC-23.0: Cervical Cancer – General Considerations

- Primary histology for cervical cancer is squamous cell. Other, less common histologies are adenosquamous and adenocarcinoma. If biopsy is consistent with one of these less common histologies, it is necessary to clarify that tumor is not of primary uterine origin.

- If the primary histology is uterine in origin, follow imaging recommendations for uterine cancer, see: ONC-22: Uterine Cancer.
### ONC-23.1: Cervical Cancer – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Biopsy should be performed prior to imaging</td>
</tr>
</tbody>
</table>
# ONC-23.2: Cervical Cancer – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage IB1 or higher stages</td>
<td>Any of the following combinations, not both:  &lt;br&gt;♣ PET/CT (CPT® 78815 or CPT® 78816)  &lt;br&gt;or  &lt;br&gt;♣ CT Chest with contrast (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)  &lt;br&gt;  &lt;br&gt;   □ MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast if CT contrast allergy or inconclusive CT findings</td>
</tr>
<tr>
<td>Any size cervical cancer incidentally found in a hysterectomy specimen</td>
<td>♣ CT Chest with contrast (CPT® 71260)  &lt;br&gt;♣ CT Abdomen/Pelvis with contrast (CPT® 74177)  &lt;br&gt;♣ MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast if CT contrast allergy or inconclusive CT findings  &lt;br&gt;♣ PET/CT (CPT® 78815 or CPT® 78816) if inconclusive conventional imaging</td>
</tr>
</tbody>
</table>
# ONC-23.3: Cervical Cancer – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficult or abnormal examination</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>Elevated LFTs</td>
<td>MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast if CT contrast allergy or inconclusive CT findings</td>
</tr>
<tr>
<td>Signs or symptoms of recurrence</td>
<td>PET/CT (CPT® 78815 or CPT® 78816) for inconclusive conventional imaging</td>
</tr>
</tbody>
</table>

If primary therapy was surgery

- See Surveillance guidelines [ONC-23.4: Cervical Cancer – Surveillance](#)

If primary therapy radiation therapy ± chemotherapy (no surgery)

- Any of the following, not both:
  - PET/CT (CPT® 78815 or CPT® 78816) at least 12 weeks after completion of treatment
  - CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)
  - MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast if CT contrast allergy or inconclusive CT findings

Unresectable disease or metastatic disease on systemic treatment

- Every 2 cycles of treatment (commonly every 6 to 8 weeks):
  - CT Chest with contrast (CPT® 71260)
  - CT Abdomen/Pelvis with contrast (CPT® 74177)
  - CT with contrast of other involved or symptomatic areas
## ONC-23.4: Cervical Cancer – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>No routine advanced imaging needed.</td>
</tr>
</tbody>
</table>
References


## ONC-24: Anal Cancer & Cancers of the External Genitalia

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>ONC-24.1: Anal Carcinoma – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-24.2: Anal Carcinoma – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-24.3: Anal Carcinoma – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-24.4: Anal Carcinoma – Surveillance</td>
</tr>
<tr>
<td>ONC-24.5: Cancers of External Genitalia – General Considerations</td>
</tr>
<tr>
<td>ONC-24.6: Cancers of External Genitalia – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-24.7: Cancers of External Genitalia – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-24.8: Cancers of External Genitalia – Surveillance</td>
</tr>
</tbody>
</table>

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ONC-24.0: Anal Carcinoma – General Considerations

- Most are squamous cell carcinomas, although some transitional and cloacogenic carcinomas are seen.
- Tumors reported as adenocarcinomas of the anal canal are treated as rectal cancers.
- Squamous cell carcinoma of the perianal region (up to 5 cm radius from the anal verge) are imaged according to anal carcinoma guidelines.
- Bowen’s disease and Paget’s disease of the perianal and perigenital skin are considered non-invasive/in-situ conditions and do not routinely require advanced imaging. See **ONC-5.6: Non-Melanoma Skin Cancers – Initial Work-up/Staging**.
### ONC-24.1: Anal Carcinoma – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>Advanced imaging prior to biopsy is not needed</td>
</tr>
</tbody>
</table>
### ONC-24.2: Anal Carcinoma – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All patients</td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
<tr>
<td>Stage II-III Squamous Cell Carcinoma of the Anal Canal and no evidence of metastatic disease by conventional imaging</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td></td>
</tr>
</tbody>
</table>
# ONC-24.3: Anal Carcinoma – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I and II patients</td>
<td>See <strong>ONC-24.4 for surveillance guidelines</strong></td>
</tr>
</tbody>
</table>
| Stage III and IV patients | - CT Abdomen/Pelvis with contrast (CPT® 74177) every 2 cycles (generally 6 to 8 weeks) during treatment and at the end of planned chemotherapy treatment  
- CT Chest (CPT® 71260) if chest x-ray is abnormal or if symptoms of chest involvement  
- Difficult or abnormal examination  
- Elevated LFTs  
- Signs or symptoms of recurrence  
- Biopsy proven recurrence  
| Inconclusive findings on conventional imaging | - CT Chest (CPT® 71260) with contrast  
One of the following:  
- CT Abdomen/Pelvis with contrast (CPT® 74177)  
- MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast  
- PET/CT (CPT® 78815) |
### ONC-24.4: Anal Carcinoma – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>For all stages</td>
<td>- CT Chest (CPT® 71260) with contrast or CT Chest without contrast (CPT® 71250) annually for 3 years</td>
</tr>
<tr>
<td></td>
<td>- ONE of the following annually for three years:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
</tbody>
</table>
ONC-24.5: Cancers of External Genitalia – General Considerations

- These imaging guidelines are applicable for squamous cell carcinomas arising from the vulva, vagina, penis and scrotum
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>For stage II or higher</td>
<td>One of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen with contrast (CPT® 74160) and MRI Pelvis without and with contrast (CPT® 72197)</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260) is indicated only for:</td>
</tr>
<tr>
<td></td>
<td>- Signs/symptoms suggestive of chest involvement</td>
</tr>
<tr>
<td></td>
<td>- Abnormal findings on chest X-ray</td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
# ONC-24.7: Cancers of External Genitalia – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difficult or abnormal examination</td>
<td>CT Chest (CPT® 71260) with contrast and any one of the following:</td>
</tr>
<tr>
<td>Elevated LFTs</td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>Signs or symptoms of recurrence</td>
<td>MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>Biopsy proven recurrence</td>
<td></td>
</tr>
<tr>
<td>Individuals receiving systemic treatment</td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177) every 2 cycles (generally 6 to 8 weeks) during treatment and at the end of planned chemotherapy treatment</td>
</tr>
<tr>
<td></td>
<td>CT Chest (CPT® 71260) if chest x-ray is abnormal or if symptoms of chest involvement</td>
</tr>
<tr>
<td>Inconclusive findings on conventional imaging</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
</tbody>
</table>
### ONC-24.8: Cancers of External Genitalia – Surveillance

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All stages of vulvar and vaginal cancers</td>
<td>Routine advanced imaging is not indicated for asymptomatic surveillance</td>
</tr>
<tr>
<td>Penile Cancer: stage I-IIIA</td>
<td>Routine advanced imaging is not indicated for asymptomatic surveillance</td>
</tr>
<tr>
<td>Penile cancer: stages IIIB and higher</td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177) every 3 months for year 1, and then every 6 months for year 2, then no further routine advanced imaging indicated</td>
</tr>
</tbody>
</table>
**References**


## ONC-25: Multiple Myeloma and Plasmacytomas

<table>
<thead>
<tr>
<th>ONC-25.0</th>
<th>Multiple Myeloma and Plasmacytomas – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-25.1</td>
<td>Multiple Myeloma and Plasmacytomas – Suspected/Diagnosis</td>
</tr>
<tr>
<td>ONC-25.2</td>
<td>Multiple Myeloma and Plasmacytomas – Initial Work-up/Staging</td>
</tr>
<tr>
<td>ONC-25.3</td>
<td>Multiple Myeloma and Plasmacytomas – Restaging/Recurrence</td>
</tr>
<tr>
<td>ONC-25.4</td>
<td>Multiple Myeloma and Plasmacytomas – Surveillance</td>
</tr>
</tbody>
</table>
**ONC-25.0: Multiple Myeloma and Plasmacytomas – General Considerations**

- Multiple myeloma (MM) is a neoplastic disorder characterized by the proliferation of a single clone of plasma cells derived from B cells which grows in the bone marrow and adjacent bone, producing skeletal destruction.

- Multiple myeloma group of disorders can be classified as below, which influence imaging modality of choice.

<table>
<thead>
<tr>
<th>Condition</th>
<th>Monoclonal protein</th>
<th>Bone marrow plasma cells</th>
<th>CRAB criteria**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solitary Plasmacytoma (biopsy proven tumor containing plasma cells)</td>
<td>&lt; 3 gm/dL</td>
<td>Absent</td>
<td>Absent</td>
</tr>
<tr>
<td>Monoclonal Gammapathy of Unknown Significance (MGUS)</td>
<td>&lt; 3 gm/dL</td>
<td>&lt; 10%</td>
<td>Absent</td>
</tr>
<tr>
<td>Smoldering Myeloma (SMM) (stage I MM or asymptomatic MM)</td>
<td>≥ 3 gm/dL</td>
<td>10% - 60%</td>
<td>Absent</td>
</tr>
<tr>
<td>Multiple Myeloma (MM)</td>
<td>≥ 3 gm/dL</td>
<td>≥ 10%</td>
<td>Present</td>
</tr>
</tbody>
</table>

**CRAB criteria = hypercalcemia, renal insufficiency, anemia, lytic bony lesions**

- Diagnosis and monitoring of response to therapy is primarily with laboratory studies that include urine and serum monoclonal protein levels, serum free light chain levels, LDH and beta-2 microglobulin. Routine advanced imaging to monitor response to treatment is not indicated.

- PET scans have not been shown to significantly alter therapeutic decisions and may only provide prognostic information.

- Rarely, (< 5%), an individual may have Nonsecretory Myeloma, which does not produce measurable M-protein. These patients require imaging as primary method to monitor disease.

- For myeloma-like and lymphoma-like disease, see **ONC-27: Non-Hodgkin Lymphomas**.

- Other conditions that may present with Monoclonal Gammapathy include:
  - **POEMS syndrome**: Polyneuropathy, Organomegaly, Endocrinopathy, Monoclonal protein and Skin Changes – these patients may also have sclerotic bone lesions and Castleman’s disease
  - **Waldenstrom’s Macroglobulinemia**: IgM monoclonal protein along with bone marrow infiltration of small lymphocytes. See **ONC-27: Non-Hodgkin Lymphomas** for imaging recommendations.
  - **Light chain Amyloidosis**: light chain monoclonal protein in serum or urine with clonal plasma cells in bone marrow, systemic involvement of the kidneys, liver, heart, gastrointestinal tract or peripheral nerves due to amyloid deposition. See **ONC-25: Multiple Myeloma and Plasmacytomas** for imaging recommendations.
### ONC-25.1: Multiple Myeloma and Plasmacytomas – Suspected/Diagnosis

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td>X-ray skeletal series</td>
</tr>
</tbody>
</table>
### ONC-25.2: Multiple Myeloma and Plasmacytomas – Initial Work-up/Staging

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following:</td>
<td>Whole body low-dose skeletal CT scan (CPT® 76497)</td>
</tr>
<tr>
<td>◦ Abnormal skeletal survey</td>
<td></td>
</tr>
<tr>
<td>◦ Abnormal myeloma labs</td>
<td></td>
</tr>
<tr>
<td>◦ Signs/symptoms of multiple myeloma</td>
<td></td>
</tr>
<tr>
<td>If skeletal CT is negative, inconclusive, or not feasible</td>
<td>Any one of the following:</td>
</tr>
<tr>
<td>◦ MRI Bone Marrow Blood Supply (CPT® 77084)</td>
<td></td>
</tr>
<tr>
<td>◦ MRI Cervical (CPT® 72141), Thoracic (CPT® 72146), Lumbar spine (CPT® 72148), and Pelvis (CPT® 72195) without contrast</td>
<td></td>
</tr>
<tr>
<td>◦ MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), Lumbar spine (CPT® 72158), and Pelvis (CPT® 72197) without and with contrast</td>
<td></td>
</tr>
<tr>
<td>◦ CT contrast as requested of a specific area to determine radiotherapy or surgical candidacy, or for suspected extraosseous plasmacytoma</td>
<td></td>
</tr>
<tr>
<td>For any of the following (after the tests listed above are completed):</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>◦ Determining if a plasmacytoma is truly solitary</td>
<td></td>
</tr>
<tr>
<td>◦ Suspected extraosseous plasmacytomas</td>
<td></td>
</tr>
<tr>
<td>◦ Suspected progression of MGUS or SMM to a more malignant form and CT/MRI imaging are negative</td>
<td></td>
</tr>
<tr>
<td>◦ Inconclusive or negative conventional imaging</td>
<td></td>
</tr>
</tbody>
</table>
# ONC-25.3: Multiple Myeloma and Plasmacytomas – Restaging/Recurrence

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extra-osseous plasmacytoma response to initial therapy</td>
<td>CT contrast as requested or MRI without contrast, or MRI without and with contrast of any previously involved area</td>
</tr>
<tr>
<td>Laboratory tests fail to normalize with treatment</td>
<td>CT contrast as requested or MRI without contrast or MRI without and with contrast of symptomatic areas</td>
</tr>
<tr>
<td>Known spine involvement with new neurological signs/symptoms or worsening pain</td>
<td>MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), Lumbar spine (CPT® 72158) without and with contrast</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>One of the following:</td>
</tr>
<tr>
<td>- Suspected relapse/recurrence</td>
<td>Whole body low-dose skeletal CT scan (CPT® 76497)</td>
</tr>
<tr>
<td>- Suspected progression of MGUS or SMM to a more malignant form</td>
<td>MRI Bone Marrow Blood Supply (CPT® 77084)</td>
</tr>
<tr>
<td>- To determine therapy response with inconclusive labs</td>
<td>MRI Cervical (CPT® 72141), Thoracic (CPT® 72146), Lumbar spine (CPT® 72148), and Pelvis (CPT® 72195) without contrast</td>
</tr>
<tr>
<td>- Negative PET will allow change in management from active treatment to maintenance or surveillance.</td>
<td>MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), Lumbar spine (CPT® 72158), and Pelvis (CPT® 72197) without and with contrast</td>
</tr>
<tr>
<td>- Determine additional therapies in refractory disease or non-secretory disease. These requests will be forwarded for Medical Director review.</td>
<td>MRI without contrast, or MRI without and with contrast for any previously involved bony area or symptomatic area</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>Stem cell transplant recipients</td>
<td>One of the following, once before transplant and once after transplant:</td>
</tr>
<tr>
<td></td>
<td>Whole body low-dose skeletal CT scan (CPT® 76497)</td>
</tr>
<tr>
<td></td>
<td>MRI Bone Marrow Blood Supply (CPT® 77084)</td>
</tr>
<tr>
<td></td>
<td>MRI Cervical (CPT® 72141), Thoracic (CPT® 72146), Lumbar spine (CPT® 72148), and Pelvis (CPT® 72195) without Contrast</td>
</tr>
<tr>
<td></td>
<td>MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), Lumbar spine (CPT® 72158), and Pelvis (CPT® 72197) without and with contrast</td>
</tr>
</tbody>
</table>
**ONC-25.4: Multiple Myeloma and Plasmacytomas – Surveillance**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Study</th>
</tr>
</thead>
</table>
| ✷ Plasmacytomas  
✷ Smoldering myeloma                          | Any one of the following annually for 5 years:                        |
|                                                 | ✷ Whole body low-dose skeletal CT scan (CPT® 76497)                    |
|                                                 | ✷ Skeletal survey annually                                           |
| Multiple myeloma after treatment and/or after stem cell transplant | ✷ Advanced imaging is not routinely indicated for surveillance in asymptomatic individuals |
References
## ONC-26: Leukemias, Myelodysplasia and Myeloproliferative Neoplasms

<table>
<thead>
<tr>
<th>ONC-26.1: Leukemias, Myelodysplasia and Myeloproliferative Neoplasms – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-26.2: Acute Leukemias</td>
</tr>
<tr>
<td>ONC-26.3: Chronic Myeloid Leukemias, Myelodysplastic Syndrome and Myeloproliferative Disorders</td>
</tr>
<tr>
<td>ONC-26.4: Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL)</td>
</tr>
</tbody>
</table>
ONC-26.1: Leukemias, Myelodysplasia and Myeloproliferative Neoplasms – General Considerations

- PET imaging is considered investigational and experimental for all indications in acute lymphoblastic leukemia, acute myeloid leukemia, and chronic myeloid leukemia.

- Routine advanced imaging is not indicated in the evaluation and management of Hairy cell leukemia in the absence of specific localizing clinical symptoms.
ONC-26.2: Acute Leukemias

- Imaging indications for acute lymphoblastic leukemia in adult patients are identical to those for pediatric patients. See PEDONC-3.2: Acute Lymphoblastic Leukemia (ALL) for imaging guidelines.

- Imaging indications for acute myeloid leukemia in adult patients are identical to those for pediatric patients. See PEDONC-3.3: Acute Myeloid Leukemia (AML) for imaging guidelines.
**ONC-26.3: Chronic Myeloid Leukemias, Myelodysplastic Syndrome and Myeloproliferative Disorders**

- Routine advanced imaging is not indicated in the evaluation and management of chronic myeloid leukemias, myelodysplastic syndromes or myeloproliferative disorders in the absence of specific localizing clinical symptoms or clearance for hematopoietic stem cell transplantation.

- See **ONC-29: Hematopoietic Stem Cell Transplantation** for imaging guidelines related to transplant.

- For work-up of elevated blood counts, see **ONC-30.3: Paraneoplastic Syndromes – General Considerations**
**Oncology Imaging**

**ONC-26.4: Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL)**

- PET imaging is not indicated in the evaluation of CLL/SLL with the exception of suspected Richter’s transformation (see Suspected transformation, below)
- CLL/SLL is monitored with serial laboratory studies. Routine advanced imaging is not indicated for monitoring treatment response or surveillance, except when initial studies reveal bulky disease involvement.
- Bulky disease is defined as lymph node mass > 5 cm or spleen > 6 cm below costal margin

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging/Diagnosis</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td><strong>Treatment Response</strong></td>
<td>For patients with bulky nodal disease at diagnosis, CT with contrast of previously involved area(s) every 2 cycles of therapy</td>
</tr>
<tr>
<td></td>
<td>- Routine imaging is not indicated for patients without bulky nodal disease at diagnosis</td>
</tr>
<tr>
<td><strong>End of Therapy Evaluation</strong></td>
<td>For patients with bulky nodal disease at diagnosis, CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td><strong>Suspected progression</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td><strong>Suspected transformation (Richter’s) from a low grade lymphoma to a more aggressive type based on one or more of the following:</strong></td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td></td>
<td>- New B symptoms</td>
</tr>
<tr>
<td></td>
<td>- Rapidly growing lymph nodes</td>
</tr>
<tr>
<td></td>
<td>- Extranodal disease develops</td>
</tr>
<tr>
<td></td>
<td>- Significant recent rise in LDH above normal range</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>For patients with bulky nodal disease at diagnosis, every 6 months for two years, then annually:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>- Routine imaging is not indicated for patients without bulky nodal disease at diagnosis</td>
</tr>
</tbody>
</table>
References
## ONC-27: Non-Hodgkin Lymphomas

<table>
<thead>
<tr>
<th>ONC-27.1</th>
<th>Non-Hodgkin Lymphomas – General Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-27.2</td>
<td>Diffuse Large B Cell Lymphoma (DLBCL)</td>
</tr>
<tr>
<td>ONC-27.3</td>
<td>Follicular Lymphoma</td>
</tr>
<tr>
<td>ONC-27.4</td>
<td>Marginal Zone Lymphomas</td>
</tr>
<tr>
<td>ONC-27.5</td>
<td>Mantle Cell Lymphoma</td>
</tr>
<tr>
<td>ONC-27.6</td>
<td>Burkitt’s Lymphomas</td>
</tr>
<tr>
<td>ONC-27.7</td>
<td>Lymphoblastic Lymphomas</td>
</tr>
<tr>
<td>ONC-27.8</td>
<td>Cutaneous Lymphoma and T Cell Lymphomas</td>
</tr>
</tbody>
</table>
### ONC-27.1: Non-Hodgkin Lymphomas – General Considerations

- Lymphoma is often suspected when patients have any of the following:
  - Bulky lymphadenopathy (lymph node mass > 5 cm in size), hepatomegaly or splenomegaly
  - The presence of systemic symptoms (fever, drenching night sweats or unintended weight loss of > 10%, called “B symptoms”)

- See **ONC-31.11: Castleman’s Disease (Unicentric and Multicentric)** for guidelines covering Castleman’s disease.

- See **ONC-26.4: Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL)** for guidelines covering Chronic Lymphocytic Leukemia (CLL)/Small Lymphocytic Lymphoma (SLL).

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of suspected or biopsy proven lymphoma</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>- MRI without and with contrast for individuals who cannot tolerate CT contrast due to allergy or impaired renal function</td>
</tr>
<tr>
<td>Signs or symptoms of disease involving the neck</td>
<td>CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>Signs or symptoms suggesting CNS involvement with lymphoma.</td>
<td>MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>- See <strong>ONC-2.7: CNS Lymphoma (also known as Microglioma)</strong></td>
</tr>
<tr>
<td>Known or suspected bone involvement with lymphoma</td>
<td>MRI without and with contrast of symptomatic or previously involved bony areas</td>
</tr>
<tr>
<td></td>
<td>- Bone scan is inferior to MRI for evaluation of known or suspected bone involvement with lymphoma</td>
</tr>
<tr>
<td>Determine a more favorable site for biopsy when a relatively inaccessible site is contemplated</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT is not medically necessary for all other indications prior to histological confirmation of lymphoma</td>
</tr>
</tbody>
</table>
**ONC-27.2: Diffuse Large B Cell Lymphoma (DLBCL)**

- Grey zone lymphomas, primary mediastinal B cell lymphomas, grade 3 (high) follicular lymphoma and double-hit or triple-hit lymphomas should also be imaged according to these guidelines.

- Post-transplant lymphoproliferative disorder (PTLD) or viral-associated lymphoproliferative disorder can rarely occur following solid organ or hematopoietic stem cell transplantation, or in primary immunodeficiency. These disorders may be treated similarly to high grade NHL when altering immunosuppressive regimens is unsuccessful, are highly FDG-avid, and should be imaged according to this section.

- PET/CT scan is not generally supported for interim restaging (monitoring response to treatment) due to increased false-positive results. Treatment intensification based on positive interim PET/CT scan does not improve outcomes. Any positive findings noted on an interim PET/CT scan should be biopsied before changing treatment.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Staging/Diagnosis</td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>Treatment Response</td>
<td>Any or all of the following may be approved every 2 cycles of therapy:</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT is not indicated for monitoring response, but can be considered in</td>
</tr>
<tr>
<td></td>
<td>rare circumstances when CT did not show disease (e.g. bone). These cases</td>
</tr>
<tr>
<td></td>
<td>should be forwarded for Medical Director review.</td>
</tr>
<tr>
<td>End of Chemotherapy and/or Radiation Therapy</td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td>Evaluation</td>
<td>- PET/CT (CPT® 78815 or CPT® 78816) may be approved at the end of chemo and</td>
</tr>
<tr>
<td></td>
<td>again at the end of radiation</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td>Suspected or Biopsy-Confirmed Recurrence</td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT can be considered in rare circumstances (e.g. bone involvement).</td>
</tr>
<tr>
<td></td>
<td>These cases should be forwarded for Medical Director review.</td>
</tr>
<tr>
<td>CAR-T cell therapy</td>
<td>Once before treatment and once 30-60 days after completion of treatment:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>Surveillance</td>
<td>- Stage I and II:</td>
</tr>
<tr>
<td></td>
<td>- No routine advanced imaging indicated</td>
</tr>
<tr>
<td></td>
<td>- Stage III and IV:</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s) every 6 months for two</td>
</tr>
<tr>
<td></td>
<td>years, then no further routine advanced imaging</td>
</tr>
</tbody>
</table>
## ONC-27.3: Follicular Lymphoma

This section applies to follicular lymphomas with WHO grade of 1 (low) or 2 (intermediate). Grade 3 (high) follicular lymphomas should be imaged according to **ONC-27.2: Diffuse Large B Cell Lymphoma (DLBCL)**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Staging/Diagnosis</td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>If radiation therapy is being considered for stage I or II disease:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>Treatment Response</td>
<td>CT with contrast of previously involved area(s) every 2 cycles of therapy</td>
</tr>
<tr>
<td>End of Therapy Evaluation</td>
<td>One of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>Suspected Recurrence</td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td>Suspected transformation (Richter’s) from a low grade lymphoma to a more aggressive type based on one or more of the following:</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>New B symptoms</td>
<td></td>
</tr>
<tr>
<td>Rapidly growing lymph nodes</td>
<td></td>
</tr>
<tr>
<td>Extranodal disease develops</td>
<td></td>
</tr>
<tr>
<td>Significant recent rise in LDH above normal range</td>
<td></td>
</tr>
<tr>
<td>Surveillance</td>
<td>For all stages, every 6 months for two years, then annually:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
</tbody>
</table>
**ONC-27.4: Marginal Zone Lymphomas**

- MALT lymphomas in any location should also be imaged according to these guidelines.
- Splenic Marginal Zone Lymphoma is diagnosed with splenomegaly, peripheral blood flow cytometry and bone marrow biopsy. Splenectomy is diagnostic and therapeutic. PET scan is not routinely indicated prior to splenectomy.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging/Diagnosis</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>If radiation therapy is being considered for stage I or II disease:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td><strong>Treatment Response</strong></td>
<td>CT with contrast of previously involved area(s) every 2 cycles of therapy</td>
</tr>
<tr>
<td><strong>End of Therapy Evaluation</strong></td>
<td>One of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td><strong>Suspected Recurrence</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT can be considered in rare circumstances (e.g. bone involvement).</td>
</tr>
<tr>
<td></td>
<td>These cases should be forwarded for Medical Director review.</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>For all stages of nodal marginal zone lymphoma, the following is indicated</td>
</tr>
<tr>
<td></td>
<td>every 6 months for two years, then annually:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>All stages of extranodal marginal zone lymphoma:</td>
</tr>
<tr>
<td></td>
<td>- No routine advanced imaging indicated</td>
</tr>
</tbody>
</table>
# ONC-27.5: Mantle Cell Lymphoma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| **Initial Staging/Diagnosis** | Any or all of the following may be approved:  
  ✦ CT Chest with contrast (CPT® 71260)  
  ✦ CT Abdomen/Pelvis with contrast (CPT® 74177)  
  If radiation therapy is being considered for stage I or II disease:  
  ✦ PET/CT (CPT® 78815 or CPT® 78816) |
| **Treatment Response**      | ✦ CT with contrast of previously involved area(s) every 2 cycles of therapy  
  ✦ PET/CT is not indicated for monitoring treatment response, but can be considered in rare circumstances when CT did not show disease (e.g. bone). These cases should be forwarded for Medical Director review |
| **End of Therapy Evaluation** | One of the following may be approved:  
  ✦ CT with contrast of previously involved area(s)  
  ✦ PET/CT (CPT® 78815 or CPT® 78816) |
| **Suspected Recurrence**   | Any or all of the following may be approved:  
  ✦ CT Chest with contrast (CPT® 71260)  
  ✦ CT Abdomen/Pelvis with contrast (CPT® 74177)  
  ✦ CT with contrast of previously involved area(s)  
  ✦ PET/CT can be considered in rare circumstances (e.g. bone involvement). These cases should be forwarded for Medical Director review. |
| **Surveillance**            | All Stages of Disease:  
  ✦ CT Chest with contrast (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177) every 6 months for 2 years |
## ONC-27.6: Burkitt’s Lymphomas

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| **Initial Staging/Diagnosis** | Any or all of the following may be approved:  
  - PET/CT (CPT® 78815 or CPT® 78816)  
  - CT Chest with contrast (CPT® 71260)  
  - CT Abdomen/Pelvis with contrast (CPT® 74177) |
| **Treatment Response**      |  
  - CT with contrast of previously involved area(s) every 2 cycles of therapy  
  - PET/CT is not indicated for monitoring treatment response, but can be considered in rare circumstances when CT did not show disease (e.g. bone). These cases should be forwarded for Medical Director review. |
| **End of Therapy Evaluation** | Any or all of the following may be approved:  
  - PET/CT (CPT® 78815 or CPT® 78816) may be approved at the end of chemo and again at the end of radiation  
  - CT with contrast of previously involved area(s) |
| **Suspected Recurrence**    | Any or all of the following may be approved:  
  - CT Chest with contrast (CPT® 71260)  
  - CT Abdomen/Pelvis with contrast (CPT® 74177)  
  - CT with contrast of previously involved area(s)  
  - PET/CT can be considered in rare circumstances (e.g bone involvement). These cases should be forwarded for Medical Director review. |
| **Surveillance**            | All Stages of Disease:  
  - No routine advanced imaging indicated |
**ONC-27.7: Lymphoblastic Lymphomas**

- Patients with lymphoblastic lymphoma (even those with bulky nodal disease) are treated using the leukemia treatment plan appropriate to the cell type (B or T cell). Imaging indications in adult patients are identical to those for pediatric patients. See [PEDONC-3.2: Acute Lymphoblastic Leukemia (ALL)] for imaging guidelines.
### ONC-27.8: Cutaneous Lymphoma and T Cell Lymphomas

Includes Primary Cutaneous B Cell Lymphomas, Peripheral T-Cell Lymphomas, Mycosis Fungoides/Sézary Syndrome, Anaplastic Large Cell Lymphoma, Primary Cutaneous CD30+T Cell Lymphoproliferative Disorders

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging/Diagnosis</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td></td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td><strong>Treatment Response</strong></td>
<td>CT with contrast of previously involved area(s) every 2 cycles of therapy</td>
</tr>
<tr>
<td></td>
<td>PET/CT is not indicated for monitoring treatment response, but can be considered in rare circumstances when CT did not show disease (e.g. bone). These cases should be forwarded for Medical Director review</td>
</tr>
<tr>
<td><strong>End of Therapy Evaluation</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>PET/CT (CPT® 78815 or CPT® 78816) may be approved at the end of chemo and again at the end of radiation</td>
</tr>
<tr>
<td><strong>Suspected Recurrence</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>PET/CT can be considered in rare circumstances (e.g. bone involvement). These cases should be forwarded for Medical Director review</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>Stage I and II:</td>
</tr>
<tr>
<td></td>
<td>No routine advanced imaging indicated</td>
</tr>
<tr>
<td></td>
<td>Stage III and IV:</td>
</tr>
<tr>
<td></td>
<td>CT with contrast of previously involved area(s) every 6 months for two years, then no further routine advanced imaging</td>
</tr>
</tbody>
</table>

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References


<table>
<thead>
<tr>
<th>ONC-28: Hodgkin Lymphoma</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ONC-28.1:</strong> Hodgkin Lymphoma – General Considerations</td>
</tr>
<tr>
<td><strong>ONC-28.2:</strong> Classical Hodgkin Lymphoma</td>
</tr>
<tr>
<td><strong>ONC-28.3:</strong> Nodular Lymphocyte – Predominant Hodgkin Lymphoma</td>
</tr>
</tbody>
</table>
ONC-28.1: Hodgkin Lymphoma – General Considerations

- Lymphoma is often suspected when patients have any of the following:
  - Bulky lymphadenopathy (lymph node mass > 5 cm in size), hepatomegaly or splenomegaly
  - The presence of systemic symptoms (fever, drenching night sweats or unintended weight loss of > 10%, called “B symptoms”)

- Patients with AIDS-related lymphoma should be imaged according to the primary lymphoma histology

- The Deauville Criteria are internationally accepted criteria, which utilize a five-point scoring system for the FDG avidity of a Hodgkin’s lymphoma or Non-Hodgkin’s lymphoma tumor mass as seen on FDG PET.
  - Score 1: No uptake above the background
  - Score 2: Uptake ≤ mediastinum
  - Score 3: Uptake > mediastinum but ≤ liver
  - Score 4: Uptake moderately increased compared to the liver at any site
  - Score 5: Uptake markedly increased compared to the liver at any site
  - Score X: New areas of uptake unlikely to be related to lymphoma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of suspected or biopsy proven lymphoma</td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>MRI without and with contrast for individuals who cannot tolerate CT contrast</td>
</tr>
<tr>
<td></td>
<td>due to allergy or impaired renal function</td>
</tr>
<tr>
<td>Signs or symptoms of disease involving the neck</td>
<td>CT Neck with contrast (CPT® 70491)</td>
</tr>
<tr>
<td>Signs or symptoms suggesting CNS involvement with lymphoma.</td>
<td>MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>See ONC-2.7: CNS Lymphoma (also known as Microglioma)</td>
</tr>
<tr>
<td>Known or suspected bone involvement with lymphoma</td>
<td>MRI without and with contrast of symptomatic or previously involved bony areas</td>
</tr>
<tr>
<td></td>
<td>Bone scan is inferior to MRI for evaluation of known or suspected bone invasion</td>
</tr>
<tr>
<td></td>
<td>with lymphoma</td>
</tr>
<tr>
<td>Determine a more favorable site for biopsy when a relatively inaccessible site is contemplated</td>
<td>PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td></td>
<td>PET/CT is medically unnecessary for all other indications prior to histological confirmation of lymphoma</td>
</tr>
</tbody>
</table>
# ONC-28.2: Classical Hodgkin Lymphoma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging/Diagnosis</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td><strong>Treatment Response</strong></td>
<td>One of the following, not both:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816) as frequently as every 2 cycles</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved areas as frequently as every 2 cycles</td>
</tr>
<tr>
<td><strong>End of Chemotherapy and/or Radiation Therapy Evaluation</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815 or CPT® 78816) may be approved at the end of chemo and again at the end of radiation (after 12 weeks of completion of radiation therapy)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td><strong>Suspected Recurrence</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>Any or all of the following may be approved at 6, 12, and 24 months after completion of therapy:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>In addition to the above studies:</td>
</tr>
<tr>
<td></td>
<td>- A single follow-up PET/CT may be approved</td>
</tr>
<tr>
<td></td>
<td>&gt; 12 weeks after radiation therapy if end of therapy PET/CT report documents Deauville 4 or 5 FDG avidity</td>
</tr>
</tbody>
</table>
# ONC-28.3: Nodular Lymphocyte – Predominant Hodgkin Lymphoma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial Staging/Diagnosis</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>♦ PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td></td>
<td>♦ CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>♦ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td><strong>Treatment Response</strong></td>
<td>One of the following, not both:</td>
</tr>
<tr>
<td></td>
<td>♦ PET/CT (CPT® 78815 or CPT® 78816) as frequently as every 2 cycles</td>
</tr>
<tr>
<td></td>
<td>♦ CT with contrast of previously involved areas as frequently as every 2 cycles</td>
</tr>
<tr>
<td><strong>End of Chemotherapy and/or Radiation Therapy Evaluation</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>♦ PET/CT (CPT® 78815 or CPT® 78816) may be approved at the end of chemo and again at the end of radiation (after 12 weeks of completion of radiation therapy)</td>
</tr>
<tr>
<td></td>
<td>♦ CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td><strong>Suspected Recurrence</strong></td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td></td>
<td>♦ CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>♦ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>♦ CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td><strong>Suspected transformation (Richter’s) from a low grade lymphoma to a more aggressive type based on one or more of the following:</strong></td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td></td>
<td>♦ New B symptoms</td>
</tr>
<tr>
<td></td>
<td>♦ Rapidly growing lymph nodes</td>
</tr>
<tr>
<td></td>
<td>♦ Extranodal disease develops</td>
</tr>
<tr>
<td></td>
<td>♦ Significant recent rise in LDH above normal range</td>
</tr>
<tr>
<td><strong>Surveillance</strong></td>
<td>Any or all of the following may be approved at 6, 12, and 24 months after completion of therapy:</td>
</tr>
<tr>
<td></td>
<td>♦ CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td></td>
<td>♦ CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>♦ CT with contrast of previously involved area(s)</td>
</tr>
<tr>
<td></td>
<td>In addition to the above studies:</td>
</tr>
<tr>
<td></td>
<td>♦ A single follow-up PET/CT may be approved &gt; 12 weeks after radiation therapy if end of therapy PET/CT report documents Deauville 4 or 5 FDG avidity</td>
</tr>
</tbody>
</table>
References
ONC-29: Hematopoietic Stem Cell Transplantation

ONC-29.1: General Considerations for Stem Cell Transplant
Oncology Imaging

ONC-29.1: General Considerations for Stem Cell Transplant

**Transplant types:**

**Allogeneic ("allo"):** The donor and recipient are different people, and there are multiple types depending on the source of the stem cells and degree of match between donor and recipient. This is most commonly used in diseases originating in the hematopoietic system, such as leukemias and lymphomas, and bone marrow failure syndromes or metabolic disorders. Common types are:

- Matched sibling donor (MSD or MRD): Donor and recipient are full siblings and HLA-matched
- Matched unrelated donor (MUD): Donor and recipient are HLA matched but not related to each other
- Cord blood: Donor stem cells come from frozen umbilical cord blood not related to the recipient, sometimes from multiple different donors at once
- Haploidentical transplant (haplo): Donor is a half-HLA match to the recipient, usually a parent

**Autologous ("auto"):** The donor and recipient are the same person. The process involves delivery of high dose chemotherapy that is ablative to the bone marrow, followed by an infusion of one’s own harvested stem cells.

Allogeneic HSCT results in a much greater degree of immunosuppression than autologous HSCT because of the need to allow the new immune system to chimerize with the recipient’s body. Immune reconstitution commonly takes more than a year for individuals who receive allogeneic HSCT, and individuals remain at high risk for invasive infections until that has occurred.
# Pre-Transplant Imaging in HSCT:

Pre-transplant imaging in HSCT generally takes place within 30 days prior to transplant and involves a reassessment of the individual’s disease status as well as infectious disease clearance.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging</th>
</tr>
</thead>
</table>
| Immediate pre-transplant period         | - Chest x-ray  
  - CT Chest with contrast (CPT® 71260) or CT Chest without contrast (CPT® 71250) for new findings on CXR, or new/worsening signs/symptoms.  
  - CT Sinus (CPT® 70486) if clinically indicated |
| Assess cardiac function                 | - Echocardiogram (CPT®93306, CPT®93307 or CPT® 93308)  
  - MUGA scan (CPT® 78472) may be indicated in specific circumstances, see: [CD-12.1: Oncologic Indications for Cancer Therapeutics-Related Cardiac Dysfunction (CTRCD)] |
| Assess pulmonary function               | - Pulmonary function tests                                               |
| Assess primary disease status           | - See disease-specific guideline                                         |
Post-Transplant Imaging in HSCT:

- There are many common complications from HSCT, including infection, graft versus host disease, hepatic sinusoidal obstruction syndrome, restrictive lung disease, among others.
- Disease response generally takes place at ~Day +30 (autos and some allos) or ~Day +100 (allos) post-transplant.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assess known or suspected HSCT complications</td>
<td>◆ Site-specific imaging should generally be approved</td>
</tr>
<tr>
<td>Assess primary disease status post-transplant</td>
<td>◆ See disease-specific guidelines for end of therapy evaluation and surveillance</td>
</tr>
<tr>
<td>Individuals receiving tandem auto transplants (2-4 autos back-to-back, spaced 6 to 8 weeks apart)</td>
<td>◆ Guideline recommended imaging can be repeated after each transplant</td>
</tr>
<tr>
<td>Suspected Bronchiolitis obliterans with organizing pneumonia (BOOP)</td>
<td>◆ CT Chest without contrast (CPT® 71250)</td>
</tr>
</tbody>
</table>
References
   Hematopoietic Cell Transplantation, available at:
   https://www.nccn.org/professionals/physician_gls/pdf/hct.pdf. Referenced with permission from the
   NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®) for Hematopoietic Cell
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   complete version of the NCCN Guidelines®, go online to NCCN.org.
### ONC-30: Medical Conditions with Cancer in the Differential Diagnosis

<table>
<thead>
<tr>
<th>ONC-30.x</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-30.1</td>
<td>Fever of Unknown Origin (FUO)</td>
</tr>
<tr>
<td>ONC-30.2</td>
<td>Unexplained Weight Loss</td>
</tr>
<tr>
<td>ONC-30.3</td>
<td>Paraneoplastic Syndromes</td>
</tr>
</tbody>
</table>
**Oncology Imaging**

**ONC-30.1: Fever of Unknown Origin (FUO)**

- FUO is defined as a persistent fever ≥ 101°F and ≥ 3 weeks with unidentified cause.
- While fever is a classic “B” symptom of advanced lymphoma, a cancer-related fever presenting in isolation without any other signs or symptoms of neoplastic disease is rare.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| In addition to physical examination, based on suspected location, one can consider: | ✦ Chest x-ray  
✦ Echocardiogram (CPT® 93306)  
✦ Abdominal ultrasound (CPT® 76700)  
✦ MRI Brain without and with contrast (CPT® 70553) |
| Above studies (including PE/ENT exam, pelvic exam, and DRE with laboratory studies) have failed to demonstrate site of infection | ✦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast  
✦ Radiopharmaceutical localization of tumor or distribution of radiopharmaceutical agent(s): CPT® 78800, 78801, or 78802, CPT® 78804, CPT® 78803 or 78831 (SPECT), or CPT® 78830, or 78832 (SPECT/CT) |
| “B” symptoms                                                              | ✦ See **ONC-27: Non-Hodgkin Lymphomas**                                      |
| Any CNS sign/symptom accompanied by fever                                  | ✦ MRI Brain without and with contrast (CPT® 70553)                           |
| All patients                                                               | ✦ PET is not indicated in the work-up of patients with FUO                  |

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ONC-30.2: Unexplained Weight Loss

Unintentional weight loss is defined as loss of ≥ 10 lbs. or ≥5% of body weight over 6 months or less, without an identifiable reason.

<table>
<thead>
<tr>
<th>Potential causes of weight loss and initial evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dysphagia and early satiety</td>
</tr>
<tr>
<td>Panhypopituitarism or hyperthyroidism</td>
</tr>
<tr>
<td>Hypogonadism</td>
</tr>
<tr>
<td>Occult GI bleeding</td>
</tr>
<tr>
<td>Depression and early dementia</td>
</tr>
</tbody>
</table>

Advanced imaging, as follows, may be indicated if the initial evaluations did not identify the cause of weight loss.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any abnormality of pituitary hormones</td>
<td>✦ MRI of the sella turcica without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td>Elevated thyroglobulin level</td>
<td>✦ Nuclear thyroid scan, or</td>
</tr>
<tr>
<td></td>
<td>✦ Thyroid ultrasound (CPT® 76536)</td>
</tr>
<tr>
<td>Rule out renal, hepatic pathologies</td>
<td>✦ Abdominal ultrasound (CPT® 76700)</td>
</tr>
<tr>
<td>Rule out cardiac pathologies</td>
<td>✦ Echocardiogram (CPT® 93306)</td>
</tr>
<tr>
<td>For non-smokers</td>
<td>✦ Chest x-ray should be performed initially</td>
</tr>
<tr>
<td>For current or former smokers</td>
<td>✦ CT Chest with contrast (CPT® 71260)</td>
</tr>
<tr>
<td>If all of the above do not identify cause of weight loss</td>
<td>✦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
</tbody>
</table>

PET is not appropriate in the work-up of individuals with unexplained weight loss.
ONC-30.3: Paraneoplastic Syndromes

General Considerations

- Paraneoplastic syndromes are metabolic and neuromuscular disturbances. These syndromes are not directly related to a tumor or to metastatic disease. There may be a lead time between initial finding of a possible paraneoplastic syndrome and appearance of the cancer with imaging. Limited studies suggest annual imaging for 2 years after diagnosis of possible paraneoplastic syndrome may detect cancer, however benefit after 2 years is not well documented.

- The following are the most common symptoms of paraneoplastic syndromes known to arise from various malignancies:
  - Hypertrophic Pulmonary Osteoarthropathy: Often presents as a constellation of rheumatoid-like polyarthritis, periostitis of long bones, and clubbing of fingers and toes
  - Amyloidosis
  - Hypercalcemia
  - Hypophosphatemia
  - Cushing’s Syndrome
  - Somatostatinoma syndrome (vomiting, abdominal pain, diarrhea, cholelithiasis)
  - Syndrome of inappropriate antidiuretic hormone secretion (SIADH)
  - Polymyositis/dermatomyositis
  - Opsoclonus
  - Paraneoplastic sensory neuropathy
  - Subacute cerebellar degeneration
  - Eaton-Lambert syndrome (a myasthenia-like syndrome)
  - Second event of unprovoked thrombosis
  - Disseminated Intravascular Coagulation
  - Migratory thrombophlebitis
  - Polycythemia
  - Chronic leukocytosis and/or thrombocytosis
  - Elevated tumor markers

See also: PN-6: Muscle Disorders in the Peripheral Nerve Disorders Guidelines
See also: ONC-25: Multiple Myeloma and Plasmacytomas for evaluation of possible multiple myeloma.
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial evaluation</td>
<td>* CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>* PET/CT (CPT® 78815 or CPT® 78816)</td>
</tr>
<tr>
<td>- Abnormality on conventional imaging difficult to biopsy</td>
<td></td>
</tr>
<tr>
<td>- Inconclusive conventional imaging</td>
<td></td>
</tr>
<tr>
<td>- Documented paraneoplastic antibody and conventional imaging fails to demonstrate primary site</td>
<td></td>
</tr>
<tr>
<td>Subsequent evaluation for known paraneoplastic syndrome</td>
<td>* CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast may be repeated every 6 months for 2 years after initial imaging for Lambert-Eaton Myasthenia syndrome</td>
</tr>
<tr>
<td></td>
<td>* CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast may be repeated every 6 months for 4 years for all other paraneoplastic syndromes</td>
</tr>
<tr>
<td>Systemic mastocytosis</td>
<td>* Any one of the following:</td>
</tr>
<tr>
<td></td>
<td>- CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td></td>
<td>- MRI Abdomen (CPT® 74183) and MRI Pelvis (CPT® 72197) without and with contrast is indicated</td>
</tr>
<tr>
<td></td>
<td>- PET/CT scan is not indicated for evaluation of mastocytosis</td>
</tr>
<tr>
<td>First episode of unprovoked DVT/VTE</td>
<td>* Imaging to evaluate for malignancy is not indicated</td>
</tr>
<tr>
<td>Second unprovoked DVT/PE</td>
<td>* Imaging may be considered in the setting of a negative work-up for inherited thrombophilia and antiphospholipid syndrome</td>
</tr>
<tr>
<td>In addition thyroid US is recommended for elevated CEA, and upper/lower endoscopy is recommended for elevated CEA or CA 19-9.</td>
<td></td>
</tr>
</tbody>
</table>
References


## ONC-31: Metastatic Cancer, Carcinoma of Unknown Primary Site, and Other Types of Cancer

<table>
<thead>
<tr>
<th>ONC-31.1: Lung Metastases</th>
</tr>
</thead>
<tbody>
<tr>
<td>ONC-31.2: Liver Metastases</td>
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<tr>
<td>ONC-31.3: Brain Metastases</td>
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<tr>
<td>ONC-31.4: Adrenal Gland Metastases</td>
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<tr>
<td>ONC-31.5: Bone (including Vertebral) Metastases</td>
</tr>
<tr>
<td>ONC-31.6: Spinal Cord Compression</td>
</tr>
<tr>
<td>ONC-31.7: Carcinoma of Unknown Primary Site</td>
</tr>
<tr>
<td>ONC-31.8: Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors</td>
</tr>
<tr>
<td>ONC-31.9: Primary Peritoneal Mesothelioma</td>
</tr>
<tr>
<td>ONC-31.10: Kaposi’s Sarcoma</td>
</tr>
<tr>
<td>ONC-31.11: Castleman’s Disease (Unicentric and Multicentric)</td>
</tr>
</tbody>
</table>
Guideline sections **ONC-31.1: Lung Metastases** through **ONC-31.5: Bone (including Vertebral) Metastases** should only be used for patients with metastatic cancer in the following circumstances:
- The primary diagnosis section does not address a particular metastatic site that is addressed in these sections
- The cancer type is rare and does not have its own diagnosis-specific imaging guidelines

**ONC-31.1: Lung Metastases**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| New or worsening signs or symptoms suggestive of metastatic lung involvement or new or worsening chest x-ray abnormality | ◆ CT Chest with contrast (CPT® 71260)  
◆ CT Chest without contrast (CPT® 71250) can be approved if there is a contraindication to CT contrast or only parenchymal lesions are being evaluated |
| Chest wall or brachial plexus involvement                                  | ◆ MRI Chest without and with contrast (CPT® 71552)                             |
| One of the following and no diagnosis-specific guideline regarding PET imaging: | ◆ PET/CT (CPT® 78815)  
◆ When primary cancer known, PET request should be reviewed by primary cancer guideline |
| - Lung nodule(s) ≥ 8 mm                                                  |                                                                              |
| - Confirm solitary metastasis amenable to resection on conventional imaging |                                                                              |
| Previous or current malignancy and pulmonary nodule(s) that would reasonably metastasize to the lungs | ◆ CT Chest with contrast (CPT® 71260) at 3, 6, 12 and 24 months from the first study |
**ONC-31.2: Liver Metastases**

Ablation of liver metastases or primary HCC may be performed utilizing chemical, chemotherapeutic, radiofrequency, or radioactive isotope methods. **Regardless of the modality of ablation, PET is not indicated for assessing response to this mode of therapy.**

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>New or worsening signs or symptoms suggestive of metastatic liver involvement or new elevation in LFTs.</td>
<td>CT Abdomen with (CPT® 74160) or without and with contrast (CPT® 74170)</td>
</tr>
<tr>
<td>Any of the following:</td>
<td></td>
</tr>
<tr>
<td>✦ Considering limited resection</td>
<td>MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td>✦ Inconclusive CT findings</td>
<td></td>
</tr>
<tr>
<td>One of the following and no diagnosis-specific guideline regarding PET imaging:</td>
<td>PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>✦ Confirm solitary metastasis amenable to resection on conventional imaging</td>
<td>▪ When primary cancer known, PET request should be reviewed by primary cancer guideline</td>
</tr>
<tr>
<td>✦ LFT’s and/or tumor markers continue to rise and CT and MRI are negative</td>
<td></td>
</tr>
<tr>
<td>Monitoring of liver metastases that have been surgically resected</td>
<td>Review according to primary cancer guideline</td>
</tr>
<tr>
<td>Evaluation for hepatic artery chemotherapy infusion or chemoembolization with radioactive spheres (TheraSphere or SIR Spheres) for liver metastases or primary liver tumors:</td>
<td>CTA Abdomen (CPT® 74175) can be approved immediately prior to procedure</td>
</tr>
<tr>
<td>One of the following studies may be approved PRE-treatment based upon provider preference:</td>
<td></td>
</tr>
<tr>
<td>✦ Liver Imaging Planar (CPT® 78201) or with liver flow (CPT® 78202)</td>
<td></td>
</tr>
<tr>
<td>✦ Radiopharmaceutical Localization Limited Area (CPT® 78800)</td>
<td></td>
</tr>
<tr>
<td>✦ Liver Imaging SPECT (CPT® 78803)</td>
<td></td>
</tr>
<tr>
<td>One of the following studies may be approved POST-treatment based upon provider preference:</td>
<td></td>
</tr>
<tr>
<td>✦ Liver Planar Imaging (CPT® 78201) or with liver flow (CPT® 78202)</td>
<td></td>
</tr>
<tr>
<td>✦ Radiopharmaceutical Localization Limited Area (CPT® 78800)</td>
<td></td>
</tr>
<tr>
<td>✦ Liver Imaging SPECT (CPT® 78803)</td>
<td></td>
</tr>
<tr>
<td>Please note: liver-lung shunt calculation is included in the pre-treatment Liver Scan and does not require additional Lung Perfusion Scan</td>
<td></td>
</tr>
<tr>
<td>Indication</td>
<td>Imaging Study</td>
</tr>
<tr>
<td>------------------------------------------</td>
<td>-------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Monitoring of ablated liver metastases or primary tumors | One of the following, immediately prior to ablation, 1 month post-ablation, then every 3 months for 2 years, and then annually  
|                                           | • CT Abdomen without and with contrast (CPT® 74170)                           |
|                                           | • MRI Abdomen without and with contrast (CPT® 74183)                          |
### ONC-31.3: Brain Metastases

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual with cancer and signs or symptoms of CNS disease or known brain metastasis with new signs or symptoms.</td>
<td>♦ MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td>Stereotactic radiosurgery planning</td>
<td>♦ Unlisted MRI for treatment planning purposes (CPT® 76498)</td>
</tr>
<tr>
<td>If a diagnostic thin-slice MRI brain has not been performed in the preceding 30 days</td>
<td>♦ MRI Brain without and with contrast (CPT® 70553)</td>
</tr>
</tbody>
</table>

**Monitoring of brain metastases treated with surgery or radiation therapy**

Post-treatment, then every 3 months for 1 year and every 6 months thereafter:
♦ MRI Brain without and with contrast (CPT® 70553)

***Individuals treated with stereotactic radiosurgery alone may have MRI Brain without and with contrast (CPT® 70553) every 2 months for the first year and then every 6 months thereafter

PET Metabolic Brain (CPT® 78608) and MR Spectroscopy (CPT® 76390) are considered investigational and experimental for evaluation of metastatic brain cancer

**Any of the following:**
♦ Solitary brain metastasis suspected in patient with prior diagnosis of cancer and no diagnosis-specific guideline regarding PET imaging
♦ Brain metastases and no known primary tumor

♦ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast
♦ Mammography for female patients
♦ PET/CT (CPT® 78815 or CPT® 78816) is indicated for any of the following:
  - Inconclusive conventional imaging
  - Confirm either stable systemic disease or absence of other metastatic disease
  - When primary cancer known, PET request should be reviewed by primary cancer guideline

**Primary brain tumors**

See: [ONC-2: Primary Central Nervous System Tumors](#)
## ONC-31.4: Adrenal Gland Metastases

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiate benign adrenal adenoma from metastatic disease</td>
<td>See <strong>AB-16.1: Adrenal Cortical Lesions</strong></td>
</tr>
<tr>
<td>Known cancer and no known systemic metastases:</td>
<td>If not done previously, any of the following may be obtained:</td>
</tr>
<tr>
<td>◦ New adrenal mass</td>
<td>◦ CT Abdomen without contrast (CPT® 74150)</td>
</tr>
<tr>
<td>◦ Enlarging adrenal mass</td>
<td>◦ CT Abdomen without and with contrast (CPT® 74170, adrenal protocol)</td>
</tr>
<tr>
<td>◦ Inconclusive findings on recent CT scan</td>
<td>◦ MRI Abdomen without contrast (CPT® 74181)</td>
</tr>
<tr>
<td></td>
<td>◦ MRI Abdomen without and with contrast (CPT® 74183)</td>
</tr>
<tr>
<td></td>
<td>◦ CT-directed needle biopsy (CPT® 77012)</td>
</tr>
<tr>
<td>For any of the following:</td>
<td>PET/CT (CPT® 78815) may be approved if supported by primary cancer guidelines</td>
</tr>
<tr>
<td>◦ Biopsy is not feasible or is non-diagnostic</td>
<td></td>
</tr>
<tr>
<td>◦ Isolated metastasis on conventional imaging and patient is a candidate for aggressive surgical management</td>
<td></td>
</tr>
<tr>
<td>◦ Known extra-adrenal metastases</td>
<td></td>
</tr>
<tr>
<td>Known extra-adrenal malignancy and undiagnosed adrenal mass being monitored off treatment</td>
<td>See <strong>ONC-1.2: Phases of Oncology Imaging and General Phase-Related Considerations</strong></td>
</tr>
</tbody>
</table>
**ONC-31.5: Bone (including Vertebral) Metastases**

Patients with Stage IV cancer with new onset back pain can forgo a bone scan (and plain films) in lieu of an MRI with and without contrast of the spine.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following in a patient with a current or prior malignancy:</td>
<td>Bone scan (see ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology) supplemented by plain x-rays is the initial diagnostic imaging study of choice</td>
</tr>
<tr>
<td>- Bone pain</td>
<td></td>
</tr>
<tr>
<td>- Rising tumor markers</td>
<td></td>
</tr>
<tr>
<td>- Elevated alkaline phosphatase</td>
<td></td>
</tr>
<tr>
<td>Any of the following:</td>
<td>Any of the following may be approved:</td>
</tr>
<tr>
<td>- Any patient with stage IV cancer with new onset back pain</td>
<td>- MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast</td>
</tr>
<tr>
<td>- Bone scan is not feasible or readily available</td>
<td>- CT Cervical (CPT® 72127), Thoracic (CPT® 72130), and Lumbar spine (CPT® 72133) without and with contrast can be approved if MRI is contraindicated or not readily available</td>
</tr>
<tr>
<td>- Continued suspicion despite inconclusive or negative bone scan or other imaging modalities</td>
<td>- CT without contrast can be approved if there is a contraindication to CT contrast</td>
</tr>
<tr>
<td>- Neurological compromise</td>
<td></td>
</tr>
<tr>
<td>- Soft tissue component suggested on other imaging modalities or physical exam</td>
<td></td>
</tr>
<tr>
<td>- Differentiate neoplastic disease from Paget’s disease of bone</td>
<td></td>
</tr>
<tr>
<td>- Suspected leptomeningeal involvement</td>
<td></td>
</tr>
</tbody>
</table>

**Monitoring untreated spinal metastases**

- MRI without and with contrast or CT without and with contrast of the involved spinal level every 3 months for 1 year.

**Monitoring metastases within the spine treated with surgery and/or radiation therapy**

- MRI without and with contrast or CT without and with contrast of the involved spinal level once within 3 months post treatment and then every 3 months for 1 year.

**Imaging beyond 1 year is based on any new clinical signs/symptoms**
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leptomeningeal involvement with cancer</td>
<td><strong>On active treatment:</strong>&lt;br&gt;◆ MRI Brain without and with contrast (CPT® 70553)&lt;br&gt;◆ MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast every 2 cycles&lt;br&gt;<strong>Once treatment completed:</strong>&lt;br&gt;◆ Routine advanced imaging not indicated for surveillance in asymptomatic individuals</td>
</tr>
<tr>
<td>Bone pain when both bone scan and either CT or MRI are inconclusive</td>
<td>◆ ¹⁸F-FDG-PET/CT (CPT® 78815 or CPT® 78816) on a case-by-case basis&lt;br&gt;<strong>NOTE:</strong> ¹⁸F-NaF PET imaging (sodium fluoride, or “PET bone scan”) is investigational. See: <a href="#">ONC-1.4: PET Imaging in Oncology</a></td>
</tr>
<tr>
<td>Suspected metastatic bone disease and negative work-up for myeloma</td>
<td>◆ CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast</td>
</tr>
<tr>
<td>No prior cancer history with suspected pathologic fracture on plain x-ray</td>
<td>◆ See <a href="#">ONC-31.7: Carcinoma of Unknown Primary Site</a></td>
</tr>
<tr>
<td>Signs/symptoms concerning for spinal cord compression</td>
<td>◆ See <a href="#">ONC-31.6: Spinal Cord Compression</a></td>
</tr>
</tbody>
</table>
### ONC-31.6: Spinal Cord Compression

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any of the following in a current or former cancer patient:</td>
<td>Any or all of the following may be approved:</td>
</tr>
<tr>
<td>- Any patient with stage IV cancer with new onset back pain</td>
<td>- MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast</td>
</tr>
<tr>
<td>- New back pain persisting over two weeks</td>
<td>- Post myelogram CT of the Cervical (CPT® 72126), Thoracic (CPT® 72129), and Lumbar spine (CPT® 72132)</td>
</tr>
<tr>
<td>- Back pain that is rapidly progressive or refractory to aggressive pain management</td>
<td>- MRI without and with contrast of involved spinal level</td>
</tr>
<tr>
<td>- Signs or symptoms of neurological compromise at the spinal cord level</td>
<td>- MRI without contrast of the involved spinal level</td>
</tr>
<tr>
<td>- Unexpected, sudden loss of bowel or bladder control</td>
<td>- CT without contrast of the involved spinal level if MRI contraindicated</td>
</tr>
<tr>
<td>- Sudden loss of ability to ambulate</td>
<td>- MRI without and with contrast of involved spinal level</td>
</tr>
<tr>
<td>- Complete loss of pinprick sensation corresponding to a specific vertebral level</td>
<td>- MRI without contrast of the involved spinal level</td>
</tr>
<tr>
<td>- Loss of pain at a site that had previously been refractory to pain management</td>
<td>- CT without contrast of the involved spinal level if MRI contraindicated</td>
</tr>
</tbody>
</table>

Any current or former cancer patient with radicular symptoms suggestive of nerve root involvement but not consistent with cord compression and one of the following: | One of the following: |
|   - Unilateral weakness |   - MRI without and with contrast of involved spinal level |
|   - Unilateral change of reflexes |   - MRI without contrast of the involved spinal level |
|   - Pain unrelieved by change in position |   - CT without contrast of the involved spinal level if MRI contraindicated |
|   - Age > 70 years |   - MRI without and with contrast of involved spinal level |
|   - Unintentional weight loss |   - MRI without contrast of the involved spinal level |
|   - Night pain |   - CT without contrast of the involved spinal level if MRI contraindicated |
ONC-31.7: Carcinoma of Unknown Primary Site

General Considerations

- Defined as carcinoma found in a lymph node or in an organ known not to be the primary for that cell type (e.g., adenocarcinoma arising in the brain or in a neck lymph node).

- This guideline also applies to a pathologic fracture that is clearly due to metastatic neoplastic disease in a patient without a previous cancer history.

- Detailed history and physical examination including pelvic and rectal exams and laboratory tests to be performed before advanced imaging.

- Patients presenting with a thoracic squamous cell carcinoma described as metastatic appearing on chest imaging, or in lymph nodes above the clavicle, should undergo a detailed head and neck examination by a clinician skilled in laryngeal and pharyngeal examinations, especially in smokers.

- Patients with suspected unknown primary carcinomas based on only suspicious lytic bone lesions should be considered for serum protein electrophoresis (SPEP); urine protein electrophoresis (UPEP) and serum free light chains prior to consideration of extensive imaging.
<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Carcinoma found in a lymph node or in an organ known not to be primary | - CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)  
- CT Neck with contrast (CPT® 70491) if cervical or supraclavicular involvement  
- CT with contrast or MRI without and with contrast of any other symptomatic site  
- For female patients:  
  - Diagnostic (not screening) mammogram and full pelvic exam  
  - MRI Bilateral Breasts (CPT® 77049) if pathology consistent with breast primary and mammogram is inconclusive |
| Sebaceous carcinoma of the skin (can be associated with underlying primary malignancy) | - CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)  
- CT Neck with contrast (CPT® 70491) if cervical or supraclavicular involvement  
- CT with contrast or MRI without and with contrast of any other symptomatic site |
| Axillary adenocarcinoma | - Diagnostic (not screening) mammogram and full pelvic exam  
- MRI Bilateral Breasts (CPT® 77049) if pathology consistent with breast primary and mammogram is inconclusive  
- If the above are non-diagnostic for primary site:  
  - CT Neck (CPT® 70491), CT Chest (CPT® 71260), and CT Abdomen with contrast (CPT® 74160)  
  - CT with contrast or MRI without and with contrast of any other symptomatic site |
| Carcinoma found within a bone lesion | - CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)  
- Bone Scan (see ONC-1.5)  
- CT with contrast or MRI without and with contrast of any symptomatic site |
| Above studies have failed to demonstrate site of primary | - PET/CT (CPT® 78815 or CPT® 78816) |
| Post-treatment surveillance | - Advanced imaging is not indicated for routine surveillance of asymptomatic individuals after treatment completion |
ONC-31.8: Extrathoracic Small Cell and Large Cell Neuroendocrine Tumors
All poorly-differentiated or high-grade, small cell and large cell neuroendocrine tumors arising outside the lungs or of unknown primary origin are imaged according to these guidelines.

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial staging</td>
<td>Any or all of the following are indicated:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- MRI Brain without and with contrast (CPT® 70553) should be performed for symptoms of CNS involvement and for poorly differentiated neuroendocrine cancers of the neck or extrapulmonary thorax.</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815) if no evidence of metastatic disease or conventional imaging is inconclusive for determining localized vs. distant metastatic disease</td>
</tr>
<tr>
<td>Restaging during treatment</td>
<td>CT Chest (CPT® 71260) and Abdomen/Pelvis (CPT® 74177) and any known sites of disease with contrast every 2 cycles</td>
</tr>
<tr>
<td>Suspected Recurrence</td>
<td>Any or all of the following are indicated:</td>
</tr>
<tr>
<td></td>
<td>- CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- MRI brain without and with contrast (CPT® 70553)</td>
</tr>
<tr>
<td></td>
<td>- Bone scan (See ONC-1.3: Nuclear Medicine (NM) Imaging in Oncology)</td>
</tr>
<tr>
<td></td>
<td>- PET imaging is generally not indicated but can be considered for rare circumstances. These requests should be forwarded for Medical Director review.</td>
</tr>
<tr>
<td>Surveillance</td>
<td>CT Chest (CPT® 71260) and Abdomen/Pelvis with contrast (CPT® 74177) every 3 months for 1 year, then every 6 months for 4 additional years and then annually</td>
</tr>
</tbody>
</table>
# ONC-31.9: Primary Peritoneal Mesothelioma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
</table>
| Initial staging       | - CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177)  
- PET/CT (CPT® 78815) if there is no evidence of metastatic disease or conventional imaging is inconclusive |
| Recurrence/Restaging  | - If there is known prior disease, CT Chest (CPT® 71260) and Abdomen/Pelvis with contrast (CPT® 74177)  
- PET for inconclusive finding on conventional imaging |
| Surveillance          | - CT Abdomen/Pelvis with contrast (CPT® 74177) every 3 months for 2 years, then every year of life |
## ONC-31.10: Kaposi’s Sarcoma

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kaposi’s Sarcoma</td>
<td>Advanced imaging is not generally indicated since disease is generally localized to skin.</td>
</tr>
<tr>
<td></td>
<td>CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177) can be approved at initial diagnosis. If initial scans are negative then future imaging would be based on signs or symptoms.</td>
</tr>
</tbody>
</table>
# ONC-31.11: Castleman’s Disease (Unicentric and Multicentric)

<table>
<thead>
<tr>
<th>Indication</th>
<th>Imaging Study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Initial staging</strong></td>
<td>- Either CT Chest (CPT® 71260) and CT Abdomen/Pelvis with contrast (CPT® 74177) or PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td></td>
<td>- CT Neck with contrast (CPT® 70491) if cervical or supraclavicular involvement</td>
</tr>
<tr>
<td></td>
<td>- If CT scans were utilized initially and suggested unicentric disease, and surgical resection is being considered, PET/CT (CPT® 78815) can be approved to confirm unicentric disease.</td>
</tr>
<tr>
<td></td>
<td>- If unicentric disease is surgically removed, proceed to Surveillance section.</td>
</tr>
<tr>
<td><strong>Restaging:</strong></td>
<td>One of the following every 2 cycles:</td>
</tr>
<tr>
<td>Multicentric disease or surgically unresected unicentric disease on chemotherapy</td>
<td>- CT Chest (CPT® 71260) and Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td></td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>Any of the following:</td>
<td>One of the following:</td>
</tr>
<tr>
<td>Suspected recurrence</td>
<td>- CT Chest (CPT® 71260) and Abdomen/Pelvis with contrast (CPT® 74177)</td>
</tr>
<tr>
<td>Recurrent B symptoms</td>
<td>- PET/CT (CPT® 78815)</td>
</tr>
<tr>
<td>Rising LDH/IL-6/VEGF levels</td>
<td>CT with contrast of involved areas no more than every 6 months up to 5 years</td>
</tr>
<tr>
<td>Surveillance</td>
<td></td>
</tr>
</tbody>
</table>
References


<table>
<thead>
<tr>
<th>ONC-32: Medicare Coverage Policies for PET</th>
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<td>ONC-32.2: Oncologic Non-FDG PET</td>
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<td>ONC-32.3: Brain PET</td>
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<tr>
<td>ONC-32.4: Cardiac PET</td>
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<tr>
<td>ONC-32.5: PET for Infection and Inflammation</td>
</tr>
</tbody>
</table>

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ONC-32.1: Oncologic FDG PET

The complete coverage policy is found in the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.17:


220.6.17 – Positron Emission Tomography (FDG PET) for Oncologic Conditions

General
FDG (2-[F\(^{18}\)] fluoro-2-deoxy-D-glucose) PET is a minimally invasive diagnostic imaging procedure used to evaluate glucose metabolism in normal tissue, as well as in diseased tissues, in conditions such as cancer, ischemic heart disease, and some neurologic disorders. FDG is an injected radionuclide (or radiopharmaceutical that emits sub-atomic particles, known as positrons, as it decays. FDG PET uses a positron camera (tomograph) to measure the decay of FDG. The rate of FDG decay provides biochemical information on glucose metabolism in the tissue being studied. As malignancies can cause abnormalities of metabolism and blood flow, FDG PET evaluation may indicate the probable presence or absence of a majority of cancer types based upon observed differences in biologic activity compared to adjacent tissues.

The Centers for Medicare and Medicaid Services (CMS) was asked by the National Oncologic PET Registry (NOPR) to reconsider section 220.6 of the National Coverage Determination (NCD) Manual to end the prospective data collection requirements under Coverage with Evidence Development (CED) across all oncologic indications of FDG PET imaging. The CMS received public input indicating that the current framework of prospective data collection under CED be ended for all oncologic uses of FDG PET imaging

1. Framework
Effective for claims with dates of service on and after June 11, 2013, CMS is adopting a coverage framework that ends the prospective data collection requirements by NOPR under CED for all oncologic uses of FDG PET imaging. CMS is making this change for all NCDs that address coverage of FDG PET for oncologic uses addressed in this decision. This decision does not change coverage for any use of PET imaging using radiopharmaceuticals ammonia N\(^{-13}\), or rubidium\(^{82}\) (Rb\(^{82}\)).

2. Initial Anti-Tumor Treatment Strategy
CMS continues to believe that the evidence is adequate to determine that the results of FDG PET imaging are useful in determining the appropriate initial anti-tumor treatment strategy for beneficiaries with suspected cancer and improve health outcomes and thus are reasonable and necessary under §1862(a)(1)(A) of the Social Security Act (the “Act”).

Therefore, CMS continues to nationally cover ONE FDG PET study for beneficiaries who have cancers that are biopsy proven or strongly suspected based on other diagnostic testing when the beneficiary’s treating physician determines that the FDG
PET study is needed to determine the location and/or extent of the tumor for the following therapeutic purposes related to the initial anti-tumor treatment strategy:

- To determine whether or not the beneficiary is an appropriate candidate for an invasive diagnostic or therapeutic procedure; or
- To determine the optimal anatomic location for an invasive procedure; or
- To determine the anatomic extent of tumor when the recommended anti-tumor treatment reasonably depends on the extent of the tumor.

See the table at the end of this section for a synopsis of all nationally covered and non-covered oncologic uses of FDG PET imaging.

### Initial Anti-Tumor Treatment Strategy Nationally Covered Indication

**Effective: June 11, 2013**

- CMS continues to nationally cover FDG PET imaging for the initial anti-tumor treatment strategy for male and female breast cancer only when used in staging distant metastasis.
- CMS continues to nationally cover FDG PET to determine initial anti-tumor treatment strategy for melanoma other than for the evaluation of regional lymph nodes.
- CMS continues to nationally cover FDG PET imaging for the detection of pre-treatment metastasis (i.e., staging) in newly diagnosed cervical cancers following conventional imaging.

### Initial Anti-Tumor Treatment Strategy Nationally Non-Covered Indication

**Effective: June 11, 2013**

- CMS continues to nationally non-cover initial anti-tumor treatment strategy in Medicare beneficiaries who have adenocarcinoma of the prostate.
- CMS continues to nationally non-cover FDG PET imaging for diagnosis of breast cancer and initial staging of axillary nodes.
- CMS continues to nationally non-cover FDG PET imaging for initial anti-tumor treatment strategy for the evaluation of regional lymph nodes in melanoma.
- CMS continues to nationally non-cover FDG PET imaging for the diagnosis (no biopsy result) of cervical cancer related to initial anti-tumor treatment strategy.

### 3. Subsequent Anti-Tumor Treatment Strategy

**Subsequent Anti-Tumor Treatment Strategy Nationally Covered Indication,**

**Effective: June 11, 2013**

THREE FDG PET scans are nationally covered when used to guide subsequent management of anti-tumor treatment strategy after completion of initial anti-tumor therapy. Coverage of more than three FDG PET scans to guide subsequent management of anti-tumor treatment strategy after completion of initial anti-tumor therapy shall be determined by the local Medicare Administrative Contractors.

Effective for claims with dates of service on and after June 11, 2013, the chart below summarizes national FDG PET coverage for oncologic conditions. Additional details may be obtained at https://www.cms.gov/medicare/coverage/determinationprocess/downloads/petforsolidtumorsoncologicdxcodesattachment_NCD220_6_17.pdf

<table>
<thead>
<tr>
<th>FDG PET for Solid Tumors and Myeloma Tumor Type</th>
<th>Initial Treatment Strategy (formerly “diagnosis” &amp; “staging”)</th>
<th>Subsequent Treatment Strategy (formerly “restaging” &amp; “monitoring response to) treatment”)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colorectal</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Esophagus</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Head and Neck (not thyroid or CNS)</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Non-small cell lung</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Ovary</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Brain</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Cervix</td>
<td>Cover with exceptions</td>
<td>Cover</td>
</tr>
<tr>
<td>Small cell lung</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Soft tissue sarcoma</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Pancreas</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Testes</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Prostate</td>
<td><strong>Non-cover</strong></td>
<td>Cover</td>
</tr>
<tr>
<td>Thyroid</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Breast (male and female)</td>
<td>Cover with exceptions</td>
<td>Cover</td>
</tr>
<tr>
<td>Melanoma</td>
<td>Cover with exceptions</td>
<td>Cover</td>
</tr>
<tr>
<td>All other solid tumors</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>Myeloma</td>
<td>Cover</td>
<td>Cover</td>
</tr>
<tr>
<td>All other cancers not listed</td>
<td>Cover</td>
<td>Cover</td>
</tr>
</tbody>
</table>
### Invasive Breast Cancer:
Nationally non-covered for initial diagnosis and/or staging of axillary lymph nodes. Nationally covered for initial staging of known or suspected metastatic disease. All other indications for initial anti-tumor strategy for breast cancer are nationally covered.
- Prior to surgical lymph node sampling: **NOT indicated**
- Metastatic disease or suspicious lesions seen on CT and/or bone scan: **Indicated**
- After completion of surgical lymph node sampling in place of CT scans: **Indicated**

### Melanoma:
Nationally non-covered for initial staging of regional lymph nodes. All other indications for initial anti-tumor treatment strategy for melanoma are nationally covered.
- Prior to surgical lymph node sampling: **NOT indicated**
- Metastatic disease or suspicious lesions seen on CT and/or bone scan: **Indicated**
- After completion of surgical lymph node sampling in place of CT scans: **Indicated**

### Cervix:
Nationally non-covered for the initial diagnosis (before biopsy) of cervical cancer related to initial antitumor treatment strategy. All other indications for initial anti-tumor treatment strategy for cervical cancer are nationally covered.

### 5. CPT codes for FDG-PET scan for Oncologic Conditions
The decision whether to use skull base to mid-femur ("eyes to thighs": procedure code for PET (CPT® 78812 or CPT® 78815) or whole body PET(CPT® 78813 or CPT® 78816) is addressed in the diagnosis-specific guideline sections. Requests requiring CPT® code redirection should be forwarded to Medical Director for review.
ONC-32.2: Oncologic Non-FDG PET

PET/CT Scan using non-FDG Radiotracers:

- Medicare National Coverage Determination for PET (NCD 220.6.17) has recently included coverage of PET-CT scans with three new non-FDG radiotracers. Local Medicare contractors have the authority to make coverage decisions about oncologic studies performed with other agents.

Additional details are available at:

- PET/CT scan using non-FDG radiotracers is reported with the same CPT codes (CPT® 78815 and CPT® 78816)
- Either FDG or non-FDG PET/CT scan may be approved to assess the disease status, both may not be obtained simultaneously.
- As with FDG PET/CT scan, Medicare NCD allows coverage for ONE non-FDG PET/CT scan for initial anti-tumor strategy (except for newly diagnosed prostate cancer as noted above) and THREE additional non-FDG PET/CT scans for subsequent anti-tumor treatment strategy. Coverage of more than three non-FDG PET/CT scans to guide subsequent management of anti-tumor treatment strategy after completion of initial anti-tumor therapy shall be determined by the local Medicare Administrative Contractors.

11C Choline for Prostate cancer

- COVERED FOR:
  - Subsequent treatment strategy for patients with prostate cancer who have a rising PSA after prior treatment
- NOT COVERED FOR:
  - Initial treatment strategy for newly diagnosed prostate cancer
  - Surveillance of patients with localized/advanced prostate cancer, who have completed definitive therapy or are receiving maintenance therapy

18F-Fluciclovine (AXUMIN®) for Prostate cancer

- COVERED FOR:
  - Subsequent treatment strategy for patients with prostate cancer who have a rising PSA after prior treatment
- NOT COVERED FOR:
  - Initial treatment strategy for newly diagnosed prostate cancer
  - Surveillance of patients with localized/advanced prostate cancer, who have completed definitive therapy or are receiving maintenance therapy
68Gallium DOTATATE (NETSPOT®) for Neuroendocrine tumors

▶ COVERED FOR:
  ♦ Initial treatment strategy for newly diagnosed low-grade neuroendocrine tumors
  ♦ Subsequent treatment strategy for low-grade neuroendocrine tumors

▶ NOT COVERED FOR:
  ♦ Surveillance of patients with localized/advanced low-grade neuroendocrine tumors, who have completed definitive therapy or are receiving maintenance therapy

18F Na Fluoride PET/CT Scan for Bone Metastases:

▶ PET/CT using F-18 sodium fluoride (NaF-18) has been studied to identify bone metastases. At this time, Medicare NCD excludes coverage for PET/CT scan using Na fluoride radiotracer.

Coverage with Evidence Development (CED):

▶ CED is a program designed to make PET/CT available to Medicare beneficiaries while at the same time gathering data regarding PET’s effectiveness.

▶ Under CED, Medicare will reimburse the claim if the beneficiary is enrolled in, and the PET provider is participating in, a qualifying prospective clinical trial or registry.

▶ Full details regarding qualifying clinical trials, including the list of required scientific integrity standards and relevance to the Medicare population are available in the Medicare NCD Manual, Section 220.6.17.

▶ Qualifying research trials must be registered on the www.ClinicalTrials.gov website by the principal sponsor/investigator, prior to the enrollment of the first study subject.

National Oncologic PET Registry (NOPR):

▶ Providers can meet Medicare’s requirements for CED by submitting PET data to the National Oncologic PET Registry (NOPR).

▶ A participating hospital or imaging center must submit information to the NOPR for all Medicare PET that falls under CED. This information includes pre- and post-study forms completed by the referring provider, as well as the final radiology report.

▶ Providers cannot bill Medicare for the services until the NOPR notifies the facility that all required information has been received.

▶ Imaging facilities cannot submit data to the NOPR for studies performed for covered indications.
ONC-32.3: Brain PET

- CPT® 78608 is used to report FDG PET metabolic brain studies for dementia, seizure disorders, and dedicated PET tumor imaging studies of the brain. See ONC-2.2: Low Grade Gliomas and ONC-2.3: High Grade Gliomas for indications of this study.
- CPT® 78609 is used to report PET brain perfusion studies that are not performed with FDG. These scans are nationally noncovered by Medicare.
- CPT® 78811 (Limited PET) or CPT® 78814 (Limited PET/CT hybrid) are used to report Amyloid PET brain studies (these are not metabolic studies).

Amyloid-beta(Aβ) PET Brain Studies:
- Medicare will reimburse for brain PET, performed with the radiopharmaceuticals that detect levels of amyloid in the human brain, only through CED.
- Examples of these radiopharmaceuticals include Amyvid™ (florbetapir F18), Neuraceq™ (florbetaben F18) and Vizamyl™ (flutemetamol F18).
- CMS will cover one PET Aβ scan per patient through CED.
- For CMS, approval with Coverage with Evidence Development (CED) is available for patients enrolled in clinical trials approved by CMS. See the following link for a list of the CMS approved clinical trials: https://www.cms.gov/Medicare/Coverage/Coverage-with-Evidence-Development/Amyloid-PET.html

FDG PET for Dementia and Neurodegenerative Diseases
- Medicare covers FDG PET for individuals with a recent diagnosis of dementia and documented cognitive decline of at least six months who meet diagnostic criteria for both Alzheimer’s disease (AD) and Frontotemporal dementia (FTD).
- The individual must have been evaluated for specific alternate neurodegenerative diseases or other causative factors, but the etiology of the symptoms remains unclear.
- Other conditions must also be met. For the complete coverage policy, see the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.13*
- Medicare also covers FDG PET for individuals with mild cognitive impairment or early dementia when the study is performed in the context of a CMS-approved clinical trial. Requirements are detailed in Section 220.6.13 of the NCD Manual*.
- All other uses of FDG PET for patients with a presumptive diagnosis of dementia-causing neurodegenerative disease for which CMS has not specifically indicated coverage continue to be noncovered. Examples of noncovered indications described in the NCD include: possible or probable AD, clinically typical FTD, dementia of Lewy bodies, and Creutzfeld-Jacob disease.

FDG PET for Refractory Seizures

- Medicare covers FDG PET for pre-surgical evaluation for the purpose of localizing a focus of refractory seizure activity.
- The complete coverage policy is found in the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.9:
ONC-32.4: Cardiac PET

PET Myocardial Perfusion
- Medicare covers PET for myocardial perfusion with rubidium (Rb-82) or ammonia (N-13) when one of the following conditions is met:
  - PET is performed in place of, but not in addition to, a SPECT, or
  - An individual has had an inconclusive SPECT. In these cases, the PET must be considered necessary in order to determine what medical or surgical intervention is required to treat the individual
- PET myocardial perfusion is reported with either CPT® 78491 or CPT® 78492.
- The complete coverage policy is found in the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.1:

PET Myocardial Viability
- Medicare covers FDG PET for myocardial viability as a primary or initial diagnostic study prior to revascularization surgery, or following an inconclusive SPECT scan.
  - The study must be performed on a full or partial ring PET scanner.
  - When PET is performed following an inconclusive SPECT, Medicare will not cover a follow-up SPECT exam if the results of the PET are inconclusive.
- PET myocardial viability is reported with CPT® 78459.
- The complete coverage policy is found in the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.8:
ONC-32.5: PET for Infection and Inflammation

- Medicare does not cover FDG PET for the following indications:
  - Chronic osteomyelitis
  - Infection of hip arthroplasty
  - Fever of unknown origin
  - The complete coverage policy is found in the Medicare National Coverage Determinations (NCD) Manual, Section 220.6.16:
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<td>PV-25: Nuclear Medicine</td>
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### Abbreviations for Pelvis Imaging Guidelines

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA-125</td>
<td>cancer antigen 125 test</td>
</tr>
<tr>
<td>CT</td>
<td>computed tomography</td>
</tr>
<tr>
<td>FSH</td>
<td>follicle-stimulating hormone</td>
</tr>
<tr>
<td>GTN</td>
<td>gestational trophoblastic neoplasia</td>
</tr>
<tr>
<td>HCG</td>
<td>human chorionic gonadotropin</td>
</tr>
<tr>
<td>IC/BPS</td>
<td>interstitial cystitis/bladder pain syndrome</td>
</tr>
<tr>
<td>IUD</td>
<td>intrauterine device</td>
</tr>
<tr>
<td>KUB</td>
<td>kidneys, ureters, bladder (frontal supine abdomen radiograph)</td>
</tr>
<tr>
<td>LH</td>
<td>luteinizing hormone</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MRI</td>
<td>magnetic resonance imaging</td>
</tr>
<tr>
<td>MSv</td>
<td>millisievert</td>
</tr>
<tr>
<td>PA</td>
<td>posteroanterior projection</td>
</tr>
<tr>
<td>PID</td>
<td>pelvic inflammatory disease</td>
</tr>
<tr>
<td>TA</td>
<td>transabdominal</td>
</tr>
<tr>
<td>TSH</td>
<td>thyroid-stimulating hormone</td>
</tr>
<tr>
<td>TV</td>
<td>transvaginal</td>
</tr>
<tr>
<td>UCPPS</td>
<td>Urologic Chronic Pelvic Pain Syndrome</td>
</tr>
<tr>
<td>WBC</td>
<td>white blood cell count</td>
</tr>
</tbody>
</table>
PV-1.1: General Guidelines - Overview

- A current clinical evaluation (within 60 days) is required before advanced imaging can be considered. The clinical evaluation may include a relevant history and physical examination, appropriate laboratory studies, and non-advanced imaging modalities such as plain x-ray or Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or Transvaginal ultrasound (CPT® 76830).
  - The clinical evaluation may also include a gynecological and/or urological exam with appropriate laboratory studies such as blood count, tumor markers and endocrine evaluations.
  - Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.

- Abdominal imaging begins at the diaphragm and extends to the umbilicus or iliac crest. Pelvic imaging begins at the umbilicus and extends to the pubis.

- Pregnant women should be evaluated with ultrasound or MRI without contrast to avoid radiation exposure. In carefully selected clinical circumstances, evaluation with CT may be considered with careful attention to technique and radiation protection as deemed clinically appropriate.

**Ultrasound**

- Transvaginal ultrasound is the recommended modality for imaging; no alternative modality has demonstrated sufficient superiority to justify routine use, and Transvaginal ultrasound (TV) (CPT® 76830) is the optimal study to evaluate adult female pelvic pathology.

- Pelvic ultrasound (complete CPT® 76856, or limited CPT® 76857) can be performed if it is a complementary study to the TV ultrasound. It may substitute for TV in pediatric patients or non-sexually active females.

- CPT® 76942 is used to report ultrasound imaging guidance for needle placement during biopsy, aspiration, and other percutaneous procedures.

**Soft Tissue Ultrasound**

- Pelvic wall, buttocks, penis and perineum - CPT® 76857

- Groin - CPT® 76882

**Scrotal Ultrasound**

- See
  - **PV-17: Impotence/Erectile Dysfunction**
  - **PV-18: Penis-Soft Tissue Mass**

- Ultrasound scrotum and contents - CPT® 76870
**Other Ultrasound**

- CPT® 93975 Duplex scan (complete) of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study.

- CPT® 93976 Duplex scan (limited) of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study.

- CPT® 93975 and CPT® 93976 should not be reported together during the same session.

- 3D Rendering (CPT® 76376 or CPT® 76377) See Preface-4.1: 3D Rendering in the Preface Imaging Guidelines
  - CPT® 76377 (3D rendering requiring image post-processing on an independent workstation) or CPT® 76376 (3D rendering not requiring image post-processing on an independent workstation) can be considered in the following clinical scenarios:
    - Uterine intra-cavitary lesion when initial ultrasound is equivocal (See PV-2.1: Abnormal Uterine Bleeding (AUB) and PV-12.1: Leiomyomata)
    - Hydrosalpinges or peritoneal cysts when initial ultrasound is equivocal (See PV-5.3: Complex Adnexal Masses)
    - Lost IUD (inability to feel or see IUD string) with initial ultrasound (See PV-10.1: Intrauterine Device)
    - Uterine anomalies with initial ultrasound (See PV-14.1: Uterine Anomalies)
    - Infertility (See PV-9.1: Infertility Evaluation, Female)

**CT**

- CT Pelvis with contrast is a possible modality unless there is a contrast allergy or CT without contrast to look for a calculus in the distal ureter or bladder.
  - CT is not generally warranted for evaluating pelvic anatomy because it is limited due to soft tissue contrast resolution.

**MRI**

- Can be used as a more targeted study or for patients allergic to iodinated contrast.
  - MRI Pelvis without contrast (CPT® 72195)
  - MRI Pelvis without and with contrast (CPT® 72197)
  - MRI Pelvis with contrast only (CPT® 72196) is rarely performed.
References
<table>
<thead>
<tr>
<th>PV-2: Abnormal Uterine Bleeding</th>
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<tbody>
<tr>
<td>PV-2.1: Abnormal Uterine Bleeding (AUB)</td>
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PV-2.1: Abnormal Uterine Bleeding (AUB)

- Initial evaluation includes any of the following:
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or Transvaginal ultrasound (CPT® 76830), D&C and/or endometrial biopsy

- If ultrasound is equivocal for intracavitary lesion, 3-D Rendering (CPT® 76377 or CPT® 76376) may be approved as an add-on.

- If ultrasound is equivocal for intracavitary lesion, Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830).

- If ultrasound is equivocal for an intracavitary lesion, saline infusion sonohysterography (CPT® 76831) may be indicated.

- CT is not generally warranted for evaluating AUB since uterine anatomy is limited due to soft tissue contrast resolution.
  - An abnormal endometrium found incidentally on CT should be referred for TV ultrasound for further evaluation.

References
<table>
<thead>
<tr>
<th>PV-3: Amenorrhea</th>
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<tbody>
<tr>
<td>PV-3.1: Amenorrhea</td>
<td>11</td>
</tr>
<tr>
<td>PV-3.2: Amenorrhea - Delayed Puberty</td>
<td>11</td>
</tr>
</tbody>
</table>
**PV-3.1: Amenorrhea**

- If a pregnancy test is negative:
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830).

The results of test(s) above determine the next steps, which may include:

- MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) can be performed if ultrasound is indeterminate or equivocal for Asherman’s Syndrome, Polycystic Ovary Syndrome, or Androgen Secreting Ovarian Tumor.

- Suspicion for hormonally active adrenal tumor should be evaluated by criteria in **AB-16: Adrenal Cortical Lesions** in the Abdomen Imaging Guidelines.

- Patients with absent uterus or a foreshortened vagina should have karyotype evaluation. (See **PV-14.1: Uterine Anomalies**)

- MRI Brain (pituitary protocol) without and with contrast (CPT® 70553) can be performed if:
  - Estradiol is low with finding of inappropriately normal or low gonadotropins
  - Prolactin (PRL) level is elevated above normal
  - See **HD-19: Pituitary** in the Head Imaging Guidelines.

- Hysterosalpingogram (CPT® 74740), sonohysterosalpingography (CPT® 76831), and/or hysteroscopy can be performed if ultrasound is indeterminate for Asherman’s syndrome.

**PV-3.2: Amenorrhea - Delayed Puberty**

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830),

- Hysterosalpingogram (CPT® 74740), sonohysterosalpingography (CPT® 76831), and/or hysteroscopy can be performed if ultrasound is indeterminate.

- MRI Brain (pituitary protocol) without and with contrast (CPT® 70553) can be performed if:
  - Estradiol is low with finding of inappropriately normal or low gonadotropins
  - Prolactin (PRL) level is elevated
  - See **HD-19: Pituitary** in the Head Imaging Guidelines.

**Practice Notes**

In some cases of hypothyroidism, there may be an increase in the PRL level. Treatment of hypothyroidism can normalize prolactin levels.

Many medications are known to often result in hyperprolactinemia. More common offenders include antipsychotics (first generation and second generation e.g. Haloperidol and Risperidone, respectively), antidepressants (cyclic, SSRIs, e.g. Amitriptyline, Citalopram), anti-emetics and other gastrointestinal agents (such as Metoclopramide and Prochlorperazine), opioid analgesics (methadone, morphine), and antihypertensives (Verapamil, Methyldopa).
References
PV-4.1: Adenomyosis

TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) is the diagnostic procedure of choice for the initial evaluation of suspected adenomyosis. Doppler ultrasound (CPT® 93975 or CPT® 93976) can be added if requested.

MRI Pelvis without contrast (CPT® 72195) or MRI Pelvis without and with contrast (CPT® 72197) is considered a second-line imaging option after transvaginal ultrasound if:
- Inconclusive ultrasound and the patient has failed several months (3 months) of hormone suppression

Adenomyosis – Practice Notes

Adenomyosis is when endometrial tissue, which normally lines the uterus, moves into the outer muscular walls of the uterus. Adenomyosis is a histologic diagnosis and is suspected by history and physical examination. Ultrasound findings of adenomyosis include heterogeneous myometrium, myometrial cysts, asymmetric myometrial thickness, and subendometrial echogenic linear striations.

Reference
### PV-5: Adnexal Mass/Ovarian Cysts

| PV-5.1: Suspected Adnexal Mass – Initial Evaluation in All Women | 16 |
| PV-5.2: Simple Cysts | 17 |
| PV-5.3: Complex Adnexal Masses | 18 |
| PV-5.4: Screening for Ovarian Cancer/Suspected Ovary Cancer | 21 |
**PV-5.1: Suspected Adnexal Mass – Initial Evaluation in All Women**

- A potential mass is found on exam and/or found incidentally on other imaging.
- Transvaginal (TV) ultrasound imaging (CPT® 76830) is the initial study of choice.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) can be performed if requested as a complimentary study to the TV ultrasound.
  - Once confirmed, Color Doppler ultrasonography (CPT® 93975) may be useful to evaluate the vascular characteristics of adnexal masses.
- MRI Pelvis without contrast (CPT® 72195), OR without and with contrast (CPT® 72197; CPT® 72195 if pregnant) if ultrasound does not identify the origin of the pelvic mass (adnexal, uterine, or other in etiology).
  - If the mass is unrelated to female pelvic anatomy, See **AB-13: Abdominal Mass** in the Abdomen Imaging Guidelines

**Practice Notes**

- Consultation with or referral to a gynecologic oncologist is recommended for women with an adnexal mass who meet one or more of the following criteria:7
  - Postmenopausal with elevated CA-125 level ultrasound findings suggestive of malignancy, ascites, a nodular or fixed pelvic mass, or evidence of abdominal or distant metastasis.7
  - Premenopausal with very elevated CA-125 level, ultrasound findings suggestive of malignancy, ascites, a nodular or fixed pelvic mass, or evidence of abdominal or distant metastasis.7
  - Premenopausal or postmenopausal with an elevated score on a formal risk assessment test such as the multivariate index assay, risk of malignancy index, or the Risk of Ovarian Malignancy Algorithm or one of the ultrasound-based scoring systems from the International Ovarian Tumor Analysis group.7

- Simple and Complex Adnexal Cysts
  - Simple cysts are smooth walled and clear without debris.
  - Complex cysts can have solid areas or excrescences, and/or debris in them, greater than 3mm irregular septations, mural nodules with Doppler-detected blood flow, and/or free abdominal/pelvic fluid.

- Suspected Adnexal Mass – Tumor Markers
  - The adnexa include the ovaries, Fallopian tubes, and ligaments that hold the uterus in place.
  - CA-125 is a tumor marker that is useful for the evaluation of adnexal mass:
    - Elevation occurs with both malignant (epithelial cancer) and benign entities (leiomyoma, endometriosis, PID, inflammatory disease such as lupus, and inflammatory bowel disease).
    - Increase in the markers over time occurs with malignancy only
    - Consider tumor markers in patients with an abnormal ultrasound that is not a simple cyst
  - Other markers include Beta hCG, LDH, and AFP (germ cell tumors) and Inhibin A and B (granulosa cell tumor).
PV-5.2: Simple Cysts

- Simple cysts are smooth, thin walled, anechoic and clear without debris. Simple cysts up to 10 cm in diameter as measured by ultrasound are almost universally benign.
  - Repeat TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856)
    - Follow up according to the below schedule if ≤10 cm
  - Cysts >10cm have not been studied and the current recommendation is to consider surgical intervention and/or MRI Pelvis without and with contrast (CPT® 72197).

Simple Cyst Follow-Up

<table>
<thead>
<tr>
<th>Size</th>
<th>Pre-Menopausal</th>
<th>Post-Menopausal</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤3 cm</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>&gt;3 cm to 5 cm</td>
<td>None</td>
<td>Follow-up in 3-6 months with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856); further follow-up intervals may be adjusted on basis of degree of cyst change.</td>
</tr>
<tr>
<td>&gt;5 cm to ≤10 cm</td>
<td>Follow up in 8-12 weeks (proliferative phase if possible) TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856); further follow-up intervals may be adjusted on basis of degree of cyst change</td>
<td>Follow-up in 3-6 months with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856); further follow-up intervals may be adjusted on basis of degree of cyst change. Subsequent follow up with TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856), annually and if stable for 2 years or decreasing in size, no further imaging follow-up is needed. Further follow-up intervals may be adjusted on basis of degree of cyst change.</td>
</tr>
</tbody>
</table>
## PV-5.3: Complex Adnexal Masses

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pre-Menopausal</th>
<th>Post-Menopausal</th>
</tr>
</thead>
</table>
| Hemorrhagic cyst| - If initial ultrasound imaging confirms hemorrhagic cyst ≤5 cm no further imaging is necessary  
                  - If initial ultrasound imaging confirms hemorrhagic cyst >5 cm but <10 cm, follow up with Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) in 8-12 weeks is indicated. Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830).  
                  - If follow-up imaging confirms a hemorrhagic cyst that has not completely resolved, or has enlarged, an MRI Pelvis without and with contrast (CPT® 72197) can be considered.  
                  - MRI Pelvis without and with contrast (CPT® 72197) maybe approved for Hemorrhagic cyst ≥10cm | - Hemorrhagic cyst should not occur in post-menopausal patient. However, if an ultrasound shows a hemorrhagic cyst in this population, MRI Pelvis without and with contrast (CPT® 72197) can be considered |
| Endometriomas   | - If initial imaging confirms an Endometrioma, follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) can be performed at 8 to 12 weeks in the proliferative phase, if possible; duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830).  
                  - If ultrasound equivocal for Endometriomas, MRI Pelvis without and with contrast (CPT® 72197)  
                  - If follow up ultrasound imaging shows changing morphology and/or a vascular component then consider MRI Pelvis without and with contrast (CPT® 72197)  
                  - MRI Pelvis without and with contrast (CPT® 72197) maybe approved for Endometriomas ≥10cm | - If initial ultrasound imaging confirms an endometrioma, then MRI Pelvis without and with contrast (CPT® 72197) can be considered |
<table>
<thead>
<tr>
<th>Condition</th>
<th>Pre-Menopausal</th>
<th>Post-Menopausal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dermoids</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>➤ If initial ultrasound imaging confirms a Dermoid, follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) can be performed at 8 to 12 weeks in the proliferative phase, if possible; duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830).</td>
<td></td>
</tr>
<tr>
<td></td>
<td>➤ If ultrasound equivocal for Dermoid, MRI Pelvis without and with contrast (CPT® 72197)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>➤ If follow up ultrasound imaging shows changing morphology and/or a vascular component then consider MRI Pelvis without and with contrast (CPT® 72197).</td>
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<tr>
<td></td>
<td>➤ If surgical resection of a definitive Dermoid is not performed, then follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) can be obtained every 6 to 12 months.</td>
<td></td>
</tr>
<tr>
<td></td>
<td>➤ MRI Pelvis without and with contrast (CPT® 72197) maybe approved for Dermoids ≥10cm</td>
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</tr>
<tr>
<td></td>
<td>➤ If initial imaging ultrasound confirms a Dermoid, then MRI Pelvis without and with contrast (CPT® 72197) can be considered.</td>
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<tr>
<td></td>
<td>➤ If surgical resection of a definitive Dermoid is not performed, then follow-up Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) can be obtained every 6 to 12 months.</td>
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<tr>
<td></td>
<td>➤ MRI Pelvis without and with contrast (CPT® 72197) maybe approved for Dermoids ≥10cm</td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>Pre-Menopausal</td>
<td>Post-Menopausal</td>
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<td>-----------------------------------------------</td>
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<td>--------------------------------------------------------------------------------</td>
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</tbody>
</table>
| Hydrosalpinges (Hydrosalpinx) or Peritoneal cysts | ▶ If initial imaging confirms hydrosalpinx or peritoneal cysts, advanced imaging is rarely indicated in these clinical scenarios. Send for Medical Director Review.  
▶ If initial ultrasound imaging (CPT® 76857 or CPT® 76856) and/or TV ultrasound (CPT® 76830) is equivocal for Hydrosalpinges or Peritoneal cyst(s), one repeat ultrasound is indicated in 8-12 weeks or following a menstrual cycle to evaluate for resolution. Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830). 3-D Rendering (CPT® 76377 or CPT® 76376) may be approved as an add-on. | ▶ If initial imaging confirms hydrosalpinx or peritoneal cysts, advanced imaging is rarely indicated in these clinical scenarios. Send for Medical Director Review.  
▶ If initial ultrasound imaging (CPT® 76857 or CPT® 76856) and/or TV ultrasound (CPT® 76830) is equivocal for Hydrosalpinges or Peritoneal cyst(s), one repeat ultrasound is indicated in 8-12 weeks or following a menstrual cycle to evaluate for resolution. Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830). 3-D Rendering (CPT® 76377 or CPT® 76376) may be approved as an add-on. |

**Complex and/or solid adnexal mass incompletely evaluated by ultrasound**

▶ Generally a repeat ultrasound is recommended: TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76857 or CPT® 76856)
- MRI Pelvis without and with contrast (CPT® 72197, CPT® 72195 if pregnant) may be performed one time
  - To follow masses when they cannot be optimally visualized by ultrasound (e.g. suboptimal sonography due to large mass or obese individual)
  - Unexplained change of appearance during ultrasound follow-up
  - Other Individual-driven indications (e.g. the application of established risk prediction models (e.g., family history of ovarian cancer), correlation with abnormal serum biomarkers, and/or pelvic symptoms)
  - Differentiate the origin of pelvic masses that are not clearly of ovarian origin
  - Request for follow up MRI studies should be sent to Medical Director Review
- Concern for metastatic ovarian malignancy, See **ONC-21 Ovarian Cancer** in the Oncology Imaging Guidelines
**Practice Notes**

**Pre-Menopausal – see table above**

- For women of reproductive age (Pre-Menopausal), evaluation may include a pregnancy test (a quantitative hCG may be necessary if an ectopic pregnancy is suspected), CBC, serial hematocrit measurements, and appropriate cultures.
- Symptomatic patients often require immediate interventions (antibiotics, surgery, and/or expectant management).
- Ultrasound characteristics usually suggest the diagnosis (ectopic pregnancy, functional cysts, tuboovarian abscess (See **PV-7: Pelvic Inflammatory Disease**), hydrosalpinx, dermoid, endometrioma, hemorrhagic cyst and pedunculated fibroids (See **PV-12: Leiomyomata/Uterine Fibroids**) and direct the treatment.
- An ovarian mass suspicious for metastatic disease (e.g. from breast, uterine, colorectal or gastric cancer) should be evaluated based on the appropriate Oncology Imaging Guidelines.

**Post-Menopausal – see table above**

- For post-menopausal women, most pelvic complex cysts or solid masses should be evaluated for surgical intervention and have tumor markers (i.e. CA-125) measured.
- Some women for whom the usual management of a pelvic mass would include surgery may be at increased risk for perioperative morbidity and mortality. In such cases, repeat imaging may be a safer alternative than immediate surgery, although the frequency of follow-up imaging has not been determined.
- An ovarian mass suspicious for metastatic disease (e.g. from breast, uterine, colorectal or gastric cancer) should be evaluated based on the appropriate Oncology Imaging Guidelines.

**PV-5.4: Screening for Ovarian Cancer/Suspected Ovary Cancer**

- See **ONC-21: Ovarian Cancer** in the Oncology Imaging Guidelines
References


PV-6.1: Endometriosis

- TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) is then the first line diagnostic exam for pain or abnormality on exam.
  - In most patients, ultrasound followed by medical treatment or laparoscopy should be considered prior to advanced imaging.
  - Laparoscopy remains the definitive test for diagnosis and evaluation of endometriosis in most patients.

- MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) is helpful for the following:
  - Rectal involvement, rectovaginal endometriosis, deeply infiltrative bladder endometriosis, and cul-de-sac obliteration. MRI has been shown to accurately detect rectovaginal endometriosis and cul-de-sac obliteration in the more than 90% of cases.
  - To characterize complex adnexal masses as endometrioma if ultrasound equivocal.
  - MRI can also enable complete lesion mapping prior to surgical excision of known endometriosis that was diagnosed during a previous surgery.

References
PV-7: Pelvic Inflammatory Disease (PID)

PV-7.1: Pelvic Inflammatory Disease

26
**PV-7.1: Pelvic Inflammatory Disease**

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) is the initial study for imaging of suspected pelvic inflammatory disease (PID).
- CT Abdomen and Pelvis with contrast (CPT® 74177) or CT Pelvis with contrast (CPT® 72193) can be performed if:
  - Ultrasound equivocal, or
  - Extensive abscess formation as determined by ultrasound

**Practice Notes**

PID may be clinically suspected based on findings of abdominal pain, abnormal discharge, inter-menstrual and/or post coital bleeding, fever, low back pain, nausea/vomiting, urinary frequency, cervical motion tenderness, uterine and/or abdominal tenderness on exam

**References**

PV-8: Polycystic Ovary Syndrome

PV-8.1: Polycystic Ovary Syndrome
PV-8.1: Polycystic Ovary Syndrome

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) may be performed based on history, exam, and laboratory findings suspicious for this disease.

- Laboratory testing to be done prior to advanced imaging: Virilizing hormone levels (Testosterone and DHEAS). Disorders that mimic the clinical features of Polycystic ovary syndrome (PCOS) should be excluded by measuring: TSH, Prolactin, and 17-OHP (hydroxyprogesterone) levels. Others to consider based on the clinical presentation: Cortisol levels, ACTH, dexamethasone suppression testing, IGF-1, FSH, LH, estradiol.

- CT Abdomen without contrast (CPT® 74150) is the initial study if elevated serum levels of androgens* are found and an adrenal etiology is suspected. CT Abdomen with (bolus arterial phase) contrast (CPT® 74160) or chemical shift MRI Abdomen (CPT® 74181) can be considered if this initial CT is equivocal, non-diagnostic, or concerning for malignancy. See AB-16: Adrenal Cortical Lesions in the Abdomen Imaging Guidelines.

- *The adrenal gland preferentially secretes weak androgens such as DHEA and DHEAS. The ovary is the primary source of testosterone.

Practice Notes

- Polycystic ovary syndrome is the most common hormonal disorder among women of reproductive age, and is one of the leading causes of infertility.

- Ovaries are often enlarged and contain numerous small cysts located along the outer edge of each ovary. Signs and symptoms may include:
  - Anovulation resulting in infrequent or prolonged menstrual periods.
  - Excessive amounts or effects of androgenic (masculinizing) hormones (e.g. excess hair growth).
  - Acne
  - Obesity

References


PV-9.1: Infertility Evaluation, Female

- Initial work-up of infertility in female:
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and TV ultrasound (CPT® 76830). If indicated, color Doppler (CPT® 93975 or CPT® 93976) and/or 3D imaging (CPT® 76377 or CPT® 76376) may be approved as an add-on. See PV-14: Uterine Anomalies.

- If ultrasound is indeterminate:
  - Hysterosalpingography (HSG) (CPT® 74740).
    - Injection of contrast through a catheter (CPT® 58340) is not currently prior authorized by eviCore healthcare or
  - Sonohysterosalpingography (CPT® 76831)
    - Injection of contrast through a catheter (CPT® 58340) is not currently prior authorized by eviCore healthcare.

Practice Notes
These guidelines are not intended for fertility follow-up and management.

If infertility is a covered service, the specialist may, over the course of several menstrual cycles, request multiple ultrasounds to follow follicular maturation and monitor endometrial thickness.

References
| PV-10: Intrauterine Device (IUD) and Tubal Occlusion |
|---------------------------------|--------|
| PV-10.1: Intrauterine Device    | 33     |
| PV-10.2: Tubal Occlusion Device | 33     |
**PV-10.1: Intrauterine Device**

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) if:
  - Abnormal pelvic exam prior to IUD insertion, such as pelvic mass, irregularly shaped uterus, or enlarged uterus.
  - Suspected complication at the time or immediately following IUD insertion:
    - Abnormal IUD position
    - Uterine perforation
    - Severe pain
    - Excessive bleeding
  - Failure to improve with conservative treatment (7 days) such as antibiotics for cramping, light bleeding, and/or low grade fever following IUD placement.
  - NOT as routine imaging to evaluate position prior to, immediately after and, for example, 6 weeks after insertion.

- TV ultrasound (CPT® 76830); 3-D Rendering (CPT® 76377 or CPT® 76376) may be approved as an add-on for investigation of a possible “Lost” IUD (inability to feel or see IUD string).
  - If TV ultrasound is negative or non-diagnostic, Pelvic ultrasound (CPT® 76856 or CPT® 76857):
    - If Pelvic ultrasound is negative or non-diagnostic, plain x-ray should be performed if pregnancy test is negative.
    - Thereafter, CT Pelvis without contrast (CPT® 72192) or CT Abdomen and Pelvis without contrast (CPT® 74176) or MRI Pelvis without contrast (CPT® 72195) can be considered when both ultrasound and plain x-ray are equivocal or non-diagnostic.

- If pregnancy test is positive: See **OB-3.1: Locate an Intrauterine Device** in the Obstetrical Ultrasound Imaging Guidelines
  - Ultrasound can be performed to locate an intrauterine device (IUD) (CPT® 76801 if a complete ultrasound has not yet been performed, CPT® 76815 or CPT® 76816 if a complete anatomic ultrasound was done previously, and/or CPT® 76817 for a Transvaginal ultrasound).

**PV-10.2: Tubal Occlusion Device**

- TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) if:
  - Suspected complication of tubal occlusion device:
    - Abnormal tubal occlusion device position
    - Uterine perforation
    - Severe pain
    - Excessive bleeding

- Ultrasound is not typically indicated for routine follow up after insertion of tubal occlusion device
References


**PV-11.1: Pelvic Pain/Dyspareunia, Female**

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) initial imaging for unexplained pelvic pain and/or dyspareunia:
  - Add Duplex Doppler (CPT® 93975 or CPT® 93976) if there is a suspicion of ovarian torsion on the initial ultrasound
  - For chronic pelvic pain (pelvic pain for 6 months or greater), add Duplex Doppler (CPT® 93975 or CPT® 93976)
  - If urethral diverticulum is suspected – See **PV-13.2: Urethral Diverticula**
  - If endometriosis is suspected – See **PV-6.1: Endometriosis**

- If initial ultrasound is normal, consider urological work-up, gastroenterology work-up or laparoscopic evaluation(s) in evaluation of pelvic pain.

- If the initial ultrasound is equivocal for unexplained chronic pelvic pain, then the following can be considered:
  - CT Pelvis with contrast (CPT® 72193) for unexplained chronic pelvic pain.

- If the initial ultrasound is equivocal for unexplained chronic pelvic pain and if pelvic congestion is suspected:
  - MRI Pelvis without contrast or with and without contrast (CPT® 72195 or CPT® 72197) or MRV Pelvis (CPT® 72198), or CTV Pelvis (CPT® 72191) for pelvic congestion.
    - MRV Abdomen (CPT® 74185) or CTV Abdomen (CPT® 74175) if vascular intervention is planned.
      - CTV Abdomen and Pelvis (CPT® 74174) is appropriate if CTV Pelvis has not been performed

- CTA Pelvis (CPT® 72191) can be considered if pelvic AVM is suspected, and if one of the following is present:
  - Pulsatile pelvic mass
  - Incidental finding on prior imaging including ultrasound

- Pelvic Pain/Hip Pain - Rule Out Piriformis Syndrome
  - See **PN-2: Focal Neuropathy** in the Peripheral Nerve Disorders Imaging Guidelines
  - See **MS-24: Hip** in the Musculoskeletal Imaging Guidelines

- Work-up of interstitial cystitis/bladder pain syndrome (IC/BPS) should include history, physical exam, laboratory exam (urinalysis and urine culture), and measurement of post void residual urine by bladder catheterization (CPT® 51798)
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830).
    - CT Pelvis with contrast (CPT® 72193) may be indicated if ultrasound is equivocal for complicated interstitial cystitis/bladder pain syndrome (when ordered by Specialist).
The proctalgia syndromes are characterized by recurrent episodes of rectal/perineal pain, and may be due to sustained contractions of the pelvic floor musculature. Prior to advanced imaging, the evaluation of rectal/perineal pain should include:

- Digital rectal examination (assess for mass, fissures, hemorrhoids, etc.)
- Pelvic examination in females to exclude PID
- Recent flexible sigmoidoscopy or colonoscopy subsequent to the start of reported symptoms to exclude inflammatory conditions or malignancy

Endoanal ultrasound (CPT® 76872), MRI Pelvis with and without contrast (CPT® 72197), or CT Pelvis with contrast (CPT® 72193) are appropriate after the above studies have been performed or if laboratory or clinical information suggest infection, abscess, or inflammation.

**Practice Notes**

Interstitial Cystitis/Bladder Pain Syndrome (IC/BPS) has an unpleasant sensation (pain, pressure, discomfort), perceived to be related to the urinary bladder. It is associated with lower urinary tract symptoms of more than six weeks duration, in the absence of infection or other identifiable causes.

**References**

# PV-12.1: Leiomyomata

Leiomyomata are also known as "fibroids."

- Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830) can be performed for the following:
  - Suspected leiomyomata
  - Pre-operative prior to myomectomy
  - Recurrent symptoms such as abnormal bleeding, pain, or pelvic pressure
  - 3-D Rendering (CPT® 76377 or CPT® 76376) may be approved as an add-on if ultrasound is equivocal and intracavitary lesion is suspected, or if arterial embolization is being considered, or for surgical planning for myomectomy
  - If ultrasound is equivocal for intracavitary lesion, Duplex (Doppler) scan (CPT® 93975 complete; CPT® 93976 limited) may be approved as an add-on to TV ultrasound (CPT® 76830).

- MRI Pelvis without and with contrast (CPT® 72197), or without contrast (CPT® 72195) can be used in the evaluation of leiomyomas for the following:
  - Guide the treatment of myomas in an enlarged uterus with multiple myomas and/or precise myoma mapping is of clinical importance (for complex surgical planning)
  - Equivocal sonohysterography or panoramic hysteroscopy with suspected submucous leiomyoma and imaging is needed for surgical planning
  - Equivocal ultrasound prior to myomectomy
  - Leiomyoma necrosis is suspected
  - Uterine fibroid embolization is being considered
    - If MRI is equivocal, MRA Pelvis (CPT® 72198) or CTA Pelvis (CPT® 72191) can be considered if requested by the interventional radiologist planning the arterial embolization
    - There is no evidence to support interval MRI after embolization unless persistent or recurrent symptoms

## References

**PV-13: Periurethral Cysts and Urethral Diverticula**

| PV-13.1: Periurethral cysts, Skene duct cyst and Gartner’s duct cyst | 41 |
| PV-13.2: Urethral Diverticula | 41 |
**PV-13.1: Periurethral cysts, Skene duct cyst and Gartner’s duct cyst**

- Initial evaluation includes any of the following:
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830)

**PV-13.2: Urethral Diverticula**

- Initial evaluation includes Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830)
- Urethrography, or CT Urethrography can be performed to evaluate any urethral abnormalities
- MRI Pelvis without and with contrast (CPT® 72197) can be performed if ordered by operating surgeon if ultrasound equivocal for urethral abnormalities,

**Practice Notes**

Symptomatic infection of congenital periurethral glands can result in urethral diverticula. Symptoms include pain, urinary urgency, frequency of urination, recurrent urinary tract infection, dribbling after urination, or incontinence.

**References**

PV-14.1: Uterine Anomalies

- Initial evaluation includes Pelvic ultrasound (CPT® 76856 or CPT® 76857) and/or TV ultrasound (CPT® 76830). 3-D Rendering (CPT® 76377 or CPT® 76376) may be approved as an add-on if uterine anomaly is suspected on ultrasound.

- Retroperitoneal ultrasound (CPT® 76770 or CPT® 76775) is indicated to evaluate for coexisting renal anomalies.

- MRI Pelvis without and with contrast (CPT® 72197):
  - Ultrasound defines a complex anomaly or is not definitive for a complex anomaly, or
  - Requested for surgical planning

References


# PV-15: Fetal MRI

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PV-15.1: Fetal MRI

See OB-13: Fetal MRI in the Obstetrical Ultrasound Imaging Guidelines

Fetal MRI (CPT® 74712; CPT® 74713 for each additional gestation)
- Do not report CPT® 74712 and CPT® 74713 in conjunction with CPT® 72195, CPT® 72196, CPT® 72197

Indications for Fetal MRI
- Fetal MRI may be considered for assessment of fetal anatomic structures after 18 weeks gestation for surgical planning (re: fetal anomalies), and/or if an ultrasound is equivocal and additional information is needed for counseling purposes, for indications including the following:
  - Brain
    - Congenital anomalies
      - ventriculomegaly
      - corpus callosal dysgenesis
      - holoprosencephaly
      - posterior fossa anomalies
      - malformations of cerebral cortical development
    - Screening fetuses with a family risk for brain anomalies
      - tuberous sclerosis
      - corpus callosal dysgenesis
      - malformations of cerebral cortical development
  - Vascular abnormalities
    - vascular malformations
    - hydranencephaly
    - intra-uterine cerebral vascular accident
  - Spine
    - Congenital anomalies
      - neural tube defects
      - sacrococcygeal teratomas
      - caudal regression/sacral agenesis
      - syringomyelia
      - vertebral anomalies
  - Skull, face and neck
    - Masses of the face and neck
      - venolymphatic malformations
      - hemangiomas
      - goiter
      - teratomas
      - facial clefts
    - Airway obstruction
      - conditions that may impact parental counseling, prenatal management, delivery planning, and postnatal therapy
  - Thorax
    - Masses
congenital pulmonary airway malformations (congenital cystic adenomatoid malformation; sequestration, and congenital lobar emphysema);
- congenital diaphragmatic hernia
- effusion
- Volumetric assessment of lung
- cases at risk for pulmonary hypoplasia secondary to oligohydramnios, chest mass, or skeletal dysplasias
- **Abdomen, retroperitoneal and pelvis**
  - Mass
    - abdominal–pelvic cyst
    - tumors (e.g. hemangiomas, neuroblastomas, sacrococcygeal teratomas, and suprarenal or renal masses)
    - complex genitourinary anomalies (e.g. cloaca)
    - renal anomalies in cases of severe oligohydramnios
    - bowel anomalies such as megacystis microcolon
- **Complications of monochorionic twins**
  - Delineation of vascular anatomy prior to laser treatment of twins
  - Assessment of morbidity after death of a monochorionic co-twin
  - Improved delineation of anatomy in conjoined twins
- **Fetal surgery assessment**
  - Meningomyelocele
  - Sacrococcygeal teratomas
  - Processes obstructing the airway (e.g. neck mass or congenital high airway obstruction)
  - Complications of monochorionic twins needing surgery
  - Chest masses

**PV-15.2: Placenta Accreta/Placenta Accreta Spectrum/ Placenta Percreta**

- If the ultrasound is inconclusive or equivocal, send to Medical Director Review. Medical Director can approve MRI Pelvis without contrast (CPT® 72195).

- If only placenta or maternal pelvis is imaged without fetal imaging, use MRI Pelvis (CPT® 72195).
References


PV-16.1: Molar Pregnancy and GTN

Molar pregnancy – once diagnosed on an Obstetrical Ultrasound patients should undergo chest x-ray pre- and post-evacuation.

Patients with a molar pregnancy and rising hCG levels post evacuation and/or Gestational trophoblastic neoplasia should undergo the following for metastatic work-up.
- CT Chest (CPT® 71260) and CT Abdomen and Pelvis (CPT® 74177) with contrast
- MRI Brain without and with contrast (CPT® 70553) if pulmonary metastasis

Practice Notes
Gestational trophoblastic neoplasia (GTN) cells are malignant and can metastasize to other organs such as lungs, brain, bone, and vagina. Treatment is usually methotrexate with or without hysterectomy. Weekly hCG tests are performed until they fall to zero.

References
PV-17: Impotence/Erectile Dysfunction

PV-17.1: Impotence/Erectile Dysfunction
**PV-17.1: Impotence/Erectile Dysfunction**

- Imaging depends on the suspected disease:
  - If erectile dysfunction suspected, Penile Doppler ultrasound (CPT® 93980) can be performed\(^2\)
  - If large vessel vascular insufficiency is suspected following ultrasound, then CTA Pelvis with contrast (CPT® 72191) may be indicated.
  - Peyronie disease - Duplex ultrasound (CPT® 93980) can be used to assess penile vasculature in Peyronie disease\(^1\)
  - If male hypogonadism is suspected, See [HD-19: Pituitary](#) in the Head Imaging Guidelines

- Functional MRI or PET studies are considered investigational for this indication.

**References**

PV-18.1: Penis-Soft Tissue Mass

- Soft-tissue lesions of the penis should be evaluated initially by Penile ultrasound (CPT® 76857)

- MRI Pelvis without and with contrast (CPT® 72197) can be performed:
  - Penile ultrasound (CPT® 76857) is equivocal (not clearly benign, simple cyst), or
  - Primary penile cancer is suspected.

- Peyronie Disease
  - Ultrasound (CPT® 76857) recommended,
  - MRI Pelvis without and with contrast (CPT® 72197) if ultrasound is equivocal and surgery or injection therapy is being contemplated

References
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<th>PV-19: Male Pelvic Disorders</th>
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<td>PV-19.1: Male Pelvic Disorders</td>
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</table>
**PV-19.1: Male Pelvic Disorders**

- **Prostate Disorders**
  - Suspected Benign Prostatic Hypertrophy with obstructive voiding symptoms who have failed medication treatment can undergo:
    - Transrectal ultrasound (CPT® 76872) or Pelvis transabdominal ultrasound (bladder and prostate [CPT® 76856 or CPT® 76857]).
  - Prostatitis with urinary retention or suspected abscess can undergo any of the following imaging studies:
    - Transrectal ultrasound (CPT® 76872) or Pelvis transabdominal ultrasound (bladder and prostate [CPT® 76856 or CPT® 76857]).
    - CT Pelvis with contrast (CPT® 72193) or MRI Pelvis without contrast (CPT® 72195) or with and without contrast (CPT® 72197) may be performed if ultrasound is equivocal for abscess or mass.

- **Hematospermia**, transrectal ultrasound (TRUS) (CPT® 76872) can be the initial imaging study in all cases.
  - MRI Pelvis without contrast (CPT® 72195) can be considered to evaluate:
    - Suspected hemorrhage within the seminal vesicles
    - Radiation injury, neoplasia
    - Failure of conservative treatment for 2 weeks
    - Abnormal findings on Transrectal ultrasound.

- **Scrotal ultrasound** (CPT® 76870) and/or Duplex (Doppler) ultrasound (CPT® 93975 or CPT® 93976) of the scrotum for initial evaluation of scrotal pain or mass initial evaluation
  - MRI Pelvis without and with contrast (CPT® 72197) or Tc-99m scrotal scintigraphy (CPT® 78761) if ultrasound is inconclusive.

- **Proctalgia Syndromes**
  - The proctalgia syndromes are characterized by recurrent episodes of rectal/perineal pain, and may be due to sustained contractions of the pelvic floor musculature. Prior to advanced imaging, the evaluation of rectal/perineal pain should include:
    - Digital rectal examination (assess for mass, prostate, fissures, hemorrhoids, etc.)
    - Recent flexible sigmoidoscopy or colonoscopy subsequent to the start of reported symptoms to exclude inflammatory conditions or malignancy
  - Endoanal ultrasound (CPT® 76872), MRI Pelvis without and with contrast (CPT® 72197), or CT Pelvis with contrast (CPT® 72193) are appropriate after the above studies have been performed or if laboratory or clinical information suggest infection, abscess, or inflammation

- **Work-up of interstitial cystitis/bladder pain syndrome** (IC/BPS) should include history, physical exam, laboratory exam (urinalysis and urine culture), and measurement of post void residual urine by bladder catheterization (CPT® 51798)
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857).
CT Pelvis with contrast (CPT® 72193) may be indicated if ultrasound is equivocal for complicated interstitial cystitis/bladder pain syndrome (when ordered by Specialist)

**Practice Notes**

- The causes of scrotal pain include torsion, epididymitis, strangulated hernia, segmental testicular infarction, trauma, testicular tumor, and idiopathic scrotal edema.¹

**References**

### PV-20: Scrotal Pathology

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PV-20.1: Scrotal Pathology

- Scrotal ultrasound (CPT® 76870) and/or Duplex (Doppler) ultrasound (CPT® 93975 or CPT® 93976) of the scrotum for initial evaluation of scrotal pain or mass
  - MRI Pelvis without and with contrast (CPT® 72197) or Tc-99m scrotal scintigraphy (CPT® 78761) if ultrasound is inconclusive.¹,²
- Scrotal ultrasound (CPT® 76870), MRI Pelvis without and with contrast (CPT® 72197), or CT Pelvis with contrast (CPT® 72193) for cryptorchidism/undescended testis in the adult.
- Duplex (Doppler) ultrasound (CPT® 76870 and/or CPT® 93975 or CPT® 93976) of the scrotum with color flow mapping in supine and upright positions to assess venous reflux into plexus pampiniformis if varicocele suspected (for example, in inguinal hernia evaluation).
  - CT Abdomen and Pelvis with contrast (CPT® 74177) for right-sided varicocele, when there is suspicion for intra-abdominal pathology

Practice Notes

- The causes of scrotal pain may include torsion, epididymitis, strangulated hernia, segmental testicular infarction, trauma, testicular tumor, and idiopathic scrotal edema.¹

PV-20.2: Para testicular and spermatic cord masses

- Scrotal ultrasound (CPT® 76870) is the appropriate initial imaging procedure,
  - MRI Pelvis without and with contrast (CPT® 72197), exploration and biopsy are additional considerations if ultrasound is inconclusive.

PV-20.3: Testicular Microlithiasis

- Scrotal ultrasound (CPT® 76870) for initial evaluation
- Annual Scrotal ultrasound (CPT® 76870) follow-up until age 55, only if a risk factor is present which include:
  - Family history of germ cell tumor
  - Maldescent
  - Orchidopexy
  - Testicular atrophy

  For Personal history of germ cell tumor See ONC-20: Testicular, Ovarian and Extragonadal Germ Cell Tumors in the Oncology Imaging Guidelines
References


### PV-21: Fistula in Ano and Perirectal Abscess

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PV-21.1: Fistula in Ano

MRI Pelvis without and with contrast (CPT® 72197) is the preferred study.
- If MRI cannot be performed, endoscopic ultrasound is superior, and thus preferential, to CT imaging.
- CT Pelvis with contrast (CPT® 72193) is an inferior study to either of the above (accuracy of endoscopic ultrasound vs. CT for perianal fistula is 82% vs. 24%) and its use should be limited only to those circumstances in which MRI or endoscopic ultrasound cannot be performed.

PV-21.2: Perirectal Abscess

MRI Pelvis without and with contrast (CPT® 72197) is the preferred study
- CT Pelvis with contrast (CPT® 72193) can be approved as an alternative study if desired.

For the evaluation of Perianal and Perirectal Disease in Crohn’s Disease, See AB-23.3: Perirectal/Perianal Disease in the Abdomen Imaging Guidelines.

References
PV-22: Urinary Incontinence/Pelvic Prolapse/Fecal Incontinence

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PV-22.1: Urinary Incontinence – Initial Imaging

- Initial Imaging, associated with other evaluations, are:
  - Non-Neurogenic Incontinence
    - Measurements of post void residual urine by Bladder ultrasound (CPT® 51798) OR Bladder catheterization.
    - In addition to post void residual volume determination, screening for UTI should be considered.
    - Urodynamic studies for complex conditions or unclear case of incontinence after basic evaluation.
    - Preoperative multichannel urodynamic testing is not needed in women with stress incontinence (uncomplicated) prior to initial incontinence surgery.
  - Neurogenic Incontinence
    - Ultrasound urinary tract (CPT® 76770 or CPT® 76775) and/or urodynamic studies.

Practice Notes

Urinary incontinence can be “stress,” “urgency,” or mixed; neurogenic or non-neurogenic; and complicated or uncomplicated. Neurogenic incontinence can occur from cerebral, spinal or peripheral neurological diseases.

PV-22.2: Urinary Incontinence – Further Imaging

- CT Abdomen and/or Pelvis, contrast as requested, can be performed for the following:
  - Abnormality on ultrasound that requires further evaluation
  - Complicated incontinence
  - Suspected fistulae
  - Detecting ectopic ureters if ultrasound is non-diagnostic
  - Pre-operative planning for complicated incontinence when ordered by the operating physician

- MRI may be indicated for evaluation of the brain, spine, or other regions of the nervous system in neurogenic urinary incontinence.

Practice Notes

- Complicated urinary incontinence includes:
  - Failed conservative treatment
  - Pain or dysuria
  - Hematuria
  - Recurrent infection
  - Previous radical pelvic surgery
  - Suspected fistula
  - Suspected mass
  - Previous pelvic or prostate irradiation
PV-22.3: Pelvic Prolapse

- Transvaginal (TV) ultrasound (CPT® 76830) is the initial study of choice.
  - Pelvic ultrasound (CPT® 76856 or CPT® 76857) can be performed if requested as a complimentary study to the TV ultrasound.
- Urodynamic testing may be helpful if there is incontinence with a stage II or greater prolapse or voiding dysfunction.
- MRI Pelvis (CPT® 72195 or CPT® 72197) may be indicated for the following:
  - Pelvic floor anatomy and pelvic organ prolapse evaluations if exam and TV ultrasound (CPT® 76830) and/or Pelvic ultrasound (CPT® 76856 or CPT® 76857) are equivocal; or
  - Pre-operative planning for complex organ prolapse when ordered by the operating physician; or
  - Persistent incontinence following surgery.
- Mesh and Graft complications
  - Diagnostic evaluation for mesh and graft complications may include colonoscopy, cystoscopy, urodynamics, and radiologic imaging.
  - All requests are sent to Medical Director review.
- Sacral osteomyelitis may be a complication of sacrocolpopexy. Back pain in women after this procedure should prompt evaluation with MRI Pelvis with and without contrast (CPT® 72197) and referral to a specialist.

PV-22.4: Fecal Incontinence

The evaluation of fecal incontinence generally proceeds as follows:

- Determine the severity of the incontinence (Bristol Stool Scale, Fecal Incontinence Severity Index, etc.)
- History and Physical to include digital rectal examination and perianal pinprick (to assess for neurogenic causes).
- Trial of conservative management.
- Diagnostic Testing if symptoms persist to include:
  - Ano-rectal Manometry
  - Balloon Expulsion Test
  - Endoanal ultrasound (CPT® 76872) to confirm sphincter defects in patients with suspected sphincter injury (e.g. history of vaginal delivery or anorectal surgery)
  - MRI Pelvis (CPT® 72197) or MRI Defecography (CPT® 72195) can be considered if:
    - Ano-rectal manometry suggests weak sphincter pressures AND/OR there is an abnormal balloon expulsion test
    AND
    - There has been a failure of a recent trial of conservative management
    AND
    - Surgery is being considered.
**Practice Notes**

With regards to fecal incontinence ACG Guidelines note that “the internal sphincter is visualized more clearly by endoanal ultrasound, whereas MRI is superior for discriminating between an external anal sphincter tear and a scar and for identifying external sphincter atrophy.

However, guidelines adopted by the American Society of Colon and Rectal Surgeons note that “Endoanal ultrasound is a useful and sensitive tool in the evaluation of patients with FI (fecal incontinence), especially when there is a history of vaginal delivery or anorectal surgery. Ultrasound can reliably identify internal and external sphincter defects that may be associated with sphincter dysunction.” In addition, the guidelines note “Other modalities (eg, MRI) have shown substantial interobserver variability and, at this point, are likely inferior to ultrasound imaging, but they may provide additional information where endoanal ultrasound is unavailable.”

**References**

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**PV-23.1: Patent Urachus**

- Drainage from the umbilicus, redness around umbilicus, abdominal pain, or urinary tract infection from persistent fetal connection between the bladder and the umbilicus can be evaluated by:
  - Ultrasound (CPT® 76856 or CPT® 76857 and/or CPT® 76700 or CPT® 76705) or voiding cystourethrography (VCUG) (CPT® 74455) for suspected patent urachus
  - CT Pelvis with contrast (CPT® 72193) or MRI Pelvis without contrast (CPT® 72195) or with and without contrast (CPT® 72197) may be performed if the ultrasound is equivocal or if additional imaging is needed for surgical planning if there is a suspected urachal carcinoma or other urachal abnormality.

**References**

PV-24: Bladder Mass

Bladder masses, stones, and diverticuli can be found on ultrasound, CT or MRI incidentally. Symptoms may include hematuria, urgency, frequency, chronic urinary infection, obstruction or urinary retention. Bladder masses can be evaluated by:

- CT Pelvis without contrast (CPT® 72192) for suspected bladder stone seen on KUB, if translucent and surgery is planned
- CT Pelvis with and without contrast (CPT® 72194) if suspected bladder diverticuli
- CT Urogram (CPT® 74178) for suspected carcinoma
- MRI Pelvis with and without contrast (CPT® 72197) may be indicated for uncommon cell lines such as rhabdomyosarcoma, and leiomyosarcoma

References

PV-25: Nuclear Medicine

- Nuclear Medicine
  - Nuclear medicine studies are rarely used in imaging of the pelvis, but are indicated in some clinical circumstances, including the following:
    - Lymph system mapping (CPT® 78195) is indicated for lower extremity lymphedema with recent negative Doppler ultrasound, or a history of Milroy’s disease or prior pelvic lymph node dissection.
  - Nuclear testicular imaging (CPT® 78761) is indicated for evaluation of scrotal pain when testicular torsion is suspected and recent Doppler ultrasonography is inconclusive or unavailable.
  - Radiopharmaceutical Voiding Cystogram (CPT® 78730) with Urinary Bladder Residual study is indicated for suspicion of urinary retention and a recent non-diagnostic ultrasound.

References
### Abbreviations for Peripheral Nerve Disorders Imaging Guidelines

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### Abbreviations for Peripheral Nerve Disorders Imaging Guidelines

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<td>Acquired Immunodeficiency Syndrome</td>
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<tr>
<td>ALS</td>
<td>Amyotrophic Lateral Sclerosis</td>
</tr>
<tr>
<td>CIDP</td>
<td>Chronic Inflammatory Demyelinating Polyneuropathy</td>
</tr>
<tr>
<td>CNS</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>CPK</td>
<td>Creatinine phosphokinase</td>
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<td>CT</td>
<td>Computed tomography</td>
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<td>EMG</td>
<td>Electromyogram</td>
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<td>LEMS</td>
<td>Lambert-Eaton Myasthenic Syndrome</td>
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<tr>
<td>MG</td>
<td>Myasthenia gravis</td>
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<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
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<tr>
<td>MRN</td>
<td>Magnetic resonance neurography</td>
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<tr>
<td>MRS</td>
<td>Magnetic resonance spectroscopy</td>
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<tr>
<td>NCV</td>
<td>Nerve conduction velocity</td>
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<td>Positron emission tomography</td>
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<td>PNS</td>
<td>Peripheral nervous system</td>
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<td>POEMS</td>
<td>Polyneuropathy, Organomegaly, Endocrinopathy, M-protein, Skin Changes</td>
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<tr>
<td>TOS</td>
<td>Thoracic Outlet Syndrome</td>
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</table>
PN-1: General Guidelines

A current clinical evaluation (within 60 days) is required before advanced imaging can be considered. The clinical evaluation may include a relevant history and physical examination, including a neurological examination, appropriate laboratory studies, non-advanced imaging modalities, electromyography and nerve conduction (EMG/NCV) studies. Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.

If imaging of peripheral nerves is indicated, ultrasound is the preferred modality for superficial peripheral nerves. MRI may be used for imaging deep nerves such as the lumbosacral plexus or nerves obscured by overlying bone such as the brachial plexus or for surgical planning. CT is limited to cases in which MRI is contraindicated.

References
## PN-2: Focal Neuropathy

<table>
<thead>
<tr>
<th>Focal Disorder</th>
<th>EMG/NCV Initially?</th>
<th>Advanced Imaging</th>
</tr>
</thead>
</table>
| Carpal Tunnel Syndrome       | YES                | ▶ Ultrasound Wrist or MRI Wrist without contrast (CPT® 73321) to estimate size of the carpal tunnel and diameter of the median nerve may be helpful in the evaluation and confirmation of carpal tunnel syndrome pre-operatively when EMG findings are equivocal and clinical findings are uncertain.  
| Ulnar Neuropathy             | YES                | Ultrasound for evaluation when clinical findings and EMG/NCV findings are uncertain. MRI Elbow without contrast (CPT® 73221) or MRI Upper Arm or Forearm without contrast (CPT® 73218) for complex cases when diagnosis remains uncertain after EMG and US or for pre-op planning. |
| Radial Neuropathy            | YES                | ▶ MRI Upper Arm or Forearm without contrast (CPT® 73218) in severe cases when surgery is being considered.  
▶ MRI Upper Arm or Forearm without and with contrast (CPT® 73220) if there is a suspicion of a nerve tumor such as a neuroma. |

**Radial Neuropathy Notes:** Leads to wrist drop with common sites of entrapment the inferior aspect of the humerus (Saturday night palsy) or the forearm (Posterior Interosseous Syndrome). Trauma or fractures of the humerus, radius, or ulna can damage the radial nerve.

| Sciatic Neuropathy           | YES                | MRI Pelvis without contrast (CPT® 72195) may be performed in the evaluation of these entities. CT Pelvis without contrast is not indicated due to lack of soft tissue contrast. It should only be performed in the rare circumstance of contrast allergy and contraindication to MRI such as pacemaking device. |

**Sciatic Neuropathy Notes:** Trauma to the gluteal area with hematoma, injection palsy, hip or pelvic fractures, or hip replacement (arthroplasty) and rarely Piriformis Syndrome involves entrapment of the sciatic nerve at the sciatic notch in the pelvis by a tight piriformis muscle band.

| Femoral Neuropathy           | NO                 | MRI Pelvis without contrast (CPT® 72195) may be performed in the evaluation of these entities. |

**Femoral Neuropathy Notes:** May occur as a complication of pelvic surgery in women or those on anticoagulants with retroperitoneal bleeding, or as a mononeuropathy in diabetics.
<table>
<thead>
<tr>
<th>Focal Disorder</th>
<th>EMG/NCV Initially?</th>
<th>Advanced Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meralgia Paresthetica</td>
<td>NO</td>
<td>MRI Pelvis without contrast (CPT® 72195) may be performed in cases of diagnostic uncertainty or for pre-op planning. CT Pelvis without contrast is not indicated due to lack of soft tissue contrast. It should only be performed in the rare circumstance of contrast allergy and contraindication to MRI such as pacemaking device.</td>
</tr>
<tr>
<td>Meralgia Paresthetica Notes:</td>
<td></td>
<td>Sensory loss in the lateral femoral cutaneous nerve as it exits the pelvis under the inguinal ligament (lateral thigh without extension into lower leg), and is usually easily diagnosed based on a careful history and physical exam. EMG/NCV testing is often technically difficult and not required.</td>
</tr>
<tr>
<td>Peroneal Neuropathy</td>
<td>YES</td>
<td>MRI Knee without contrast (CPT® 73721) or MRI Lower Extremity other than joint without contrast (CPT® 73718) in severe cases when surgery is considered.</td>
</tr>
<tr>
<td>Tarsal Tunnel Syndrome</td>
<td>N/A</td>
<td>See MS-27: Foot (Tarsal Tunnel Syndrome) in the Musculoskeletal Imaging Guidelines.</td>
</tr>
</tbody>
</table>

**References**

### PN-3: Polyneuropathy

<table>
<thead>
<tr>
<th>Poly-Disorder</th>
<th>EMG/NCV Initially?</th>
<th>Advanced Imaging</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>PNS/CNS Crossover Syndromes</td>
<td>YES</td>
<td>MRI Brain and/or Spinal Cord without and with contrast if clinical findings point to abnormalities in those areas.</td>
<td>Guillain-Barré syndrome</td>
</tr>
<tr>
<td>AIDS Related Cytomegaloviral Neuropathy/Radiculopathy</td>
<td>YES</td>
<td>MRI Lumbar Spine without and with contrast (CPT® 72158) if suspected.</td>
<td>Urinary retention and a clinically confusing picture in the legs.</td>
</tr>
<tr>
<td>Chronic Inflammatory Demyelinating Polyneuropathy (CIDP)</td>
<td>YES</td>
<td>MRI Lumbar Spine without and with contrast (CPT® 72158) if uncertain following EMG.</td>
<td></td>
</tr>
<tr>
<td>Multifocal Motor Neuropathy</td>
<td>YES</td>
<td>MRI Brachial Plexus without and with contrast (CPT® 71552 or CPT® 73220) if uncertain following EMG.</td>
<td></td>
</tr>
<tr>
<td>POEMS (Polyneuropathy, Organomegaly, Endocrinopathy, M-protein, Skin changes)</td>
<td>YES</td>
<td>Advanced imaging is for the non-neurological entities of this rare osteosclerotic plasmacytoma syndrome.</td>
<td>See <strong>ONC-25: Multiple Myeloma and Plasmacytomas</strong> in the Oncology Imaging Guidelines.</td>
</tr>
<tr>
<td>Subacute Sensory Neuronopathy &amp; Other Paraneoplastic Demyelinating Neuropathies</td>
<td>YES</td>
<td>Advanced imaging should be guided by specific clinical concern (See relevant guideline). For evaluation of suspected paraneoplastic syndromes: See <strong>ONC-30.3: Paraneoplastic Syndromes</strong> in the Oncology Imaging Guidelines</td>
<td></td>
</tr>
</tbody>
</table>

**References**
PN-4: Brachial Plexus

Brachial plexus studies can be coded either as MRI Upper Extremity other than joint without or without and with contrast (CPT® 73218 or CPT® 73220), MRI Chest without or without and with contrast (CPT® 71550 or CPT® 71552) or MRI Neck without or without and with contrast (CPT® 70540 or CPT® 70543) (if upper trunk) after EMG/NCV examination for:

- Malignant infiltration (EMG not required)
- Radiation plexitis to rule out malignant infiltration
- Brachial plexitis (Parsonage-Turner Syndrome or painful brachial amyotrophy).
  - Self-limited syndrome characterized by initial shoulder region pain followed by weakness of specific muscles in a pattern which does not conform to involvement of a single root or distal peripheral nerve
  - Consider MRI Cervical Spine if radiculopathy.
  - See SP-3: Neck (Cervical Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma in the Spine Imaging Guidelines
- Traumatic injury
- Neurogenic Thoracic Outlet Syndrome (TOS) failed a 2 to 3 month trial of conservative management and are being considered for surgical treatment.
- See CH-31: Thoracic Outlet Syndrome (TOS) in the Chest Imaging Guidelines
- Preoperative study which requires evaluation of the brachial plexus

References
PN-5: Lumbar and Lumbosacral Plexus

The following studies can be considered: MRI Pelvis without and with contrast with fat suppression imaging (CPT® 72197) OR MRI Abdomen and Pelvis without and with contrast with fat suppression imaging (CPT® 74183 and CPT® 72197) OR if MRI is not available, CT Pelvis with contrast (CPT® 72193) OR CT Abdomen and Pelvis with contrast (CPT® 74177) can be considered after EMG/NCV based on whether the upper lumbar plexus (abdominal retroperitoneal space) or the lumbosacral plexus (pelvis), respectively, is involved based on:
- Malignant infiltration (EMG not required)
- Radiation plexopathy to rule out malignant infiltration
- Traumatic injury

References
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<tr>
<td>PN-6.2: Inflammatory Muscle Diseases</td>
<td>11</td>
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<tr>
<td>PN-6.3: Gaucher Disease (Storage Disorders)</td>
<td>12</td>
</tr>
</tbody>
</table>
PN-6.1: Neuromuscular Disease

- Myasthenia Gravis (MG) is associated with thymic disease and can undergo:
  - CT Chest with contrast (CPT® 71260) after an established diagnosis of MG.
    - Can be repeated if initial CT previously negative and now symptoms of chest
      mass, rising anti-striated muscle antibody titers, or need for preoperative
      evaluation (clinical presentation, electro-diagnostic studies, and antibody
      titers).
  - CT Chest without contrast (CPT® 71250) may be used if there is concern
    regarding adverse effects of contrast in patients with MG.

- Lambert–Eaton myasthenic syndrome (LEMS) is associated with small cell lung
  cancer and can undergo:
  - CT Chest with contrast (CPT® 71260) with a suspected diagnosis (Chest x-ray,
    symptoms of lung mass, clinical presentation, electro-diagnostic studies, and
    antibody titers).
    - Can be repeated if initial CT previously negative after 3 months with
      persistent suspicion.

- Stiff man syndrome is associated with small cell lung cancer and breast cancer
  - CT Chest with contrast (CPT® 71260) if Stiff Man Syndrome is suspected based
    on clinical findings.

PN-6.2: Inflammatory Muscle Diseases

- MRI and ultrasound are increasingly being used in the evaluation of muscle disease.
  MRI may be helpful in demonstrating abnormalities in muscles that are difficult to
  examine or not clinically weak, and MRI can also help distinguish between different
  types of muscle disease. MRI is also useful in determining sites for muscle biopsy.

- MRI Lower Extremity other than joint without contrast (CPT® 73718) or MRI Lower
  Extremity other than joint with contrast (CPT® 73720) and/or MRI Upper
  Extremity other than joint without contrast (CPT® 73218) or MRI Upper Extremity
  other than joint without and with contrast (CPT® 73220), usually the most affected
  muscle is imaged (when criteria is met imaging can be approved for bilateral studies)
  for:
    - Additional evaluation of myopathy or myositis (based on clinical exam and
      adjunct testing with EMG/NCV and labs)
    - To plan muscle biopsy
    - See PEDMS-10.3: Inflammatory Muscle Diseases in the Pediatric
      Musculoskeletal Imaging Guidelines

- All cases with dermatomyositis and polymyositis can undergo search for occult
  neoplasm See ONC-30.3: Paraneoplastic Syndromes in the Oncology Imaging
  Guidelines
PN-6.3: Gaucher Disease (Storage Disorders)

See AB-11: Gaucher Disease and Hemochromatosis in the Abdomen Imaging Guidelines.

See PEDPN-4: Gaucher Disease in the Pediatric Peripheral Nerve Disorders Imaging Guidelines.

References

PN-7: Magnetic Resonance Neurography (MRN)

Use limited to evaluation of complicated cases and diagnostic uncertainty when other studies (EMG/NCV, ultrasound) are equivocal or non-diagnostic and results will determine intervention and/or surgical planning for peripheral nerve surgery and repair.

Reference
PN-8: Amyotrophic Lateral Sclerosis (ALS)

MRI Brain, Cervical, Thoracic, and Lumbar Spine most often without contrast, but may be without and with contrast with meningeal symptoms.
- Can be considered when ALS is suspected (combination of upper and lower motor neuron findings) to establish a diagnosis.
- Repeat imaging can be evaluated based on the appropriate Spine Imaging Guidelines.

References
PN-9: Peripheral Nerve Sheath Tumors (PNST)

- Tumors (Schwannomas or Neurofibromas) that arise from Schwann cells or other connective tissue of the nerve are located anywhere in the body and can undergo advanced imaging when suspected, which may include:
  - MRI Brain without and with contrast (CPT® 70553). (Vestibular Schwannomas See HD-33.1: Acoustic Neuroma and Other Cerebellopontine Angle Tumors in the Head Imaging Guidelines)
  - MRI Cervical, Thoracic, and Lumbar Spine without and with contrast (CPT® 72156, CPT® 72157, and CPT® 72158) if paraspinal neurofibroma is found any spine level or multiple simplex perineural neurofibromas.
  - Follow-up imaging is not needed unless:
    - New symptoms or neurological findings develop
    - Post operatively, at the discretion of the surgeon and to reestablish baseline if the tumor was not completely removed
    - Malignant transformation (5%) is known or suspected; includes a metastatic work-up with CT Chest and Abdomen with contrast (CPT® 71260 and CPT® 74160).

- See PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2) in the Pediatric Oncology Imaging Guidelines

References
Peripheral Nerve Disorders (PND)

PN-10: Nuclear Imaging

- Nuclear Medicine
  - Nuclear medicine studies are not generally indicated in the evaluation of peripheral nerve disorders. See PEDPN-2: Neurofibromatosis in the Pediatric Peripheral Nerve Disorders Imaging Guidelines for specific imaging guidelines regarding PET/CT in evaluation of peripheral nerve tumors.
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## Abbreviations and Glossary for the PVD Imaging Guidelines

(See also: Cardiac Imaging Guidelines Glossary)

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>AAA</td>
<td>abdominal aortic aneurysm</td>
</tr>
<tr>
<td>ABI</td>
<td>Ankle brachial index: a noninvasive, non-imaging test for arterial insufficiency – (see toe-brachial index below). This testing can also be done after exercise if resting results are normal.</td>
</tr>
<tr>
<td>Claudication</td>
<td>or <strong>Intermittent claudication</strong>: usually a painful cramping sensation of the legs with walking or severe leg fatigue</td>
</tr>
<tr>
<td>CTA</td>
<td>computed tomography angiography</td>
</tr>
<tr>
<td>CTV</td>
<td>computed tomography venography</td>
</tr>
<tr>
<td>DLCO</td>
<td>diffusion capacity: defined as the volume of carbon monoxide transferred into the blood per minute per mmHg of carbon monoxide partial pressure</td>
</tr>
<tr>
<td>DVT</td>
<td>deep venous thrombosis</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>ENT</td>
<td>Ears, Nose, Throat</td>
</tr>
<tr>
<td>HbA1C</td>
<td>hemoglobin A1C: test used to determine blood sugar control for patients with diabetes</td>
</tr>
<tr>
<td>MRA</td>
<td>magnetic resonance angiography</td>
</tr>
<tr>
<td>MRV</td>
<td>magnetic resonance venography</td>
</tr>
<tr>
<td>PAD</td>
<td>peripheral artery disease</td>
</tr>
<tr>
<td>PAH</td>
<td>pulmonary artery hypertension</td>
</tr>
<tr>
<td>PFT</td>
<td>pulmonary function tests</td>
</tr>
<tr>
<td>PVD</td>
<td>peripheral vascular disease</td>
</tr>
<tr>
<td>SVC</td>
<td>superior vena cava</td>
</tr>
<tr>
<td>TIA</td>
<td>transient ischemic attack</td>
</tr>
<tr>
<td>TTE</td>
<td>transthoracic echocardiogram</td>
</tr>
<tr>
<td>Toe-Brachial Index</td>
<td>useful in patients with ABI above the normal range due to non-compressible posterior tibial or dorsalis pedis arteries</td>
</tr>
<tr>
<td>V/Q Scan</td>
<td>ventilation and perfusion scan</td>
</tr>
</tbody>
</table>
## PVD-1: General Guidelines

<table>
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<th>Section</th>
<th>Page</th>
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<tr>
<td>PVD-1.3: General Guidelines – Imaging</td>
<td>8</td>
</tr>
</tbody>
</table>
PVD-1.1: General Information

- A current clinical evaluation (within 60 days), including medical treatments, are required prior to considering advanced imaging, which includes:
  - Relevant history and physical examination including:
    - The palpation of pulses
    - Evaluation of lower extremities for the presence of non-healing wounds or gangrene
    - Associated skin changes such as thickened nails, absence of hair in the feet or calves, cool extremities
    - Evaluation for the presence of arterial bruits
    - Appropriate laboratory studies
    - Non-advanced imaging modalities, such as recent ABIs (within 60 days) after symptoms started or worsened
  - Other meaningful contact (telephone call, electronic mail, or messaging) by an established patient can substitute for a face-to-face clinical evaluation

- Risk factors for vascular disease include:
  - Diabetes
  - Cigarette smoking
  - Hypertension
  - Hyperlipidemia
  - Age > 50, with at least one risk factor, are considered “at risk” for vascular disease
  - See also: PV-17: Impotence/Erectile Dysfunction in the Pelvis Imaging Guidelines

- Signs and symptoms of peripheral arterial disease
  - Claudication (Cramping pain in the legs, most notably back of the calves but can involve hips or thighs, after walking which is relieved with rest but recurs at a predictable distance)
  - Symptoms that are not consistent with claudication include
    - Generalized leg pain
    - Nocturnal cramps
    - Pain that is not easily relieved after a few minutes of rest
    - Burning pain in feet
  - Critical limb ischemia
    - Rest pain: Pain in the foot (not leg) at rest, particularly at night when the leg is elevated. Pain is relieved by dangling the leg off the bed or moving to an upright position
    - Non healing wounds. Wounds present for >2 weeks with little to no evidence of healing
  - Erectile dysfunction can be associated with vascular disease

- Claudication and critical limb ischemia have different natural histories. Claudication generally follows a benign indolent course. 70% of patients with claudication will have the same symptoms after five years with no progression. Critical limb ischemia, on the other hand, is associated with a high rate of limb loss (25%) and death (35%) one year after presentation
Simultaneous venous and arterial systems evaluation are unusual but are occasionally needed.

Post angioplasty/reconstruction: follow-up imaging is principally guided by symptoms. See also:
- **PVD-7.3: Post-Procedure Surveillance Studies**
- **PVD-6.8: Post Aortic Intervention Surveillance Studies**

### PVD-1.2: Procedure Coding

<table>
<thead>
<tr>
<th>Non-Invasive Physiologic Studies of Extremity Arteries</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Limited bilateral noninvasive physiologic studies of upper or lower extremity arteries.</td>
<td>93922</td>
</tr>
<tr>
<td>Non-invasive physiologic studies of upper or lower extremity arteries, single level, bilateral (e.g., ankle/brachial indices, Doppler waveform analysis, volume plethysmography, transcutaneous oxygen tension measurement).</td>
<td></td>
</tr>
<tr>
<td>Complete bilateral noninvasive physiologic studies of upper or lower extremity arteries, 3 or more levels.</td>
<td>93923</td>
</tr>
<tr>
<td>Non-invasive physiologic studies of upper or lower extremity arteries, multiple levels or with provocative functional maneuvers, complete bilateral study (e.g., segmental blood pressure measurements, segmental Doppler waveform analysis, segmental volume plethysmography, segmental transcutaneous oxygen tension measurements, measurements with postural provocative tests, measurements with reactive hyperemia).</td>
<td></td>
</tr>
</tbody>
</table>

- CPT® 93922 and CPT® 93923 can be requested and reported only once for the upper extremities and once for the lower extremities.
- CPT® 93922 and CPT® 93923 should not be ordered on the same request nor billed together for the same date of service.
- CPT® 93924 and CPT® 93922 and/or CPT® 93923 should not be ordered on the same request and should not be billed together for the same date of service.
- ABI studies performed with handheld dopplers, where there is no hard copy output for evaluation of bidirectional blood flow, are not reportable by these codes.

<table>
<thead>
<tr>
<th>Non-Invasive Physiologic Studies of Extremity Arteries</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-invasive physiologic studies of lower extremity arteries, at rest and following treadmill stress testing, complete bilateral study.</td>
<td>93924</td>
</tr>
</tbody>
</table>
### Arterial Duplex – Upper and Lower Extremities

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplex scan of lower extremity arteries or arterial bypass grafts; complete bilateral.</td>
<td>93925</td>
</tr>
<tr>
<td>✷ A complete duplex scan of the lower extremity arteries includes examination of the full length of the common femoral, superficial femoral and popliteal arteries.</td>
<td></td>
</tr>
<tr>
<td>✷ The iliac, deep femoral, and tibipereoneal arteries may also be examined.</td>
<td></td>
</tr>
<tr>
<td>Duplex scan of lower extremity arteries or arterial bypass grafts; unilateral or limited study.</td>
<td>93926</td>
</tr>
<tr>
<td>✷ The limited study is reported when only one extremity is examined or when less than a full examination is performed (e.g. only one or two vessels or follow-up).</td>
<td></td>
</tr>
<tr>
<td>Duplex scan of upper extremity arteries or arterial bypass grafts; complete bilateral.</td>
<td>93930</td>
</tr>
<tr>
<td>✷ A complete duplex of the upper extremity arteries includes examination of the subclavian, axillary, and brachial arteries.</td>
<td></td>
</tr>
<tr>
<td>✷ The radial and ulnar arteries may also be included.</td>
<td></td>
</tr>
<tr>
<td>Duplex scan of upper extremity arteries or arterial bypass grafts; unilateral or limited study.</td>
<td>93931</td>
</tr>
<tr>
<td>✷ The limited study is reported when only one extremity is examined or when less than a full examination is performed (e.g. only one or two vessels or follow-up).</td>
<td></td>
</tr>
</tbody>
</table>

### Cerebrovascular Artery Studies

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplex scan of extracranial arteries; complete bilateral study.</td>
<td>93880</td>
</tr>
<tr>
<td>Duplex scan of extracranial arteries; unilateral or limited study.</td>
<td>93882</td>
</tr>
<tr>
<td>✷ This study is often referred to as a “carotid ultrasound” or “carotid duplex”.</td>
<td></td>
</tr>
<tr>
<td>✷ Typically, it includes evaluation of the common, internal, and external carotid arteries.</td>
<td></td>
</tr>
</tbody>
</table>

### Transcranial Doppler Studies

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transcranial Doppler study of the intracranial arteries; complete study</td>
<td>93886</td>
</tr>
<tr>
<td>Transcranial Doppler study of the intracranial arteries; limited study</td>
<td>93888</td>
</tr>
<tr>
<td>Transcranial Doppler vasoreactivity study</td>
<td>93890</td>
</tr>
<tr>
<td>Transcranial Doppler study of the intracranial arteries; emboli detection without intravenous microbubble injection</td>
<td>93892</td>
</tr>
<tr>
<td>Transcranial Doppler study of the intracranial arteries; emboli detection with intravenous microbubble injection</td>
<td>93893</td>
</tr>
</tbody>
</table>

### Venous Studies - Extremities

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-invasive physiologic studies of extremity veins, complete bilateral study (e.g. Doppler waveform analysis with responses to compression and other maneuvers, phleborheography, impedance plethysmography). This study is rarely performed.</td>
<td>93965</td>
</tr>
<tr>
<td>Duplex scan of extremity veins, including responses to compression and other maneuvers; complete bilateral study.</td>
<td>93970</td>
</tr>
<tr>
<td>Duplex scan of extremity veins, including responses to compression and other maneuvers; unilateral or limited study.</td>
<td>93971</td>
</tr>
<tr>
<td>✷ These codes are used to report studies of lower or upper extremity veins.</td>
<td></td>
</tr>
<tr>
<td>✷ A complete bilateral study of the lower extremity veins includes examination of the common femoral, proximal deep femoral, great saphenous and popliteal veins. Calf veins may also be included.</td>
<td></td>
</tr>
<tr>
<td>✷ A complete bilateral study of upper extremity veins includes examination of the subclavian, jugular, axillary, brachial, basilica, and cephalic veins. Forearm veins may also be included.</td>
<td></td>
</tr>
</tbody>
</table>
**Visceral Vascular Studies**

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study.</td>
<td>93975</td>
</tr>
<tr>
<td>Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study</td>
<td>93976</td>
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<tr>
<td>Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete study</td>
<td>93978</td>
</tr>
<tr>
<td>Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; unilateral or limited study</td>
<td>93979</td>
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</table>

**Duplex for Hemodialysis Access**

<table>
<thead>
<tr>
<th>Procedure Description</th>
<th>CPT®</th>
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</thead>
<tbody>
<tr>
<td>Duplex scan of hemodialysis access (including arterial inflow, body of access and venous outflow).</td>
<td>93990</td>
</tr>
</tbody>
</table>

**PVD-1.3: General Guidelines – Imaging**

- ABI should be measured first:
  - If normal, then further vascular studies are generally not indicated
  - If clinical suspicion for PAD remains high with normal ABI’s, exercise ABI’s (CPT® 93924) can be performed on a treadmill to elicit ischemia
  - The TBI (toe-brachial index) is used to establish the diagnosis of PAD in the setting of non-compressible arteries (ABI >1.40) and may also be used to assess perfusion in patients with suspected CLI (rest pain and/or non-healing wound)

- Imaging Studies:
  - Carotid studies (MRA Neck or CTA Neck) capture the area from the top of the aortic arch (includes the origin of the innominate artery, common carotid artery, and subclavian artery, which gives off the vertebral artery) to the base of the skull
  - CTA/ MRA Abdomen (CPT® 74175/ CPT® 74185) images from the diaphragm to the umbilicus or iliac crest
  - CTA or MRA Chest (CPT® 71275/ CPT® 71555) images from the base of the neck to the dome of the liver
  - Runoff studies (CPT® 75635 for CTA or CPT® 74185, CPT® 73725, and CPT® 73725 for MRA) image from the umbilicus to the feet
    - CTA Abdomen and lower extremities should be reported as CPT® 75635, rather than using the individual CPT® codes for the abdomen, pelvis, and legs
    - MRA Abdomen, MRA Pelvis and MRA Lower extremities should be reported as CPT® 74185, CPT® 73725, and CPT® 73725. The CPT® code for MRA Pelvis (CPT® 72198) should not be included in this circumstance
  - If a prior imaging study (Ultrasound, MRA, CTA, Catheter angiogram, etc.) has been completed for a condition, a follow-up, additional, or repeat study for the same condition is generally not indicated unless there has been a change in the patient’s condition, previous imaging showed an indeterminate finding, or eviCore healthcare guidelines support routine follow-up imaging
References
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<td>PVD-2.2: Screening for Vascular related genetic connective tissue Disorders (Familial Aneurysm Syndromes/Spontaneous Coronary Artery Dissection (SCAD)/Ehlers-Danlos/Marfan/Loeys-Dietz)</td>
</tr>
<tr>
<td>PVD-2.3: Screening for TAA in patients with bicuspid aortic valves</td>
</tr>
</tbody>
</table>
PVD-2.1: Asymptomatic Screening

- Routine screening of asymptomatic patients for PAD is not advised. Those with CVD risk factors should be placed on best medical management and should be questioned on symptoms of PAD at annual physicals.
- Resting ABI’s may be appropriate in patients with abnormal pulse exams.
- Currently, there is no evidence to demonstrate that screening all patients with PAD for asymptomatic atherosclerosis in other arterial beds improves clinical outcome.

PVD-2.2: Screening for Vascular related genetic connective tissue Disorders (Familial Aneurysm Syndromes/Spontaneous Coronary Artery Dissection (SCAD)/Ehlers-Danlos/Marfan/Loeys-Dietz)

- Screening for Familial Syndromes in patients with a positive family history (1st degree relative with dissection/TAA) but no known genetic syndrome/mutation, otherwise known as Suspected Familial Aneurysm syndrome.
  - ECHO (CPT® 93306, CPT® 93307, or CPT® 93308) and chest x-ray for all First-degree relatives (parents, siblings, children) of patients with TAA and/or dissection.
  - Any imaging listed can be performed if these studies identify a TAA or are equivocal or do not visualize the ascending aorta adequately.
  - Studies can be repeated at 2 year intervals if negative.
- Follow-Up per TAA Follow-Up guidelines.
  - For patients with documented Marfan/Loeys-Dietz/Ehlers-Danlos type IV on initial diagnosis full vascular imaging should be performed from head to pelvis with CTA head, carotid duplex, CTA chest or CT chest w contrast, and abdominal duplex. If there are no identified aneurysms or dissections, repeat imaging can be obtained at 2 year intervals.
  - Imaging should be every 6 months once an aneurysm has been identified until a decision has been made to repair.
    - Intracranial aneurysm – CTA or MRA head
    - Aneurysm of a cervical artery – Carotid duplex or CTA neck if unable to fully visualize with carotid duplex
    - Thoracic aorta – CTA chest or CT chest w or without
    - Abdominal aneurysm – Abdominal duplex
    - Visceral aneurysm – These can be difficult to visualize on duplex. If not visible on duplex, can obtain a CTA Abdomen.
PVD-2.3: Screening for TAA in patients with bicuspid aortic valves

Screening in patients with bicuspid aortic valve:
- Screening, any requested imaging from the “Table of Thoracic Aorta Imaging Options” in PVD 6.2 Thoracic Aortic Aneurysm and/or ECHO (CPT® 93306, CPT® 93307, or CPT® 93308).
  - Additional imaging such as MRI Cardiac, CT Cardiac, or CCTA is NOT generally indicated.
  - There is no evidence-based data to support screening relatives of patients with bicuspid aortic valve.
- Follow-up per TAA Follow-Up guidelines in PVD-6.2: Thoracic Aortic Aneurysm (TAA).

If no dilatation of the aortic root or ascending thoracic aorta is found, there is no evidence-based data to support continued surveillance imaging.

References

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<th>PVD-3: Cerebrovascular and Carotid Disease</th>
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<tr>
<td>PVD-3.3: Surveillance Imaging WITH History of Carotid Surgery or Intervention</td>
</tr>
</tbody>
</table>
PVD-3.1: Initial Imaging

- Prior to considering advanced imaging, duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) should generally be used to evaluate possible carotid artery disease when any of the following apply:
  - Hemispheric neurologic symptoms including stroke, TIA, or amaurosis fugax.
  - Known or suspected retinal arterial emboli or Hollenhorst plaque
  - Suspected carotid dissection
  - Pulsatile neck masses
  - Carotid or cervical bruit
  - Abnormal findings on physical exam of the carotid arteries (e.g. aneurysm or absent carotid pulses)
  - Preoperative evaluation of patients with evidence of severe diffuse atherosclerosis, scheduled for major cardiovascular surgical procedures
  - Preoperative evaluation of patients prior to elective coronary artery bypass graft (CABG) surgery in patients older than 65 years of age and in those with peripheral artery disease, history of cigarette smoking, history of stroke or TIA, or carotid bruit
  - Suspected Subclavian Steal Syndrome
    - See also: CH-27: Subclavian Steal Syndrome in the Chest Imaging Guidelines
  - Blunt neck trauma
  - Neurologic complaints after chiropractic neck manipulation
  - Vasculitis potentially involving carotid arteries, i.e. Takayasu’s arteritis and fibromuscular dysplasia (FMD)

- Carotid ultrasound screening in asymptomatic individuals due only to risk factors is not indicated

- New signs and symptoms consistent with carotid artery disease (e.g. TIA, amaurosis fugax, change in nature of a carotid bruit) are an indication to re-image the cervical vessels (regardless of when the previous carotid imaging was performed) using any of the following:
  - Duplex ultrasound (CPT® 93880 bilateral study or CPT® 93882 unilateral study),
  - MRA Neck with or without and with contrast (CPT® 70548 or 70549)
  - CTA Neck (CPT® 70498)

- For Typical Symptoms of TIA/Stroke or Carotid Dissection:
  - See also: HD-21: Stroke/TIA in the Head Imaging Guidelines

- For Suspected Vertebrobasilar Pathology:
  - Symptoms include:
    - Vertigo associated with nausea and vomiting
    - Diplopia
    - Loss of vision in one or both eyes
    - Dysarthria
    - Bifacial numbness
    - Bilateral extremity weakness and/or numbness
    - Acute changes in mental status
- Loss of consciousness
- Ataxia

- Mechanisms of injury for concern of arterial dissection including, but not exclusive to:
  - Chiropractic manipulation of neck
  - Whiplash injury
  - Fibromuscular dysplasia
  - Stroke in the young (age ≤ 50)

- Initial Imaging
  - Carotid duplex-Note: carotid duplex provides limited information on vertebral disease
  - If clinical suspicion is high
  - CTA neck/MRA neck can be considered medically necessary.
  - Evaluation of posterior circulation disease requires both neck and head MRA/CTA to visualize the entire vertebral-basilar system. See **HD-1.5 General Guidelines – CT and MR Angiography** in the Head Imaging Guidelines
  - See also: **HD-21: Stroke/TIA** in the Head Imaging Guidelines

- Surveillance Imaging (post-stenting or known vertebrobasilar disease)-interval determined by Vascular Specialist, Neurologist, or Neurosurgeon (any):
  - Asymptomatic
  - Unchanged symptoms
  - New or worsening symptoms

- After Intracranial Hemorrhage:
  - Initial Imaging see also: **HD-13.1: Head Trauma** in the Head Imaging Guidelines
  - Surveillance Imaging
  - Interval determined by neurosurgeon or neurologist.

- For Suspected Subclavian Steal Syndrome:
  - Initial imaging should be a carotid duplex
    - If initial duplex demonstrates high grade stenosis or occlusion of the subclavian artery, advanced imaging is NOT indicated unless the patient is symptomatic with arm claudication or signs of hypo-perfusion of the vertebral artery with recurrent dizziness
  - Surveillance of subclavian arterial disease is NOT indicated if there has not been any intervention such as a carotid-subclavian bypass or subclavian stent
    - Advanced imaging see also: **CH-27: Subclavian Steal Syndrome – General** in the Chest Imaging Guidelines
PVD-3.2: Surveillance Imaging with NO History of Carotid Surgery or Intervention

- Surveillance imaging is appropriate once a year for patients with fibromuscular dysplasia of the extracranial carotid arteries.
- Reporting standards for carotid stenosis varies widely. The most commonly used criteria, however, is noted in the chart below published by the Society of Radiology in 2003.

<table>
<thead>
<tr>
<th>Degree of Stenosis (%)</th>
<th>ICA PSV (cm/sec)</th>
<th>Plaque Estimate (%)</th>
<th>Additional Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>&lt;125</td>
<td>None</td>
<td>ICA/CCA PSV (Ratio)</td>
</tr>
<tr>
<td>&lt;50</td>
<td>&lt;125</td>
<td>&lt;50</td>
<td>&lt;2.0</td>
</tr>
<tr>
<td>50–69</td>
<td>125–230</td>
<td>&gt;50</td>
<td>&lt;4.0–4.0</td>
</tr>
<tr>
<td>70 but less than near occlusion</td>
<td>&gt;230</td>
<td>&gt;50</td>
<td>&gt;4.0</td>
</tr>
<tr>
<td>Near occlusion</td>
<td>High, low, or undetectable</td>
<td>Visible</td>
<td></td>
</tr>
<tr>
<td>Total occlusion</td>
<td>Undetectable</td>
<td>Visible, no detectable lumen</td>
<td>Not applicable</td>
</tr>
</tbody>
</table>

- If normal study, no routine follow-up imaging is indicated.
- If <50% carotid stenosis:
  - Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) can be performed every two years.
- Between 50% and 70% carotid stenosis:
  - Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) can be performed annually.
  - A repeat duplex (CPT® 93880 bilateral or CPT® 93882 unilateral) may be performed in three to six months until stability is reached when one of the following occurs:
    - A change in the character of the bruit
    - Duplex demonstrates rapid progression, including:
      - doubling of peak systolic velocities
      - increase of the ICA/CCA ratio
      - heavy calcification
      - thrombus
      - ulcerated plaque
      - echolucent plaque
- Carotid stenosis ≥70% or ICA/CCA ratio >4:
  - Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) or MRA Neck with contrast (CPT® 70548) or CTA Neck (CPT® 70498) can be performed at the following intervals:
Peripheral Vascular Disease (PVD) Imaging

- Every 6 months until one of the following occurs:
  - Intervention is performed
  - Decision is made to not intervene

  If duplex Ultrasound shows ≥ 70% occlusion/stenosis of the internal carotid artery or the ICA/CCA ratio is >4.0 even with a lower percentage of stenosis, then MRA Neck with contrast (CPT® 70548) or CTA Neck (CPT® 70498) can be performed
    - If carotid stent is planned
      - MRA Head (CPT® 70544, or CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) can be added

PVD-3.3: Surveillance Imaging WITH History of Carotid Surgery or Intervention

- Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) can be performed post carotid surgery or intervention at the following intervals:
  - 1 month after procedure
  - Every 6 months for 2 years after procedure
  - Then annually

- If ≥ 70% residual carotid stenosis is seen at 1 month after procedure
  - Duplex ultrasound (CPT® 93880 bilateral or CPT® 93882 unilateral) can be performed at the following intervals:
    - Every 3-6 months for one year
    - Then annually.

Practice Notes

- Carotid intima-media thickness using duplex ultrasound imaging (Category III code 0126T) is not recommended in clinical practice for risk assessment for a first ASCVD event. Although outcomes data are lacking, Texas has adopted this method in Texas Heart Attack Preventive Screening Bill (HR 1290)

- Texas Heart Attack Preventive Screening Law (HR 1290) mandates that insurers in Texas cover either a calcium scoring study (CPT® 75571 or HCPCS S8092) or a carotid intima-media thickness study (ultrasound—Category III code 0126T) every five years for certain populations. To qualify, the following must apply:
  - Must be a Texas resident.
  - Must be a member of a fully-insured Texas health plan.
  - Must be a man age 45 to 75 or a woman age 55 to 75.
  - Must have either diabetes or a Framingham cardiac risk score of intermediate or higher.
  - Must not have had a calcium scoring study or a carotid intima-media thickness study within the past 5 years

- If ultrasound is technically difficult or confirmation of the degree of stenosis on ultrasound is needed because an interventional procedure is being considered, then MRA Neck (CPT® 70548) or CTA Neck (CPT® 70498) may be performed.
References

ASA/ACCF/AHA/AANN/AANS/ACR/ASNR/CNS/SAIP/SCAI/SIR/SNIS/SVM/SVS Guideline on the
Management of Patients With Extracranial Carotid and Vertebral Artery Disease. Journal of the

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Vascular Laboratory Testing: A Report from the American Society of Echocardiography and the


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6. Rogers RK, Bishu K. Optimal Treatment of Extracranial Carotid Artery Disease: Carotid
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Vertebral Artery Disease: 2017 Clinical Practice Guidelines of the European Society for Vascular

ACCF/ACR/AIUM/ASE/AS/ICAVL/SCAI/SCCT/SIR/SVM/SVS 2012 Appropriate Use Criteria for
Peripheral Vascular Ultrasound and Physiological Testing Part I: Arterial Ultrasound and

doi:10.1161/01.cir.0000437741.48606.98.


Scientific Statement for Healthcare Professionals From the American Heart Association/American
PVD-4.1: Upper Extremity PVD – Imaging

- Signs and symptoms of arterial insufficiency include but are not limited to:
  - Arm or hand claudication, cramping or fatigue of the unilateral extremity with use or with raising limb overhead that is relieved with rest and is reproducible. See CH-27: Subclavian Steal Syndrome in the Chest Imaging Guidelines.
  - Systolic blood pressure differential between arms of <15mmHg. See CH-27: Subclavian Steal Syndrome in the Chest Imaging Guidelines.
  - Bluish discoloration of the hand or fingers
  - Unilateral cold painful pulseless hand
  - Non healing wound (>2 weeks with no healing or evidence of healing) or frank gangrene

- For signs and symptoms of arterial insufficiency, appropriate studies include:
  - Arterial ultrasound of the upper extremities (CPT® 93930 or CPT® 93931) or
  - CTA of Upper extremity (CPT® 73206) or MRA of Upper extremity (CPT® 73225) and/or
  - CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555)

- For suspected Fibromuscular Dysplasia of the brachial artery, appropriate studies include:
  - MRA of Upper extremity (CPT® 73225)
  - CTA of Upper extremity (CPT® 73206)
  - Arterial Ultrasound (CPT® 93930 bilateral study or CPT® 93931 unilateral study)

- Arterial Duplex (CPT® 93931) can be obtained following upper extremity arterial revascularization at:
  - Baseline (within one month)
  - 6 months
  - Then annually if stable
  - Anytime for new or worsening symptoms

- For symptoms of venous insufficiency including but not limited to unilateral pain and swelling of the upper extremity
  - Venous duplex of the upper extremities (CPT® 93970 or CPT® 93971) should be performed initially
  - If duplex ultrasound is nondiagnostic:
    - MRV Upper extremity (CPT® 73225) and/or MRV Chest (CPT® 71555), or
    - CTV Upper extremity (CPT® 73206) and/or CTV Chest (CPT® 71275)
      - If there is a history of exertion with the limb such as with weight lifting or in the presence of central venous access (port, PICC line, to name a few) with a negative venous duplex, a CTV of Upper extremity (CPT® 73206) or MRV of Upper extremity (CPT® 73225), and/or CTV Chest (CPT® 71275) or MRV Chest (CPT® 71555) can be performed. See CH-31.1: Thoracic Outlet Syndrome in the Chest Imaging Guidelines

- For Superior Vena Cava Syndrome (upper extremity and facial symptoms):
  - CT Chest with contrast (CPT® 71260)
  - MRV (CPT® 71555) or CTV (CPT® 71275) Chest may be considered when stenting of the SVC is being considered
References


PVD-5.1: Pulmonary Artery Hypertension – Imaging

- Pulmonary artery hypertension (PAH) comprises a spectrum of diseases which will need direct evaluation, including ECG (right ventricular hypertrophy with/without strain, right atrial dilatation); chest x-ray; arterial blood gas, PFT’s or V/Q scan. Imaging is based on suspected etiology.

- Transthoracic echocardiogram (TTE) (CPT® 93306) should be performed initially and may be accompanied by:
  - Pulmonary venous hypertension - Stress echocardiogram (CPT® 93350 or CPT® 93351) or left and/or right heart catheterization
  - Pulmonary hypertension associated with hypoxemia - High-resolution CT Chest (CPT® 71250) to rule out restrictive lung disorders such as idiopathic pulmonary fibrosis

- Acute or chronic pulmonary embolism – CTA Chest (CPT® 71275);

- See also in specific subsections:
  - CD-2.2: Transthoracic Echocardiogram (TTE)-Indications
  - CD-7.4: Right Heart Catheterization (RHC)
  - CD-11.3.12: Severe Pulmonary artery hypertension (PHT) and Eisenmenger syndrome in the adult cardiac imaging guidelines
  - PEDCD-2.3: Congenital Heart Disease Modality Considerations
  - PEDCD-7: Pediatric Pulmonary Hypertension-General in the pediatric cardiac imaging guidelines
  - CH-25: Pulmonary Embolism (PE) in the Chest Imaging Guidelines.

References


# PVD-6: Aortic Disorders, Renal Vascular Disorders and Visceral Artery Aneurysms

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PVD-6.1: Aortic Disorders General Information

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<tr>
<td>Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; complete study.</td>
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<tr>
<td>Duplex scan of arterial inflow and venous outflow of abdominal, pelvic, scrotal contents and/or retroperitoneal organs; limited study.</td>
<td>93976</td>
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<tr>
<td>Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete study.</td>
<td>93978</td>
</tr>
<tr>
<td>Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; unilateral or limited study.</td>
<td>93979</td>
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</tbody>
</table>

- In clinical practice, CT, CTA, MRA are usually preferred to evaluate for stenosis of these vessels rather than ultrasound which can be difficult to perform (Exception: Duplex ultrasound is appropriate to rule out testicular or ovarian torsion or to evaluate an abdominal bruit or a pulsatile abdominal mass).

- Mesenteric Ischemia
  - See also: **AB-6: Mesenteric/Colonic Ischemia** in the Abdomen Imaging Guidelines.

References


**PVD-6.2: Thoracic Aortic Aneurysm (TAA)**

- The thoracic aorta is generally divided into two segments: the ascending aorta which includes the aortic root, aortic arch and ends just distal to the left subclavian artery and the descending aorta which starts just distal to the left subclavian artery to the level of the diaphragm.

- Advanced imaging with a CT or MR is preferred imaging for this diagnosis. Given the diversity of studies, pathology and provider preference, approved thoracic imaging for this indication can be ONE of the following studies listed in the table below:

<table>
<thead>
<tr>
<th>Table of Thoracic Aorta Imaging Options</th>
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<tbody>
<tr>
<td>CT Chest, and/or Abdomen, and/or Pelvis</td>
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<tr>
<td>CTA Chest, and/or Abdomen, and/or Pelvis</td>
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<td>MRA Chest, and/or Abdomen, and/or Pelvis</td>
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</table>

- For suspected TAA, any requested imaging from the “Table of Thoracic Aorta Imaging Options” above:
  - Abnormalities identified on chest x-ray (abnormality including widened mediastinum, suspicious calcifications) or other imaging studies (fluoroscopy, MRI Spine, etc.) abnormality.¹²³⁴⁵

- For known TAA accompanied with chest pain or back pain and suspicion of rupture, any requested imaging from the “Table of Thoracic Aorta Imaging Options” above.¹²³⁴⁵

- For planning for pre–thoracic endovascular repair (TEVAR) of thoracic aorta disease.⁹
  - CTA Chest, and/or Abdomen, and/or Pelvis (CPT® 71275, CPT® 74175, CPT® 72191, CPT® 74174); or
  - MRA Chest, and/or Abdomen, and/or Pelvis (CPT® 71555, CPT® 74185, CPT® 72198)

- For follow-up of ascending aortic aneurysms
  - **Operative treatment is reasonable for asymptomatic patients when the diameter of the arch exceeds 5.5 cm.**
  - **For patients with isolated aortic arch aneurysms < 4.0 cm in diameter**
    - Repeat imaging annually
  - **For patients with isolated aortic arch aneurysms > 4.0 cm**
    - Repeat imaging 6 months.
For follow-up of descending aortic aneurysms, any requested imaging from the "Table of Thoracic Aorta Imaging Options" above for the following:4,5,7,9
- "Medically" treated/observation.
  - 3.5 to 4.4 cm TAA can be followed annually.
  - ≥4.5 cm TAA can be followed every 6 months.
  - ≥3.0 cm TAA when there is concern for growth can have a one-time 3 month interval advanced imaging.
- Surgery or Stent treatment.
  - Preoperative open or endovascular (stent) repair imaging is appropriate.
  - Suspicion of endoleaks.
  - Open Repair imaging every 3 to 5 years.
- Endovascular graft/stent.
  - First year: 1 month, 6 months, 12 months, then annually.

Screening in the presence of other aortic aneurysms.
- In a patient with a known TAA, screening for AAA is appropriate with an abdominal duplex. See PVD-6.3: Abdominal Aortic Aneurysm (AAA) in the Peripheral Vascular Disease Imaging Guidelines.
- In a patient with a known AAA, screening for TAA is not supported by sufficient evidence.

Screening in patients with bicuspid aortic valve or familial TAA syndromes. See PVD-2.3: Screening for TAA in patients with bicuspid aortic valve. See PVD-2.2: Screening for Vascular related genetic connective tissue Disorders (Familial Aneurysm Syndromes/Spontaneous Coronary Artery Dissection (SCAD)/Ehlers-Danlos/Marfan/Loeys-Dietz)

References
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7. ACR Appropriateness Criteria® thoracic aorta interventional planning and follow-up. American College of Radiology (ACR); 2017.
PVD-6.3: Abdominal Aortic Aneurysm (AAA)

- Ultrasound Abdominal aorta (CPT® 76706) is the preferred initial imaging study to screen and retroperitoneal ultrasound (CPT® 76775) to survey for AAA or to evaluate a pulsatile abdominal mass.
- Obese Individual (BMI ≥ 35): CT Abdomen and Pelvis with contrast (CPT® 74177) or without contrast (CPT® 74176) can be substituted for US using the same timeline as a non-obese individual. Ultrasound of the abdominal aorta should ideally first be attempted to see if the image quality is adequate.

Screening

- One-time screening recommendations for AAA (Ultrasound CPT® 76706)
  - Men and women 65 to 75 years of age with a history of tobacco use
  - Men and women older than 75 years with a history of tobacco use and in otherwise good health who have not previously received a screening ultrasound examination
  - All first-degree relatives of individuals who present with an AAA and are between 65 and 75, or in those older than 75 in good health
- Medicare covers a one-time AAA screening ultrasound (CPT® 76706) if there are at least one of the following risk factors
  - Family history of AAA
  - The individual is a male age 65 to 75 who has smoked at least 100 cigarettes in his lifetime
- If there is a documented thoracic aortic aneurysm, AAA screening is reasonable with ultrasound (CPT® 76706); however, there is insufficient evidence to support the use of advanced imaging to screen for a thoracic aortic aneurysm in individuals with known abdominal aortic aneurysm.

Surveillance recommendations for AAA (CPT® 76775)

- > 2.5 cm but < 3.0 cm: 10 years
- 3.0 cm to 3.9 cm: 3 year intervals
- 4.0 cm to 4.9 cm: every 12 months
- 5.0 cm to 5.4 cm: every 6 months
- > 5.4 cm or aortic diameter has increased in size by 0.7 cm in six months, or at least 1 cm in a year may undergo more frequent monitoring and should be evaluated by a Vascular Specialist.

Additional Imaging

- CT of the Abdomen and Pelvis with contrast (CPT® 74177), CT of the Abdomen and Pelvis without and with contrast (CPT® 74178), or CTA Abdomen and Pelvis (CPT® 74174), or CTA Abdomen (CPT® 74175), or CTA Pelvis (CPT® 72191).
  - Individuals suspected to have AAA presenting with recent-onset abdominal or back pain, particularly in the presence of a pulsatile epigastric mass or significant risk factors for AAA
  - Pre-operative imaging for AAA repair
**PVD-6.4: Iliac Artery Aneurysm (IAA)**

- Evaluation of a suspected IAA should begin with ultrasound (CPT® 76882 or CPT® 93925)
  - If ultrasound is equivocal, CT Pelvis with contrast (CPT® 72193) may be performed.
  - Follow-up imaging studies can be performed annually with an ultrasound if an aneurysm is > 2cm

- Additional Imaging
  - CT of the Abdomen and Pelvis with contrast (CPT® 74177), CT of the Abdomen and Pelvis without and with contrast (CPT® 74178), or CTA Abdomen and Pelvis (CPT® 74174) for preoperative imaging if endovascular or open repair is being considered

**Practice Notes**

- Isolated IAA’s are rare and are typically associated with AAA
- Approximately one third to one half of isolated IAA’s are bilateral at time of presentation
- Abdominal Aortic aneurysm rupture usually occurs at a diameter of 5 cm or larger, whereas common iliac aneurysms that are less than 3 cm in diameter almost never rupture.

**PVD-6.5: Visceral Artery Aneurysm**

- Splenic artery aneurysms, the most common (60%), tend to exhibit very slow rates of growth, while the other visceral artery aneurysms are more unpredictable in their rate of growth with a greater tendency to rupture
- Treatment is generally indicated for aneurysm >2cm
- Workup for suspected visceral artery aneurysm (spleen, kidney, liver or intestines) if calcifications seen on plain film imaging can include:
  - Ultrasound (CPT® 76700 or CPT® 76705), or
  - CTA Abdomen (CPT® 74175), or
  - CT Abdomen with contrast (CPT® 74160).
- Further monitoring can be with Ultrasound (CPT® 76700 or CPT® 76705) or CTA Abdomen (CPT® 74175) or CT Abdomen with contrast (CPT® 74160) based on the intervals below or as determined by a vascular specialist:
  - Splenic artery aneurysms:
    - <20mm can be imaged every three years
    - If >25mm, they should be referred for treatment, either stent, excision or splenectomy
  - For all other visceral artery aneurysms:
    - Initial evaluation with six-month follow-up for one year
    - Further follow-up annually if no significant enlargement is seen
Peripheral Vascular Disease (PVD) Imaging

- CTA Abdomen (CPT® 74175), MRA Abdomen (CPT® 74185), or CT Abdomen (CPT® 74160) are indicated following stent placement at:
  - 1 month
  - 6 months
  - 12 months
  - Then every year

**Practice Notes**

- Visceral Artery Aneurysms are defined by an increase of more than 50% of the original arterial diameter

- Vascular specialty consultation is beneficial in order to determine the time frame to intervention

**References**

PVD-6.6: Renovascular Hypertension/Renal Artery Stenosis

- Renal artery revascularization has NOT been shown to be more effective than medical therapy in most situations and should not be pursued except in extreme cases, or if there is concern for Takayasu arteritis or fibromuscular dysplasia.

- MRA without or with contrast (CPT® 74185) or CTA with contrast (CPT® 74175) of the Abdomen if:
  - The individual is adherent to full doses of three blood pressure medications (including a diuretic) yet has still not achieved goal
  - Sudden and persistent worsening of previously controlled hypertension
  - Onset of hypertension younger than 30 years of age
  - Malignant hypertension with coexistent evidence of acute end-organ damage (acute renal failure, new visual or neurological disturbance and/or advanced retinopathy) or flash pulmonary edema
  - Women who develop hypertension (≥ 140/90) within the first 20 weeks of pregnancy, if hypertension persists > 12 weeks post-partum
  - New or worsening renal function/increasing creatinine (especially after the administration of an ACE inhibitor or with angiotensin receptor blocking agent)
  - Unexplained atrophic kidney or discrepancy in size between kidneys of greater than 1.5 cm

- Gadolinium agents may be contraindicated in patients with severe renal disease or on dialysis due to the risk of developing nephrogenic systemic sclerosis.

- US kidney retroperitoneal (CPT® 76775) and/or Doppler (CPT® 93975 or CPT® 93976) if expertise is available.

- In individuals with documented or highly suspicious renal artery stenosis due to fibromuscular dysplasia (mostly women between 15 and 50 years of age), a screening carotid duplex (CPT® 93880) is reasonable to assess for carotid involvement. Hypertensive patient with documented cervicocephalic fibromuscular dysplasia should be screened for renovascular fibromuscular dysplasia with CTA Abdomen (CPT® 74175) or MRA Abdomen (CPT® 74185). The assessment of other vascular beds should be considered if supported by suggestive symptoms or medical history.
References

PVD-6.7: Aortic Dissection and Other Aortic Conditions

- Classic symptoms of sharp, severe acute onset of retrosternal or interscapular chest pain is seen in 96% and is best adapted to the emergent setting. Chest x-ray is imprecise; any suspicion should be considered since up to 10% of patients with aortic dissection present without classic symptoms.

- CTA or MRA of the entire aorta (including arch branches) and extending through the femoral arteries for suspected aortic dissection.¹,²,³,⁴

- Any of the following studies can be used if acute dissection is suspected:
  - CT Chest (CPT® 71260 or CPT® 71270) and/or CT Abdomen (CPT® 74160 or CPT® 74170) and/or CT Pelvis (CPT® 72193 or CPT® 72194) or
    - If CT Abdomen and Pelvis with or with and without is requested, codes: (CPT® 74177 or CPT® 74178) are appropriate
  - CTA Chest (CPT® 71275) and/or CTA Abdomen and/or Pelvis (CPT® 74175 or CPT® 72191 or CPT® 74174), or
  - MRA Chest and/or Abdomen and/or Pelvis (CPT® 71555 and/or CPT® 74185 and/or CPT® 72198)

- Chronic Aortic Dissections
  - 1/3 of patients with chronic type B dissections that were not treated via open or endovascular repair will go on to develop aneurysmal disease requiring subsequent intervention. Advanced imaging of the affected segment of the aorta can be performed as follows with any of the studies noted above:
    - In patients with a persistent false lumen or initial aortic diameter of >4cm:
      - Every 6 months for two years until stability has been reached
      - Then annually
    - In patients with initial aortic diameter of <4cm and/or a thrombosed false lumen:
      - Annually
    - Any time if the individual is symptomatic with chest pain, back pain or has any evidence of end organ ischemia: renal dysfunction, mesenteric ischemia or acute limb ischemia

- In patients with Marfan syndrome/Loeys-Dietz/Ehlers-Danlos
  - As aneurysmal expansion within a dissection can occur rapidly, post-dissection imaging in these individuals is indicated as follows:
    - 1 month
    - 3 months
    - 6 months
    - 12 months
    - yearly thereafter
  - Depending on the location of the dissection the following may be approved:
    - CTA or MRA head
    - Carotid duplex or CTA or MRA neck
    - CTA or MRA chest
    - CTA or MRA abdomen/pelvis; or CTA or MRA abdomen; or CTA or MRA pelvis
References


PVD-6.8: Post Aortic Endovascular/Open Surgery Surveillance Studies

- Aortic root/ascending aortic aneurysm repair post-operative echocardiography (TEE/TTE) can be obtained
  - Every three months for the first year
  - Every six months year 2
  - And then annually thereafter

PVD-6.8.1: Post-operative surveillance after TEVAR for any indication

<table>
<thead>
<tr>
<th>Imaging for post-operative abdominal EVAR</th>
<th>CPT®</th>
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<tbody>
<tr>
<td>CT Chest, and/or Abdomen, and/or Pelvis</td>
<td>71260</td>
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<tr>
<td></td>
<td>74177</td>
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<tr>
<td></td>
<td>74160</td>
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<td>72193</td>
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<tr>
<td>CTA Chest, and/or Abdomen, and/or Pelvis</td>
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<td>74174</td>
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<tr>
<td>MRA Chest, and/or Abdomen, and/or Pelvis</td>
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<td></td>
<td>74185</td>
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<td>72198</td>
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</table>

- Any of the above studies listed in the table can be performed at one month, six months, twelve months and then annually
- Abdomen/pelvis imaging is indicated if TEVAR performed for a dissection that extends into the abdomen or pelvis
PVD-6.8.2: Post-operative surveillance after abdominal EVAR (endovascular aneurysm repair):

<table>
<thead>
<tr>
<th>Imaging for post operative abdominal EVAR</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>CT of the Abdomen and/or Pelvis with contrast</td>
<td>74160</td>
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<tr>
<td></td>
<td>72193</td>
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<tr>
<td></td>
<td>74177</td>
</tr>
<tr>
<td>CT of the Abdomen and/or Pelvis without and with contrast</td>
<td>74170</td>
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<tr>
<td></td>
<td>72194</td>
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<td>74178</td>
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<tr>
<td>CTA of the Abdomen and/or Pelvis</td>
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<td></td>
<td>74174</td>
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<tr>
<td>MRA of the Abdomen and/or Pelvis</td>
<td>74185</td>
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<td>72198</td>
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</tbody>
</table>

- CT as per above coding as requested and color duplex ultrasound (CPT® 93975 or CPT® 93976) one month after EVAR
- If no endoleak, or sac enlargement, repeat either preferred CT or duplex ultrasound (but not both) at 12 months
- If a type II endoleak is observed 1 month after EVAR, may approve BOTH at 6 months:
  - any of the above CT with contrast
  - color duplex US
- If no endoleak or AAA enlargement is detected at 1 year after EVAR annual surveillance with:
  - Color duplex US
  - If DGUS is not available, any of the above CT can be performed
- If a type II endoleak is associated with an aneurysm sac that is shrinking or stable in size:
  - Continue surveillance with color duplex US every 6 months for 2 years
  - Then annually thereafter.
- If US detects a new endoleak, graft migration, or aneurysm sac growth > 5mm:
  - Any of the above CT scan as requested.
  - Non-contrast CT of the entire aorta at 5-year intervals (CPT®74176)
- Open Aortic Aneurysm Repair
  - Non-contrast enhanced CT of the entire aorta at 5-year intervals (CPT®74176).
  - Imaging as requested to assess for suspected infection of the graft
PVD-6.8.3: Endovascular (Stent) Iliac Repair

<table>
<thead>
<tr>
<th>Imaging for endovascular iliac repair (stent)</th>
<th>CPT®</th>
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<tbody>
<tr>
<td>CT Pelvis</td>
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<td></td>
<td>72194</td>
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<tr>
<td>CTA Pelvis</td>
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<tr>
<td>MRA Pelvis</td>
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</tbody>
</table>

- One of the above studies can be performed for endovascular iliac repair (stent):
- If performed in conjunction with EVAR, surveillance can follow the same schedule as EVAR.
- For isolated iliac artery aneurysm repair, surveillance can be performed with an arterial duplex (CPT® 93975 or 93976) or CT or MR as above if duplex unavailable:
  - Post-operatively within the first month
  - 6 months after endovascular treatment
  - Then annually

References
# PVD-7: Lower Extremity Peripheral Vascular Disease

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<td>PVD-7.3: Post-Procedure Surveillance Studies</td>
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<td>PVD-7.4: Lower Extremity Artery Aneurysms</td>
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</table>
**PVD-7.1: Claudication**

- Initial evaluation for suspected PAD should be with a resting ABI. This can be accomplished at the bedside as part of the physical examination or requested as CPT® 93922 (limited Doppler ultrasound) or CPT® 93923 (multi-level complete Doppler ultrasound)
  - CPT® 93923 may be performed once
  - Follow-up studies may be performed with CPT® 93922
  - If the resting ABI is > 0.89 and PAD is still highly suspected clinically, then a post-exercise ABI (CPT® 93924) can be performed

- History and physical suggestive of PAD include:
  - History
    - Claudication- reproducible calf or thigh cramping with exertion that is relieved completely with rest
    - Critical limb ischemia
    - Rest pain suggestive of ischemia-pain in the ball of foot when the leg is in an elevated position particularly at night
    - Distal non-healing wound or punched out ulcer with sharply demarcated edges present for >2 weeks with no evidence of healing, i.e. presence of granulation tissue
  - Physical Examination
    - Abnormal lower extremity pulse examination
    - Vascular bruit
    - Non-healing lower extremity wound
    - Lower extremity gangrene
    - Other suggestive lower extremity physical findings (e.g., elevation pallor/dependent rubor)
    - Atrophic nails, hair loss, shiny skin

- If resting ABI (CPT® 93922) is normal (0.9 to 1.3) and disease is still suspected:
  - Differentiate from "pseudocludication". See also: **SP-9: Lumbar Spinal Stenosis** in the Spine Imaging Guidelines
  - Re-measure ABI after exercise (CPT® 93924)
  - A toe-brachial index may be used as further screening in patients with ABI’s greater than 1.3
  - Advanced imaging is necessary only if there is consideration for invasive therapy not to confirm diagnosis

- Duplex ultrasound (CPT® 93925 bilateral study or CPT® 93926 unilateral study) and Doppler studies are adjuncts to abnormal ABI that may be used to identify location and extent of disease once there has been a decision for revascularization.

- MRA Aorta and Pelvic vessels, and Lower extremities (CPT® 74185, CPT® 73725 and CPT® 73725), or CTA with run-off (CPT® 75635) to further evaluate the lower extremity arteries for the purpose of preoperative planning for any of the following:
  - Intermittent claudication (i.e. non-limb threatening ischemia) AND either:
    - Failed 3 months conservative medical therapy (physician supervised walking / exercise program plus medical therapy), or
Functional disability (e.g. exercise impairment sufficient to threaten the patient’s employment or to require significant alterations in the patient’s lifestyle)

- Potentially limb-threatening vascular disease evidenced by:
  - Skin breakdown
  - Non-healing ischemic ulcers
  - Resting leg pain
  - Gangrene

- Blue Toe Syndrome:
  - Emboli from aortic plaque or mural thrombus
  - Hyperviscosity syndrome
  - Hypercoagulable states
  - Vasculitis

- Note: MRA Pelvis should not be requested/billed with CPT® 74185, CPT® 73725 and CPT® 73725

**Practice Notes**
Claudication symptoms usually remain stable (70% to 80% of patients) and do not worsen or improve at rapid rates. Repeat studies to assess the efficacy of medical therapy are not indicated unless there is a negative change in clinical status for the purpose of preoperative planning such as worsening claudication or progression to critical limb ischemia.

**PVD-7.2: Popliteal Artery Entrapment Syndrome**
- Diagnosis of popliteal artery stenosis or occlusion due to compression by adjacent muscle and tendons seen in young men (ages 20 to 40). Ultrasound (CPT® 93926 unilateral study), CTA Lower extremity (CPT® 73706), or MRA Lower extremity (CPT® 73725).
- CT or MRI of the lower extremity (contrast as requested) if requested by the operating surgeon

**PVD-7.3: Post-Procedure Surveillance Studies**
- Scheduled Interval
  - ABI (CPT® 93922) is generally appropriate following any revascularization procedure
    - ABI (CPT® 93922) or Duplex ultrasound (CPT® 93926 unilateral study) at each routine follow up is appropriate generally after a history/physical has been performed
    - Further imaging studies such as CTA or MRA are indicated for worsening symptoms, an abnormal duplex or a significant reduction (>0.15) in the ABI
Peripheral Vascular Disease (PVD) Imaging

### Indication

| Suprainguinal Revascularization Both Open and Endovascular Therapy including Aortobifem/iliofem/fem-fem bypass/iliac angioplasty/stent | Clinical examination and ABI with arterial duplex at:
| 1 month |
| 6 months |
| 12 months |
| Then annually |

| Clinical examination and ABI with arterial duplex at: |
| 1 month |
| 6 months |
| 12 months |
| Then annually |

#### Infrainguinal Open Revascularization (Femoral-popliteal, femoral-tibial, femoral-distal bypass)

- With vein or autologous conduit
- With Prosthetic conduit (PTFE/Dacron)

#### Infrainguinal Endovascular Revascularization Femoropopliteal angioplasty/stent

| Clinical exam and ABI with arterial duplex |
| Post-operatively |
| 3 months |
| 6 months |
| 12 months |
| Then annually |

### PVD-7.3.1: For suprainguinal disease

- Arterial duplex, CTA abdomen/pelvis, CT Abdomen/pelvis with contrast, CTA Aorta with lower extremity runoff, MRI Abdomen/Pelvis, MRA Abdomen/Pelvis, MRA Aorta with lower extremity runoff can be approved for:
  - Worsening signs or symptoms
  - Reduction of ABI >0.15
  - Peak systolic velocities or PSV ratio suggestive of high grade stenosis or in-stent re-stenosis

### PVD-7.3.2: For infraininguinal bypass

- Advanced imaging CTA lower extremity or MRA lower extremity can be approved for:
  - Worsening signs or symptoms
  - Reduction of ABI>0.15
  - Duplex suggestive of threatened graft

- If intervention was performed for a non-healing wound and wound has gone on to heal, no additional imaging is recommended for surveillance. Repeat arterial duplex imaging can be obtained for worsening clinical signs and symptoms such as the presence of a new wound or rest pain
References

PVD-7.4: Lower Extremity Artery Aneurysms

For iliac artery aneurysm see also: PVD-6.4: Iliac Artery Aneurysm (IAA)

Femoral artery aneurysm

- Initial imaging
  - Ultrasound (CPT® 93925 bilateral study or CPT® 93926 unilateral study).

- Surveillance imaging
  - Symptomatic true femoral aneurysms smaller than 2.5 cm in diameter
    - Ultrasound (CPT® 93926 unilateral study) annually
  - Symptomatic true femoral aneurysms larger than 2.5 cm
    - Ultrasound (CPT® 93926 unilateral study) every 6 months

- Other imaging
  - CTA Lower extremity or MRA Lower extremity without or with contrast can be performed when:
    - Preoperative study for patients with no plans for invasive angiography
    - Technically limited or abnormal ultrasound results

Popliteal artery aneurysm

- Initial imaging
  - Ultrasound (CPT® 93925 bilateral study or CPT® 93926 unilateral study) and Ultrasound to assess for a contralateral popliteal aneurysm and abdominal aortic aneurysm (CPT® 76770 or CPT® 76775)

- Surveillance imaging
  - Ultrasound (CPT® 93926 unilateral study) annually
  - Post-interventional functional testing (ABI) (CPT® 93922) may be useful as clinically indicated

- Other imaging
  - CTA or MRA can be performed for:
    - Preoperative study for patients with no plans for invasive angiography
    - Technically limited or abnormal ultrasound results
References


PVD-8: Imaging for Hemodialysis Access

PVD-8.1: Preoperative Arterial Evaluation and Venous Mapping Prior to AV Fistula Creation
PVD-8.1: Preoperative Arterial Evaluation and Venous Mapping Prior to AV Fistula Creation

- For vessel mapping prior to AV fistula creation CPT® 93985 or 93986
- In some instances, MRA Upper Extremity may be needed (CPT® 73225) if duplex imaging is equivocal
- Arterial evaluation to assess arterial suitability (size, degree of stenosis and calcification) prior to AV fistula creation may be appropriate
  - CPT® 93930 or CPT® 93931 can be used to report upper extremity arterial evaluation
  - Venous mapping to assess venous suitability prior to AV fistula creation may be appropriate
    - CPT® 93970 or CPT® 93971 can be used to report venous mapping
- Indications for Duplex ultrasound (CPT® 93990) of hemodialysis access include but are not limited to:
  - Patients with decreased flow rates during hemodialysis.
  - Development of arm swelling or discomfort after access placement surgery or a hemodialysis session.
  - Prolonged immaturity of a surgically created AV fistula.
  - Suspected pseudoaneurysm.
  - Suspected AV fistula or graft stenosis.
  - Known or suspected fluid collection adjacent to an AV fistula or graft.
  - Though it is generally not needed, one Duplex US (CPT® 93990) can be performed after a surgically created AV fistula for assessment.

References

PVD-9: Arteriovenous Malformations (AVMs)

See: PEDPVD-2.5: Arteriovenous Malformations (AVMs) and Fistulas
Nuclear medicine

- Nuclear medicine studies are rarely used in the evaluation of peripheral vascular disorders, but are indicated in the following circumstances:
  - Lymphoscintigraphy (CPT® 78195) is indicated for evaluation of lower extremity lymphedema when a recent Doppler ultrasound is negative for valvular insufficiency.
  - Vascular flow imaging (CPT® 78445) is an obsolete study that has been replaced by MRA, CTA, or Duplex ultrasonography, and is not supported for any indication at this time.
  - Venous thrombosis imaging (CPT® 78456, CPT® 78457, and CPT® 75458) are obsolete studies that have been replaced by MRA, CTA, or Duplex ultrasonography, and are not supported for any indication at this time.
  - Indium 111 (111In)–labeled white blood cell (WBC) or Gallium-67 citrate studies (CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803) can be approved for evaluation of the following:
    - Mycotic aneurysms.
    - Vascular graft infection.
    - Infection of central venous catheter or other indwelling device.
### PVD-11: Venous Imaging General Information

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<td>PVD-11.4: General Guidelines - Imaging</td>
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**PVD-11.1: Abbreviations and glossary**

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>CTV</td>
<td>Computed Tomography Venography</td>
</tr>
<tr>
<td>DVT</td>
<td>Deep Venous Thrombosis</td>
</tr>
<tr>
<td>EVA</td>
<td>Endovenous ablation – a minimally invasive procedure using heat to obliterate the saphenous vein for the treatment of venous reflux</td>
</tr>
<tr>
<td>IVC</td>
<td>Inferior vena cava</td>
</tr>
<tr>
<td>May-Thurner’s Syndrome of compression of the left iliac vein via an overlying right common iliac artery. The pulsations of the artery into the vein against the 5th lumbar vertebra can predispose to DVT</td>
<td></td>
</tr>
<tr>
<td>MRV</td>
<td>Magnetic Resonance Venography</td>
</tr>
<tr>
<td>Phlebectomy</td>
<td>Removal of a vein usually through a small incision</td>
</tr>
<tr>
<td>Post thrombotic syndrome</td>
<td>Constellation of symptoms including chronic edema and pain that develops after a DVT</td>
</tr>
<tr>
<td>Sclerotherapy</td>
<td>Injection of an irritant into a vein to obliterate it</td>
</tr>
<tr>
<td>SEPS</td>
<td>Sub-fascial endoscopic perforator surgery</td>
</tr>
<tr>
<td>SVT</td>
<td>Superficial venous thrombosis</td>
</tr>
<tr>
<td>VVI</td>
<td>Venous Valvular Insufficiency – a study utilizing ultrasound to assess for the presence of reflux within the superficial and deep veins of the lower extremity.</td>
</tr>
</tbody>
</table>

**PVD-11.2: Background Information**

- A current clinical evaluation (within 60 days), including medical treatments, are required prior to considering advanced imaging, which includes:
  - Relevant history and physical examination including:
    - The affected limb(s), the extent of the edema (calf and/or thigh), pitting or non-pitting. With regard to venous insufficiency, presence or absence of hyperpigmentation or other skin changes, ulcerations if applicable, size of varicosities if present as well as distribution
    - Arterial examination to rule out phlegmasia alba/cerulea dolens which is comprised arterial flow secondary to extensive DVT if applicable
    - Appropriate laboratory studies, for example d-dimer, if applicable
    - Non-advanced imaging modalities, such as a venous duplex or venous valvular insufficiency study (VVI) after symptoms started or worsened
  - Other meaningful contact (telephone call, electronic mail or messaging) by an established patient can substitute for a face-to-face clinical evaluation.
- Venous disease can be classified into three categories:
  - Veno-occlusive disease
  - Venous insufficiency
  - Venous malformations

**Veno-occlusive disease**

- Types of thrombotic disease:
  - Superficial venous thrombosis
  - Deep venous thrombosis
  - Iliac vein obstruction, unilateral or bilateral
  - May-Thurner’s syndrome
Signs/Symptoms of veno-occlusive disease is generally sudden onset of pain and edema in the limb.

Risk factors include age>40, obesity, pregnancy, prolonged immobility, post-surgery, and malignancy among others.

Procedures related to veno-occlusive disease include:
- Thrombolysis
- Thrombectomy
- Post iliac vein stent/angioplasty See PVD-17: Post iliac vein stent/angioplasty

**Venous insufficiency**

Types of venous insufficiency:
- Superficial and deep venous reflux
- Varicose veins
- Reticular and spider veins

Signs/symptoms of venous insufficiency include:
- Chronic swelling in the leg that is relieved with elevation
- Chronic swelling in the leg that is worse in the evenings
- Aching or sense of heaviness in the leg
- Hyperpigmentation of the calf particularly around the ankle
- Itchy skin on legs and feet
- Leather appearance of the skin of the calves
- Skin ulcers in the calf particularly around the medial malleolus
- Varicose veins
- Spider veins/reticular veins/telangiectasias

Procedures related to the venous insufficiency include:
- Endovenous laser ablation utilizing either chemical, laser or radio-frequency
- Saphenous vein high ligation and stripping
- Phlebectomy, stab or powered
- Sclerotherapy, liquid or foam

**Venous malformations**

Types of venous malformations include
- Arterio-venous malformations which can occur throughout the body

See CH-24: Pulmonary AVM in the Chest Imaging Guidelines
See HD-12: Aneurysm and AVM in the Head Imaging Guidelines
See PV-11: Pelvic pain/dyspareunia in the Pelvis Imaging Guidelines

Klippel-Trenaunay which affects primarily the lower extremity venous circulation and is characterized by varicose veins, limb size discrepancies, and port-wine stains.

Treatment includes:
- Primarily embolization
- Sclerotherapy
  - Klippel-Trenaunay: treatment can include phlebectomy and sclerotherapy of symptomatic varicose veins provided they meet the criteria for intervention.
## PVD-11.3: Procedure Coding

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<td>CTV Abdomen/Pelvis involves obtaining images from the diaphragm to just below the inguinal ligament after a delay of a few minutes after IV contrast is administered to optimize filling and therefore visualization of the venous vasculature.</td>
<td>74174</td>
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<tr>
<td>CTV pelvis involves obtaining images from the top of the pelvic brim to the upper thighs or just below the inguinal ligament. The venogram portion is performed by obtaining images after a delay of a few minutes after IV contrast is administered to optimize filling and therefore visualization of the venous vasculature.</td>
<td>72191</td>
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<tr>
<td>MRV Abdomen/Pelvis involves taking images from the diaphragm to just below the inguinal ligament after a delay of a few minutes after IV contrast is administered to optimize filling and therefore visualization of the venous vasculature.</td>
<td>74185</td>
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<tr>
<td>MRV pelvis involves obtaining images from the top of the pelvic brim to the upper thighs or just below the inguinal ligament. The venogram portion is performed by obtaining images after a delay of a few minutes after IV contrast is administered to optimize filling and therefore visualization of the venous vasculature.</td>
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<tr>
<td>Non-invasive physiologic studies of extremity veins, complete bilateral study (e.g. Doppler waveform analysis with responses to compression and other maneuvers, phleborheography, impedance plethysmography). <strong>This study is rarely performed.</strong></td>
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<tr>
<td>Duplex scan of extremity veins, including responses to compression and other maneuvers; complete bilateral study.</td>
<td>93970</td>
</tr>
<tr>
<td>Duplex scan of extremity veins, including responses to compression and other maneuvers; unilateral or limited study.</td>
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- These codes are used to report studies of lower or upper extremity veins.
- A complete bilateral study of the lower extremity veins includes examination of the external iliac veins, common femoral, proximal deep femoral, great saphenous and popliteal veins. Calf veins may also be included.
- A complete bilateral study of upper extremity veins includes examination of the subclavian, jugular, axillary, brachial, basilic, and cephalic veins. Forearm veins may also be included.

| Duplex scan of aorta, inferior vena cava, iliac vasculature, or bypass grafts; complete study | 93978 |
| Duplex scan of extremity veins, including responses to compression and other maneuvers; unilateral or limited study. | 93979 |
PVD-11.4: General Guidelines - Imaging

- Venous duplex (CPT® 93970, 93971) of the limb is the initial imaging of choice
  - Follow-up duplex imaging (CPT® 93970, 93971) is not generally indicated to document resolution and should only be obtained for new signs/symptoms or for concerns of propagation of thrombus when the treatment plan would change (Insertion of IVC filter, change of anticoagulation, etc.)

- Imaging studies
  - Venous duplex (CPT® 93970, 93971) should visualize the veins, with demonstration of the presence or absence of compressibility and venous flow.
  - Venous valvular insufficiency studies (CPT® 93970, 93971) visualize the veins of the lower extremity, assess for reflux (reversal of venous antegrade flow after valve closure) and measure its duration.
  - CTV or MRV of the abdomen/pelvis images with contrast involves taking images from the diaphragm to just below the inguinal ligament after a delay of a few minutes after IV contrast is administered to optimize filling and therefore visualization of the venous vasculature.

References

2. Jones WS, Vemulapalli S, Parikh KS et al. Treatment Strategies for Patients with Lower Extremity Chronic Venous Disease (LECVD. Agency for Healthcare Research and Quality (US); 2017 Apr.
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<td><strong>PVD-12.3:</strong> Follow-up imaging of known DVT</td>
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<td><strong>PVD-12.4:</strong> Follow-up imaging after venous surgery</td>
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PVD-12.1: Superficial venous thrombosis (SVT)

- Superficial venous thrombosis (SVT) refers to acute or chronic thrombosis of the superficial veins in both the upper (cephalic and basilic veins) and lower extremities (greater [great] saphenous vein, lesser [small] saphenous vein, gastrocnemius and soleal veins). Treatment: Elevation and warm compresses until pain and swelling subsides.
- The diagnosis of superficial venous thrombosis is generally made on the basis of physical examination.
  - Duplex ultrasound (CPT® 93970, 93971) is the initial imaging if the diagnosis is equivocal.
  - Follow-up duplex ultrasound (CPT® 93970, 93971) is indicated only if thrombus in the superficial systems is encroaching onto the deep venous system (saphenofemoral or saphenopopliteal junction).

PVD-12.2: Acute deep venous thrombosis (DVT)

- Deep venous thrombosis is characterized by thrombosis of a deep vein in either the upper (brachial, axillary, subclavian veins) or the lower extremity (peroneal, posterior tibial, popliteal, femoral or iliac veins).
- Duplex ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is the initial imaging study for any suspected DVT.
  - Deep venous thrombosis can present as
    - Symptomatic
      - Swelling
      - Pain
      - Warmth
      - Erythema
      - Pain with dorsiflexion of the foot (Homan’s Sign)
      - Or with progression, such as phlegmasia cerulean dolens
      - Risk factors for DVT include age >40, obesity, malignancy, prolonged immobilization, hypercoaguability as well as those outlined in CH-25: Pulmonary Embolism (PE) in Chest Imaging Guidelines.
  - CTA/CTV Abdomen and pelvis with contrast can be performed to rule out IVC thrombus secondary to the filter when there is acute bilateral lower extremity swelling in a patient with a history of an IVC filter in place.
  - When there is concern for proximal DVT (iliofemoral):
    - Focused abdominal duplex can generally visualize the iliac veins and IVC to determine the absence or presence of iliac vein thrombus in a patient. If the results are equivocal or indeterminate:
      - CTV or MRV abdomen and pelvis with contrast (CPT® 74174 or 74185) can be performed.
    - For proximal DVT’s (iliac vein DVT’s or in cases of phlegmasia (extensive DVT compromising arterial inflow), thrombectomy (rarely performed) or thrombolysis can be performed.
If the cause of the DVT is found to be due to May-Thurner, iliac vein angioplasty followed by stenting of the left iliac vein is generally performed. See PVD-13.3: May-Thurner Syndrome

**PVD-12.3: Follow-up imaging of known DVT**

- Duplex ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) can be repeated in order to rule out proximal extension of a calf vein DVT in those individuals who cannot be anticoagulated, most commonly after recent surgery.
  - Time interval for follow-up study includes:
    - One week after the initial diagnosis.
    - Serial imaging (up to 3 studies) over the first three weeks if calf DVT is not treated.

- Imaging during or to terminate long-term anticoagulation therapy to determine venous recanalization is not supported by evidence. Repeat imaging to make decisions on whether or not to continue or terminate anticoagulation is not indicated.

**PVD-12.4: Follow-up imaging after venous surgery**

- Venous duplex (CPT® 93971 unilateral study) can be obtained of the treated limb to rule out a DVT within seven days of endovenous ablation.
- Follow-up routine imaging is not indicated after other venous procedures including:
  - Saphenous vein ligation and stripping
  - Phlebectomy
  - Sclerotherapy

**References**

PVD-13: Chronic limb swelling due to chronic deep venous thrombosis/May Thurner’s syndrome

- PVD-13.1: Chronic deep venous thrombosis general information 59
- PVD-13.2: Post thrombotic syndrome 59
- PVD-13.3: May-Thurner’s syndrome general information 60
PVD-13.1: Chronic deep venous thrombosis general information

- Chronic deep venous thrombosis is defined as an acute DVT that is greater than 14 days old.

- Patient with incompletely lysed or residual DVT can develop post-thrombotic syndrome that can be characterized as chronic edema, venous stasis changes, pain and in advanced cases venous stasis ulceration.
  - Incompletely lysed DVT can cause luminal narrowing of the vein restricting venous outflow leading to stenosis or occlusion and/or can lead to valve dysfunction resulting in reflux of venous blood retrograde towards gravity. Both pathologies ultimately lead to chronic edema which can cause chronic pain and venous stasis disease.
    - Imaging for post-thrombotic syndrome is not indicated unless there are signs and symptoms suggestive of a new acute DVT or for preoperative planning for iliac vein/stenting for suspected iliac vein stenosis or occlusion.
    - The mainstay of treatment for chronic deep venous thrombosis is compression stockings.
  - In patients with a history of proximal (iliofemoral) DVT who have subsequently developed post thrombotic syndrome, imaging can be performed to evaluate for iliac venous obstruction which can result from incompletely lysed thrombus.
    - Initial imaging should be duplex (CPT® 93970 bilateral study or CPT® 93971 unilateral study) followed by either a CT or MR venogram of the abdomen/pelvis, or CT or MR venogram of the pelvis, or venography for treatment planning purposes.
    - Selected patients may be a candidate for iliac vein angioplasty/stenting.

PVD-13.2: Post thrombotic syndrome

- Imaging for post-thrombotic syndrome is indicated when:
  - There are signs and symptoms suggestive of a new acute DVT and NOT for chronic swelling that has not changed in severity or character
  - For preoperative planning for iliac vein/stenting in the setting of known iliac venous obstruction in those with a history of a proximal (iliofemoral) DVT. See PVD-3.1: Chronic deep venous thrombosis general information

- See PVD-13.3: May-Thurner’s syndrome
- See PVD-15: Venous Stasis Ulceration
PVD-13.3: May-Thurner’s syndrome general information

In approximately 25% of people, the right iliac artery overlies the left iliac vein over the fifth lumbar vertebra and its pulsations can compress the vein increasing the risk of DVT in the left extremity.

- Duplex (CPT® 93970 bilateral study or CPT® 93971 unilateral study) will confirm the presence of a left common iliac vein DVT but diagnosis is made with advanced imaging such as CT or MRV abdomen/pelvis (CPT® code 74175, 74185), venography or peri-procedural intravascular ultrasound demonstrating compression of the vein.
- Treatment is with iliac vein angioplasty/stenting for both acute and chronic left-sided DVT
- Prophylactic treatment of May-Thurner’s syndrome in the absence of acute or chronic DVT OR chronic left lower extremity edema and its sequelae such as varicose veins or venous stasis ulcers is NOT considered medically necessary.

References

### PVD-14: Chronic limb swelling due to venous insufficiency/Venous stasis changes/Varicose veins

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PVD-14.1: Venous insufficiency – General

- Venous insufficiency is characterized by failure of the venous blood to flow in its normal antegrade path of flow and instead reflux backwards by the force of gravity, usually secondary to malfunction of the venous valves.
- Risk factors include previous DVT, obesity, female sex, hereditary, and environmental factors such as prolonged standing on a hard surface.
- Venous insufficiency loosely includes the diagnosis of venous reflux, varicose veins, venous stasis ulcers and spider/reticular veins.

PVD-14.2: Venous Reflux

- Diagnosis is made with a venous valvular insufficiency study (CPT® 93970 bilateral study or CPT® 93971 unilateral study) which documents the presence of reflux (>500ms) in the greater saphenous vein as well as the size of the refluxing vein (3-15mm).
- Symptoms of venous reflux include chronic edema, pain, and venous stasis ulcerations. Symptoms of venous reflux can be ameliorated with compression therapy with graded compression stockings, elevation, avoidance of prolonged standing and weight loss. Venous reflux can be seen in both the deep and superficial venous systems. Reflux within the deep system is not amenable to intervention.
  - Treatment of deep venous reflux is via active compression with compression stocks, pneumatic pumps or specialized dressings such as Unna boots.
  - Treatment of superficial venous reflux is amenable to intervention in selected patients who are symptomatic and have failed conservative therapy. A duplex ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) demonstrating the presence of pathologic reflux within the greater and lesser saphenous veins should be undertaken within the last six months. Vein size should be documented.
  - Treatment of symptomatic superficial venous reflux is via endovenous laser radiofrequency ablation of the greater or lesser saphenous vein resulting in closure of the vein allowing for venous blood to be rerouted to the deep venous system.
  - Treatment of symptomatic superficial venous reflux can also be treated via saphenous vein ligation and stripping which has fallen out of favor but can be performed for a tortuous or enlarged (>15mm) greater or lesser saphenous vein. One complication of endovenous ablation is deep venous thrombosis.
  - A post ablation venous ultrasound (CPT® 93970 bilateral study or CPT® 93971 unilateral study) is indicated within seven days post procedure. If thrombus is noted within the saphenofemoral junction, repeat imaging can be performed within seven days to assess for propagation into the deep system.
  - Ultrasound mapping or monitoring techniques are considered medically necessary only to initially determine the extent and configuration of symptomatic varicosities or valvular insufficiency. Post procedure assessment by imaging techniques is inappropriate to confirm efficacy or outcome of the procedure.
PVD-14.3: Varicose Veins

- Varicose veins are defined as enlarged, tortuous veins visible under the skin. Symptoms associated with varicose veins include achiness and heaviness of the legs and pain/discomfort over the varicosities. Varicose veins can exist both in the absence and presence of venous reflux.
- Treatment involves conservative therapy such as compression stockings, avoidance of prolonged standing, intermittent elevation, weight loss (if applicable) and exercise which relieves the distention of the varicose veins ameliorating the symptoms.
- If the varicosities remain symptomatic despite conservative therapy, varicose veins are treated with sclerotherapy or phlebectomy generally on the basis of size.

PVD-14.4: Spider veins/reticular veins

- Spider veins are formed by the dilation of a cluster of blood vessels within the dermis – generally <3mm in diameter. Diagnosis is via physical examination. Spider veins are usually asymptomatic but can cause aching, burning and tenderness in the area overlying the abnormal veins. Spider veins can exist in the absence or presence of venous reflux. The presence of spider veins should not be an indication for treatment of venous reflux.
- Treatment of spider veins is generally cosmetic except in certain cases and can be treated with sclerotherapy.

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PVD-15.1: Venous stasis ulcers – General

Venous stasis ulcers can arise from maceration of the skin in patients with venous insufficiency often with minimal trauma. The area over the medial malleolus is usually the most commonly affected area. The presence of chronic edema from either venous reflux, post-thrombotic syndrome or either etiology predisposes to the formation of venous stasis ulcerations.

PVD-15.2: Venous stasis ulcers – Treatment

The mainstay of treatment is a sterile dressing +/- adjunctive wound care salves coupled with compression with either stockings or wraps to reduce edema.

In select patients with venous stasis ulcers felt to be due to superficial venous reflux, incompetent perforators, and/or significant varicosities, the following may be indicated:

- Endovenous ablation with RF or with laser for treatment of saphenous vein reflux and incompetent perforators
- Saphenous vein ligation and stripping for treatment of saphenous vein reflux and varicose veins
- Phlebectomy for treatment of varicose veins
- Sclerotherapy for treatment of incompetent perforators and varicose veins

References


# PVD-16: IVC filters

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PVD-16.1: IVC filters – General

- IVC filters are placed in patients with known DVT that cannot be anti-coagulated, patients with poor pulmonary reserve and high risk for DVT, or prophylaxis in trauma and surgical patients.
- Most IVC filters inserted are retrievable and should be removed as soon as clinically feasible. After 12 months, removal of IVC filters can become technically more difficult.

PVD-16.2: IVC filters – Treatment

- IVC filter insertion
  - An initial venous duplex can be performed to assess for the presence of thrombus in the femoral vein which would affect the approach (transjugular or transfemoral)
  - Advanced imaging is not indicated
- Advanced imaging (CT Abdomen and Pelvis CPT® 74176) can be considered for ANY of the following:
  - A KUB demonstrates tilting of the filter or malposition of one of the filter thongs
  - New bilateral lower extremity swelling (venous duplex should be performed first)
  - Filter present for >12 months, with documentation stating intent to remove
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</table>
PVD-17.1: Post iliac vein stenting/angioplasty

- Iliac venous stents can be placed after thrombolysis for DVT associated with May-Thurner’s syndrome, DVT associated with extrinsic compression or for post thrombotic iliac obstruction.
  - Surveillance of iliac venous stents with an arterial duplex (CPT® 93975) can be obtained
  - For worsening signs or symptoms, including increased edema when stent malfunction is suspected
  - Postoperatively within the first month, at six months, twelve months and then annually
- Advanced imaging CTV or MRV Abdomen and Pelvis can be obtained for an abnormal or indeterminate duplex

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Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging

Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days

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<tr>
<td>78802</td>
<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, whole body, single day imaging</td>
</tr>
<tr>
<td>78803</td>
<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), single area (eg, head, neck, chest, pelvis), single day imaging</td>
</tr>
<tr>
<td>78830</td>
<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT) with concurrently acquired computed tomography (CT) transmission scan for anatomical review, localization and determination/detection of pathology, single area (eg, head, neck, chest, pelvis), single day imaging</td>
</tr>
<tr>
<td>78831</td>
<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT), minimum 2 areas (eg, pelvis and knees, abdomen and pelvis), single day imaging, or single area imaging over 2 or more days</td>
</tr>
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SP-1.1: General Considerations

- Before advanced diagnostic imaging can be considered, there must be an initial face-to-face clinical evaluation as well as a clinical re-evaluation after a trial of failed conservative therapy; the clinical re-evaluation may consist of a face-to-face evaluation or other meaningful contact with the provider’s office such as email, web or telephone communications.

- A face-to-face clinical evaluation is required to have been performed within the last 60 days before advanced imaging is considered. This may have been either the initial clinical evaluation or a clinical re-evaluation.

- The initial clinical evaluation should include a relevant history and physical examination (including a detailed neurological examination), appropriate laboratory studies, non-advanced imaging modalities, results of manual motor testing, the specific dermatomal distribution of altered sensation, reflex examination, and nerve root tension signs (e.g., straight leg raise test, slump test, femoral nerve tension test). The initial clinical evaluation must be face-to-face; other forms of meaningful contact (telephone call, electronic mail or messaging) are not acceptable as an initial evaluation.

- For those spinal conditions/disorders for which the Spine Imaging Guidelines require a plain x-ray of the spine prior to consideration of an advanced imaging study, the plain x-ray must be performed after the current episode of symptoms started or changed (see SP-2.1: Anatomic Guidelines).

- Clinical re-evaluation is required prior to consideration of advanced diagnostic imaging to document failure of significant clinical improvement following a recent (within 3 months) six week trial of provider-directed treatment. Clinical re-evaluation can include documentation of a face-to-face encounter or documentation of other meaningful contact with the requesting provider’s office by the patient (e.g., telephone call, electronic mail or messaging).

- Provider-directed treatment may include education, activity modification, NSAIDs (non-steroidal anti-inflammatory drugs), narcotic and non-narcotic analgesic medications, oral or injectable corticosteroids, a provider-directed home exercise/stretching program, cross-training, avoidance of aggravating activities, physical/occupational therapy, spinal manipulation, interventional pain procedures and other pain management techniques.

- Any bowel/bladder abnormalities or emergent or urgent indications should be documented at the time of the initial clinical evaluation and clinical re-evaluation.

- Altered sensation to pressure, pain, and temperature should be documented by the specific anatomic distribution (e.g., dermatomal, stocking/glove or mixed distribution).

- Motor deficits (weakness) should be defined by the specific myotomal distribution (e.g., weakness of toe flexion/extension, knee flexion/extension, ankle dorsi/plantar flexion, wrist dorsi/palmar flexion) and gradation of muscle testing should be documented as follows:
### Grading of Manual Muscle Testing

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No evidence of muscle function</td>
</tr>
<tr>
<td>1</td>
<td>Muscle contraction but no or very limited joint motion</td>
</tr>
<tr>
<td>2</td>
<td>Movement possible with gravity eliminated</td>
</tr>
<tr>
<td>3</td>
<td>Movement possible against gravity</td>
</tr>
<tr>
<td>4</td>
<td>Movement possible against gravity with some resistance</td>
</tr>
<tr>
<td>5</td>
<td>Movement possible against gravity with full or normal resistance</td>
</tr>
</tbody>
</table>

Pathological reflexes (e.g., Hoffmann’s, Babinski, and Chaddock sign) should be reported as positive or negative.

Asymmetric reflexes and reflex examination should be documented as follows:

### Grading of Reflex Testing

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No response</td>
</tr>
<tr>
<td>1+</td>
<td>A slight but definitely present response</td>
</tr>
<tr>
<td>2+</td>
<td>A brisk response</td>
</tr>
<tr>
<td>3+</td>
<td>A very brisk response without clonus</td>
</tr>
<tr>
<td>4+</td>
<td>A tap elicits a repeating reflex (clonus)</td>
</tr>
</tbody>
</table>

Advanced diagnostic imaging is often urgently indicated and may be necessary if serious underlying spinal and/or non-spinal disease is suggested by the presence of certain patient factors referred to as “red flags.” See **SP-1.2: Red Flag Indications.**

Spinal specialist evaluation can be helpful in determining the need for advanced diagnostic imaging, especially for patients following spinal surgery.

The need for repeat advanced diagnostic imaging should be carefully considered and may not be indicated if prior advanced diagnostic imaging has been performed. Requests for simultaneous, similar studies such as spinal MRI and CT need to be documented as required for preoperative surgical planning. These studies may be helpful in the evaluation of complex failed spinal fusion cases or needed for preoperative surgical planning when the determination of both soft tissue and bony anatomy is required.

Serial advanced imaging, whether CT or MRI, for surveillance of healing or recovery from spinal disease is not supported by the currently available scientific evidence-based medicine for the majority of spinal disorders.

Advanced imaging is generally unnecessary for resolved or improving spinal pain and/or radiculopathy.

For patients experiencing chronic spine pain, advanced diagnostic imaging has not been shown to be of value in patients with stable, longstanding spinal pain without neurological features or without clinically significant or relevant changes in symptoms or physical examination findings.

**Practice Notes**

**Straight leg raise test** (also known as the Lasegue’s test) – With the patient in the supine position, the hip medially rotated and adducted, and the knee extended, the examiner flexes the hip until the patient complains of pain or tightness in the back or back of the leg. If the pain is primarily back pain, it is more likely a disc herniation or the
pathology causing the pain is more central. If pain is primarily in the leg, it is more likely that the pathology causing the pressure on neurological tissues is more lateral. Disc herniation or pathology causing pressure between the two extremes are more likely to cause pain in both areas. The examiner then slowly and carefully drops the leg back (extends it) slightly until the patient feels no pain or tightness. The patient is then asked to flex the neck so the chin is on the chest, or the examiner may dorsiflex the patient’s foot, or both actions may be done simultaneously. Both of these maneuvers are considered to be provocative tests for neurological tissue.

**Slump test** – The patient is seated on the edge of the examination table with the legs supported, the hips in neutral position, and the hands behind the back. The examination is performed in sequential steps. First, the patient is asked to “slump” the back into thoracic and lumbar flexion. The examiner maintains the patient’s chin in neutral position to prevent neck and head flexion. The examiner then uses one arm to apply overpressure across the shoulders to maintain flexion of the thoracic and lumbar spines. While this position is held, the patient is asked to actively flex the cervical spine and head as far as possible (i.e., chin to chest). The examiner then applies overpressure to maintain flexion of all three parts of the spine (cervical, thoracic, and lumbar) using the hand of the same arm to maintain overpressure in the cervical spine. With the other hand, the examiner then holds the patient’s foot in maximum dorsiflexion. While the examiner holds these positions, the patient is asked to actively straighten the knee as much as possible. The test is repeated with the other leg and then with both legs at the same time. If the patient is unable to fully extend the knee because of pain, the examiner releases the overpressure to the cervical spine and the patient actively extends the neck. If the knee extends further, the symptoms decrease with neck extension, or the positioning of the patient increases the patient’s symptoms, then the test is considered positive.

**Femoral nerve tension test** (also known as the prone knee bending test) – The patient lies prone while the examiner passively flexes the knee as far as possible so that the patient’s heel rests against the buttock. At the same time, the examiner should ensure that the patient’s hip is not rotated. If the examiner is unable to flex the patient’s knee past 90 degrees because of a pathological condition in the hip, the test may be performed by passive extension of the hip while the knee is flexed as much as possible. The flexed knee position should be maintained for 45 to 60 seconds. Unilateral neurological pain in the lumbar area, buttock, and/or posterior thigh may indicate an L2 or L3 nerve root lesion. Pain in the anterior thigh indicates tight quadriceps muscles or stretching of the femoral nerve.

**Hoffmann’s sign** – The examiner holds the patient’s middle finger and briskly flicks the distal phalanx. A positive test is noted if the interphalangeal joint of the thumb of the same hand flexes.

**Babinski’s sign** – The examiner runs a sharp instrument along the plantar surface of the foot from the calcaneus along the lateral border to the forefoot. A positive test occurs with extension of the great toe with flexion and splaying of the other toes. A negative test occurs with no movement of the toes at all or uniform bunching up of the toes.
**Chaddock sign** – The examiner strokes the lateral malleolus. A positive test occurs with extension of the great toe.

**SP-1.2: Red Flag Indications**

*Red Flag Indications are intended to represent the potential for life or limb threatening conditions.* Red Flag Indications are clinical situations in which localized spine pain and associated neurological features are likely to reflect serious underlying spinal and/or non-spinal disease and warrant exception to the requirement for documented failure of six weeks of provider-directed treatment. Advanced diagnostic imaging of the symptomatic level is appropriate and/or work-up for a non-spinal source of spine pain for Red Flag Indications.

- Red Flag Indications include:
  - Motor Weakness
  - Aortic Aneurysm or Dissection
  - Cancer
  - Cauda Equina Syndrome
  - Fracture
  - Infection
  - Severe Radicular Pain

**Motor Weakness (See: Grading of Manual Muscle Testing and Reflex Testing in SP-1.1: General Considerations)**

<table>
<thead>
<tr>
<th>History, Symptoms or Physical Exam Findings (Initial clinical evaluation required within the last 60 days)</th>
<th>Advanced Diagnostic Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clinical presentation including one or more of the following:</td>
<td>MRI of the relevant spinal level without contrast or MRI of the relevant spinal level without and with contrast</td>
</tr>
<tr>
<td>- Motor weakness of grade 3/5 or less of specified muscle(s);</td>
<td></td>
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<tr>
<td>- New onset foot drop;</td>
<td></td>
</tr>
<tr>
<td>- Acute bilateral lower extremity weakness;</td>
<td></td>
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<tr>
<td>- Progressive objective motor/sensory/deep tendon reflex deficits on clinical re-evaluation.</td>
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</tbody>
</table>

**Aortic Aneurysm or Dissection**

<table>
<thead>
<tr>
<th>History, Symptoms or Physical Exam Findings (Initial clinical evaluation required within the last 60 days)</th>
<th>Advanced Diagnostic Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>- New onset of back and/or abdominal pain in an individual with a known AAA; or</td>
<td></td>
</tr>
<tr>
<td>- Acute dissection is suspected.</td>
<td></td>
</tr>
</tbody>
</table>

See: [PVD-6: Aortic Disorders, Renal Vascular Disorders and Visceral Artery Aneurysms and/or CH-29: Thoracic Aorta](#)
## Cancer

**History, Symptoms or Physical Exam Findings**  
(Initial clinical evaluation required within the last 60 days)

- Clinical presentation including either of the following:
  - There is clinical suspicion of spinal malignancy AND one or more of the following:
    - Night pain
    - Uncontrolled or unintended weight loss
    - Pain unrelieved by change in position
    - Age greater than 70 years
    - Severe and worsening spinal pain despite a reasonable (generally after 1 week) trial of provider-directed treatment with re-evaluation; or
  - Known metastatic malignancies; or acute spinal cord compression from primary or metastatic spinal neoplastic disease is suspected by history and physical examination.

**Advanced Diagnostic Imaging**

- MRI of the relevant spinal level without contrast or MRI of the relevant spinal level without and with contrast; CT without contrast of the relevant spinal level if MRI contraindicated.

See also: [ONC-31.5: Bone (including Vertebral) Metastases](#) and [ONC-31.6: Spinal Cord Compression](#) in the Oncology Imaging Guidelines.

## Cauda Equina Syndrome

**History, Symptoms or Physical Exam Findings**  
(Initial clinical evaluation required within the last 60 days)

- Clinical presentation including one or more of the following:
  - Acute onset of bilateral sciatica;
  - Perineal sensory loss (“saddle anesthesia”);
  - Decreased anal sphincter tone;
  - Bowel/bladder incontinence;
  - Acute urinary retention.

**Advanced Diagnostic Imaging**

- MRI Lumbar Spine without contrast (CPT® 72148) or MRI Lumbar Spine without and with contrast (CPT® 72158)

## Fracture

**History, Symptoms or Physical Exam Findings**  
(Initial clinical evaluation required within the last 60 days)

- There is clinical suspicion of spinal fracture related to one or more of the following:
  - Long term use of systemic glucocorticoids;
  - History of prior low energy fractures;
  - History of low bone mineral density;
  - Age ≥ 65 years;
  - Recent significant trauma at any age;
  - High speed vehicular accident;
  - Ejection from a motor vehicle;
  - Fall from elevation ≥ 3 feet/5 stairs;
  - Head trauma and/or maxillofacial trauma
  - Patients with ankylosing spondylitis are at high risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriplegia.

**Advanced Diagnostic Imaging**

- MRI of the relevant spinal level without contrast or CT of the relevant spinal level without contrast
### Infection

**History, Symptoms or Physical Exam Findings**

(Initial clinical evaluation required within the last 60 days)

| There is a clinical suspicion of spinal infection (e.g., disc space infection, epidural abscess or spinal osteomyelitis) and one or more of the following: |
| ♦ Fever; |
| ♦ History of IV drug use; |
| ♦ Recent bacterial infection (UTIs, pyelonephritis, pneumonia); |
| ♦ Immunocompromised states; |
| ♦ Long term use of systemic glucocorticoids; |
| ♦ Organ transplant recipient taking anti-rejection medication; |
| ♦ Diabetes mellitus; |
| ♦ HIV/AIDS; |
| ♦ Chronic dialysis; |
| ♦ Immunosuppressant therapy. |

**Advanced Diagnostic Imaging**

MRI of the relevant spinal level without and with contrast or MRI without contrast

### Severe Radicular Pain

| All of the following must be present (Initial clinical evaluation required within the last 60 days) |
| ♦ Severe radicular pain in a specified spinal nerve root distribution (minimum 9/10 on the VAS); and |
| ♦ Documented significant functional loss at work or at home; and |
| ♦ Severity of pain unresponsive to a minimum of seven (7) days of provider-directed treatment; and |
| ♦ Treatment plan includes one of the following: |
|   ■ Transforaminal epidural steroid injection (TFESI) at any level(s); or |
|   ■ Interlaminar epidural steroid injection (ILESI) at the cervical or thoracic levels; or |
|   ■ A plan for urgent/emergent spinal surgery; or |
|   ■ A plan for an urgent/emergent referral to/consultation from a spine specialist (Interventional Pain physician or Spine Surgeon) |

**Advanced Diagnostic Imaging**

MRI of the relevant spinal level without contrast or MRI without and with contrast
SP-1.3: Definitions

Radiculopathy, for the purpose of this policy, is defined as the presence of pain resulting in significant functional limitations (i.e., diminished quality of life and impaired, age-appropriate activities of daily living), dysesthesia(s) or paraesthesia(s) reported by the individual in a specified dermatomal distribution of an involved named spinal root(s) and ONE or MORE of the following:

- Loss of strength of specific named muscle(s) or myotomal distribution(s) or demonstrated on detailed neurologic examination (within the prior 3 months), concordant with nerve root compression of the involved named spinal nerve root(s).
- Altered sensation to light touch, pressure, pin prick or temperature demonstrated on a detailed neurologic examination (within the prior 3 months) in the sensory distribution concordant with nerve root compression of the involved named spinal nerve root(s).
- Diminished, absent or asymmetric reflex(es) within the prior 3 months concordant with nerve root compression of the involved named spinal nerve root(s).
- Either of the following:
  - A concordant radiologist’s interpretation of an advanced diagnostic imaging study (MRI or CT) of the spine demonstrating compression of the involved named spinal nerve root(s) or foraminal stenosis at the concordant level(s) (Performed within the prior 12 months).
  - Electrodiagnostic studies (EMG/NCV’s) diagnostic of nerve root compression of the involved named spinal nerve root(s). (Performed within the prior 12 months).

Radicular pain is pain which radiates to the upper or lower extremity along the course of a spinal nerve root, typically resulting from compression, inflammation and/or injury to the nerve root.

Radiculitis is defined, for the purpose of this policy, as radicular pain without objective neurological findings.

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**SP-2.1: Anatomic Guidelines**

- Anatomic regions of the spine/pelvis that are included in the following MRI and CT advanced diagnostic imaging studies:
  - Cervical spine: from the skull base/foramen magnum through T1
  - Thoracic spine: from C7 through L1
  - Lumbar spine: from T12 through mid-sacrum
  - Pelvis: includes hips, sacroiliac joints, sacrum, coccyx

- CT or MRI of the cervical and thoracic spine will image the entire spinal cord since the end of the spinal cord or conus medullaris usually ends at L1 in adults. Therefore, lumbar spine imaging is not needed when the goal is to image only the spinal cord unless there is known or suspected low lying conus medullaris (e.g. tethered cord).

- Plain x-ray should be the initial evaluation for certain suspected spine conditions, including:
  - See **SP-11: Pathological Spinal Compression Fractures**
  - See **SP-8: Lumbar Spine Spondylolysis/Spondylolisthesis**
  - See **SP-10.2: Inflammatory Spondylitis**
  - See **SP-3.2: Neck (Cervical Spine) Trauma, SP-4.2: Upper Back (Thoracic Spine) Trauma, and SP-6.2: Low Back (Lumbar Spine) Trauma**
  - See **SP-5.2: Coccydynia without Neurological Features**
  - See **SP-14: Spinal Deformities (e.g. Scoliosis/Kyphosis) and PEDSP-4: Spinal Dysraphism**
  - See **SP-10: Sacro-Iliac (SI) Joint Pain, Inflammatory Spondylitis/Sacroiliitis and Fibromyalgia**
  - See **SP-15: Post-Operative Spinal Disorders**

**SP-2.2: MRI of the Spine**

- See Procedure Codes Associated with Spine Imaging

- Spine MRI is performed either without contrast, with contrast or without and with contrast. A “with contrast” study alone is appropriate only to complete a study begun without contrast. Contrast is generally not indicated for most disc and nerve root disorders, fractures and degenerative disease.

- Spine MRI indications include:
  - Evaluation of disc disease, spinal cord and nerve root disorders and most other spinal conditions including evaluation of congenital anomalies of the spine and spinal cord
  - Suspicion for or surveillance of known spine/spinal canal/spinal cord neoplastic disease.
  - Suspicion, diagnosis of or surveillance of spinal infections, multiple sclerosis or other causes of myelitis, syringomyelia, cauda equina syndrome or other “red flag” indications. See **SP-1.2: Red Flag Indications**.
  - Preoperative evaluation to define abnormal or variant spinal anatomy that could influence the outcome of a potential surgical procedure. See **SP-16.1: Prior to Spine Surgery**.
Spinal imaging for patients having undergone recent spinal surgery e.g., laminectomy, discectomy, spinal decompression, when history and physical examination is suspicious for hematoma, post-surgical infection, or cerebrospinal fluid (CSF) leak.

**Positional MRI:**
- Positional MRI is also referred to as dynamic, weight-bearing or kinetic MRI. Currently, there is inadequate scientific evidence to support the medical necessity of this study. As such, it should be considered experimental or investigational.

**SP-2.3: CT of the Spine**
- See Procedure Codes Associated with Spine Imaging
- Spine CT indications include:
  - Individuals who cannot have MRI (with implanted ferromagnetic materials or electronically, magnetically or mechanically activated implanted devices that are not determined by the manufacturer as MRI compatible).
  - Any spinal trauma/fractures, especially spinal trauma/fractures that could result in spinal instability and spinal cord/spinal nerve compression.
  - Spinal neoplastic disease – primary or metastatic.
  - In conjunction with myelography or discography (see **SP-2.4: CT/Myelography** and **SP-2.5: Lumbar Provocative Discography CT**).
  - Preoperative evaluation to define abnormal or variant bony spinal anatomy that could influence the outcome of a potential surgical procedure (see **SP-16.1: Prior to Spine Surgery**).
  - To assess spinal fusions when pseudoarthrosis is suspected (not to be used for routine post-operative assessment where x-rays are sufficient and/or there are no concordant clinical signs or symptoms).
  - Congenital, developmental or acquired spinal deformity (see **SP-14: Spinal Deformities [e.g. Scoliosis/Kyphosis]**). Spondylolysis when routine x-rays are negative and/or MRI is equivocal, indeterminate or non-diagnostic (see **SP-8: Lumbar Spine Spondylolysis/Spondylolisthesis**).
  - To evaluate calcified lesions, (e.g., osteophytes, ossification of the posterior longitudinal ligament [OPLL]).
**SP-2.4: CT/Myelography**

- See Procedure Codes Associated with Spine Imaging
- CT/Myelography is generally unnecessary as an initial study when a diagnostic quality MRI has been obtained.

**CT/Myelography indications include:**
- To clarify equivocal, indeterminate or non-diagnostic MRI findings or to further evaluate the significance of multiple spinal abnormalities.
- When an MRI is contraindicated (see **SP-2.2: MRI of the Spine**).
- Preoperative planning for spine surgery, (e.g., multilevel spinal stenosis or when a previous MRI is insufficient, equivocal, indeterminate or non-diagnostic). See **SP-16.1: Prior to Spine Surgery**
- Evaluation after previous spinal surgery when an MRI without and with contrast is contraindicated or MRI results are equivocal, indeterminate or non-diagnostic.
- eviCore authorizes only the post-myelogram CT (i.e., CPT® 72126, CPT® 72129, and CPT® 72132) and not any other myelogram-related procedure codes (i.e., CPT® 72265 or CPT® 62284).

**SP-2.5: Lumbar Provocative Discography CT**

- eviCore authorizes only the post-lumbar discography CT procedure codes and not any other discography-related procedure codes. A post-lumbar discography CT is considered medically necessary following an approved discography and ALL of the following apply:
  - A post-discography CT is coded as without contrast.
  - A CT lumbar spine without contrast (CPT® 72131) is appropriate if verified to be performed as a post-discography CT.
  - When a post-discography CT is requested and the discography has already been approved eviCore will issue authorization for the post-discography CT procedure codes.

**Practice Notes**

- Provocative Discography/CT is a controversial procedure purported to diagnose (or rule-out) a discogenic “pain generator” i.e., the source of non-specific axial spinal pain. This diagnostic study, when reported as positive, is often used as an indication for spinal fusion in patients with non-specific axial back pain.

- The following uses of discography are considered controversial:
  - To identify a symptomatic pseudoarthrosis in a failed spinal fusion.
  - To identify which of two herniated discs seen on MRI is symptomatic when not determined clinically or otherwise.
  - To confirm the discogenic nature of pain in a patient with an abnormal disc seen on MRI and to rule out pain from an adjacent disc level.
  - To confirm the presumptive diagnosis of “internal disc disruption”.
  - Discography of the cervical and/or thoracic spine.
SP-2.6: Ultrasound of the Spinal Canal

- Spinal canal ultrasound (CPT® 76800) describes the evaluation of the spinal cord (canal and contents) most often performed in newborns, infants, young children and intraoperatively.
- CPT® 76800 describes evaluation of the entire spine and should not be reported multiple times for imaging of different areas of the spinal canal.
- CPT® 76998, rather than CPT® 76800, should be used to report intraoperative spinal canal ultrasound (ultrasonic guidance). Intraoperative use of spinal ultrasound (CPT® 76998) would not require prior authorization by eviCore.

Indications for spinal canal ultrasound (CPT® 76800):

- This study is generally limited to infants, newborns and young children because of incomplete ossification of the vertebral segments surrounding the spinal cord, including the assessment of CSF in the spinal canal and for image-guided lumbar puncture.
- When ossification of the vertebral segments is incomplete for evaluation of suspected or known tethered cord (see PEDSP-5: Tethered Cord).
- Evaluation of suspected occult and non-occult spinal dysraphism (see PEDSP-4: Spinal Dysraphism).
- Evaluation of spinal cord tumors, vascular malformations and cases of birth-related trauma.
- Contraindicated for use in the adult spine for the assessment of spinal pain, radiculopathy, facet inflammation, nerve root inflammation, disc herniation, and soft tissue conditions surrounding the adult spine other than for superficial masses.

SP-2.7: Limitations of Spinal Imaging in Degenerative Disorders

- Non-specific axial spinal pain is ubiquitous. Advanced diagnostic imaging infrequently identifies the source of the spinal pain (pain generator).
- Incidental findings on MRI and CT, including bulging, protruding, extruding or herniated discs, are often non-concordant, asymptomatic and increase in incidence as the spine ages.
- In individuals with poorly defined clinical presentations, “abnormal” spinal advanced diagnostic imaging results are infrequently clinically concordant, significant, material or substantive and may even lead to inappropriate treatment.
- Performing advanced spinal imaging based only on the presence of spinal degenerative findings identified on x-rays is not generally indicated in patients who are either asymptomatic or present with non-specific axial spinal pain.
SP-2.8: Miscellaneous Spinal Lesions

**Vertebral body hemangiomas:**
- Vertebral body hemangiomas are common and are generally benign and incidental findings on plain x-rays and advanced diagnostic imaging studies.
- If the appearance of a vertebral body hemangioma is typical on plain x-ray, further spinal advanced diagnostic imaging is not usually required, unless there are associated neurologic symptoms or signs on physical examination.
- If the appearance of a vertebral body hemangioma is atypical on plain x-ray, (with or without neurological signs or symptoms on physical exam, MRI without contrast or MRI without and with contrast is indicated.
- Occasionally, MRI may be equivocal, indeterminate or non-diagnostic and CT without contrast of the spinal area is indicated to help clarify the diagnosis.
- No follow-up imaging is necessary once the diagnosis of a vertebral body hemangioma is established without neurological features.

**Tarlov cysts:**
- Tarlov cysts are most often cystic dilatations of nerve root sleeves in the lumbar spine and sacrum.
- Controversy exists as to whether Tarlov cysts can result in neurologic signs and symptoms but they can result in erosion of the adjacent bone.
- Usually Tarlov cysts are benign, incidental findings on advanced diagnostic imaging studies. Further evaluation of a known or suspected Tarlov cyst can be performed with a MRI without and with contrast study (CPT® 72158) or with Lumbar CT/Myelography (CPT® 72132).

**Other spinal lesions:**
- MRI without and with contrast or a CT without contrast is appropriate if:
  - Other spinal lesions are seen on routine x-rays or a non-contrast MRI; **and**
  - These additional advanced imaging studies are recommended by a spine specialist or radiologist to further characterize or diagnose the lesion; **or**
  - Required for surgical planning.
SP-2.9: MRA Spinal Canal

- All requests for spinal MRA will be forwarded for Medical Director Review.
- Spine MRA imaging is utilized infrequently.
- Cerebrospinal Fluid (CSF) flow studies using MRI are included in CPT® codes 70551, 70552, and 70553 and should not be coded or reported separately.

**Indications may include:**

- Suspected spinal cord arteriovenous malformation (AVM) or arteriovenous fistula (AVF):
  - Spine MRI of the relevant spine region without and with contrast should be the initial imaging study.
  - If suspicion for a spinal AVM or AVF is high based upon the results of the spine MRI, catheter angiography is recommended (CPT® 72159 or CPT® 70496).
- Subarachnoid hemorrhage where no brain aneurysm has been previously identified
  - Catheter angiography (CPT® 70496) should be performed and is the most definitive study to define possible spinal pathology resulting in a spinal canal subarachnoid hemorrhage.
  - See HD-1.5: General Guidelines – CT and MR Angiography (CTA and MRA)
  - See HD-12.1: Intracranial Aneurysms
- Preoperative planning
  - Spinal canal MRA may be useful in identifying major intercostal feeder vessels to the spinal cord prior to surgical procedures that might interfere with this blood supply to the spinal cord. However, catheter angiography (CPT® 72159) is generally a more definitive study for this purpose.

SP-2.10: Spine PET

- At the present time there is controversy regarding spine PET due to inadequate scientific evidence to support the medical necessity of PET for the routine assessment of spinal disorders, other than for neoplastic disease.
- See ONC-31.5: Bone (including Vertebral) Metastases
- Spine PET should be considered experimental or investigational and will be forwarded to Medical Director Review.

SP-2.11: Cone-beam CT

- Cone-beam CT for imaging of the cervical spine should be considered experimental or investigational and will be forwarded to Medical Director Review.
References


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### SP-3.1: Neck (Cervical Spine) Pain without and with Neurological Features (Including Stenosis)

_All_ of the following are required prior to advanced imaging:

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

Failure of recent (within 3 months) 6-week trial of provider-directed treatment.

Clinical re-evaluation after treatment period (may consist of a face-to-face evaluation or other meaningful contact, see _SP-1.1: General Considerations_)

**Advanced Diagnostic Imaging:**
- MRI Cervical Spine, without contrast (CPT® 72141).

**Comments:**
- CT Cervical Spine without contrast (CPT® 72125) or CT Myelography (CPT® 72126) is appropriate when MRI is contraindicated.
- For surgery criteria, see the following:
  - CMM-601: Anterior Cervical Discectomy and Fusion
  - CMM-602: Cervical Total Disc Arthroplasty
  - CMM-604: Initial Posterior Cervical Decompression with or without Fusion
  - CMM-605: Cervical Microdiscectomy

### SP-3.2: Neck (Cervical Spine) Trauma

_All_ of the following are required prior to advanced imaging:

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

Failure of recent (within 3 months) 6-week trial of provider-directed treatment.

Clinical re-evaluation after treatment period (may consist of a face-to-face evaluation or other meaningful contact, see _SP-1.1: General Considerations_)

**Results of plain x-rays of cervical spine related to current symptoms**

**Advanced Diagnostic Imaging:**
- MRI Cervical Spine without contrast (CPT® 72141) or CT Cervical Spine without contrast (CPT® 72125).
- For patients with ankylosing spondylitis, both MRI Cervical Spine without contrast (CPT® 72141) and CT Cervical Spine without contrast (CPT® 72125) can be approved.

**Comments:**
- Plain x-rays and a 6 week trial of provider-directed treatment and clinical re-evaluation are _not_ required for patients with a high risk mechanism of cervical spine injury within the last 3 months (See below**).

**High risk mechanisms of cervical spine injury may include:**

- Head trauma and/or maxillofacial trauma
- Pedestrian in a motor vehicle accident
- Fall from elevation ≥ 3 feet/5 stairs
- Diving accident
- Head-on motor vehicle collision without/with airbag deployment
Rollover motor vehicle collision
- Ejection from the vehicle in a motor vehicle collision
- High speed of the vehicle at the time of collision
- Not wearing a seatbelt/shoulder harness in a motor vehicle collision
- Patients with ankylosing spondylitis are at high risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriparesis/quadriplegia

Red Flag Indications: See SP-1.2: Red Flag Indications

Practice Notes
- Pain radiation patterns from the cervical spine area into the thoracic spine area do not necessarily justify the addition of thoracic spine advanced diagnostic imaging.
- Cervical radiculopathy is often confused with shoulder disorders, brachial plexopathy, peripheral nerve entrapment and/or motor/sensory neuropathies. Electrodiagnostic testing (EMGs/NCVs) is generally used to confirm, not establish, a diagnosis of peripheral nerve entrapment and/or a motor/sensory neuropathy based upon history and physical examination findings. Electrodiagnostic testing is often considered when advanced imaging of the spine does not reveal neurocompressive pathology and/or after 6 weeks of unimproved symptoms of extremity pain, weakness, numbness and/or tingling.

References

## SP-4: Upper Back (Thoracic Spine) Pain Without/With Neurological Features (Including Stenosis) and Trauma

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**SP-4.1: Upper Back (Thoracic Spine) Pain without and with Neurological Features (Including Stenosis)**

*All of the following are required prior to advanced imaging:*

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

**Advanced Diagnostic Imaging:** MRI Thoracic Spine without contrast (CPT® 72146).

**Comments:** A CT Thoracic spine without contrast (CPT® 72128) or CT Myelography (CPT® 72129) is appropriate when MRI is contraindicated.

**SP-4.2: Upper Back (Thoracic Spine) Trauma**

*All of the following are required prior to advanced imaging:*

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

**Advanced Diagnostic Imaging:** MRI Thoracic Spine without contrast (CPT® 72146) or CT Thoracic Spine without contrast (CPT® 72128).

- Red Flag Indications: See **SP-1.2: Red Flag Indications**

**Practice Notes**

- Thoracic radiculopathy presents with pain radiation from the thoracic spine around the trunk. At upper thoracic spine levels, the pain radiation is from the thoracic spine around the rib cage following the sensory distribution of an intercostal nerve.

- Advanced diagnostic imaging is generally not appropriate in evaluation of axial low back pain with radiation toward the thoracic region unless there are documented clinical features indicating a thoracic spine disorder.

**References**

## SP-5: Low Back (Lumbar Spine) Pain/Coccydynia without Neurological Features

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| SP-5.2: Coccydynia without Neurological Features | 29 |
SP-5.1: Low Back (Lumbar Spine) Pain without Neurological Features

All of the following are required prior to advanced imaging:

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

Failure of recent (within 3 months) 6-week trial of provider-directed treatment.

Clinical re-evaluation after treatment period (may consist of a face-to-face evaluation or other meaningful contact, see SP-1.1: General Considerations).

Advanced Diagnostic Imaging: MRI Lumbar Spine without contrast (CPT® 72148)

Comments: A CT lumbar spine without contrast (CPT® 72131) or CT Myelography (CPT® 72132) is appropriate when MRI is contraindicated.

For surgery criteria, see CMM-610: Lumbar Total Disc Arthroplasty

SP-5.2: Coccydynia without Neurological Features

All of the following are required prior to advanced imaging:

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

Failure of recent (within 3 months) 6-week trial of provider-directed treatment.

Clinical re-evaluation after treatment period (may consist of a face-to-face evaluation or other meaningful contact, see SP-1.1: General Considerations).

Plain x-rays of the sacrum/coccyx are negative for fracture

Advanced Diagnostic Imaging: MRI pelvis without contrast (CPT® 72195)

Comments: A CT pelvis without contrast (CPT® 72192) when MRI is contraindicated.

- Red Flag Indications: See SP-1.2: Red Flag Indications

Practice Notes

Coccydynia is often reported by patients as “tailbone” pain that is usually idiopathic or post-traumatic and generally follows a benign course.
References


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SP-6.1: Lower Extremity Pain with Neurological Features (Radiculopathy, Radiculitis, or Plexopathy and Neuropathy) with or without Low Back (Lumbar Spine) Pain

All of the following are required prior to advanced imaging:

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

Failure of recent (within 3 months) 6-week trial of provider-directed treatment.

Clinical re-evaluation after treatment period (may consist of a face-to-face evaluation or other meaningful contact, see SP-1.1: General Considerations).

See SP-9.1: Lumbar Spinal Stenosis

Advanced Diagnostic Imaging:

<table>
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<tr>
<th>MRI Lumbar Spine without contrast (CPT® 72148)</th>
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Comments:

A CT lumbar spine without contrast (CPT® 72131) or CT Myelography (CPT® 72132) is appropriate when MRI is contraindicated.

For surgery criteria, see the following:

- CMM-606: Lumbar Microdiscectomy
- CMM-608: Lumbar Decompression
- CMM-609: Lumbar Fusion (Arthrodesis)

SP-6.2: Low Back (Lumbar Spine) Trauma

All of the following are required prior to advanced imaging:

- Initial clinical evaluation performed.
- A face-to-face evaluation within the last 60 days.
- The initial evaluation is not required within the last 60 days if another face-to-face evaluation was performed in that time frame. This may be satisfied by the initial evaluation, re-evaluation or another visit.

Failure of recent (within 3 months) 6-week trial of provider-directed treatment.

Clinical re-evaluation after treatment period (may consist of a face-to-face evaluation or other meaningful contact, see SP-1.1: General Considerations).

Results of plain x-rays of lumbar spine related to current symptoms

Advanced Diagnostic Imaging:

| MRI Lumbar Spine without contrast (CPT® 72148) or CT Lumbar Spine without contrast (CPT® 72131). |

- Red Flag Indications: See SP-1.2: Red Flag Indications
- Definitions of radiculopathy, radiculitis and radicular pain: See SP-1.3: Definitions
- Sciatic Neuropathy, Femoral Neuropathy, Peroneal Neuropathy and Meralgia Paresthetica: See PN-2: Focal Neuropathy
- Lumbar and/or Lumbosacral Plexopathy: See PN-5: Lumbar and Lumbosacral Plexus
Advanced imaging of the hip or pelvis is not generally required in the evaluation of apparent lumbar radiculopathy unless a separate recognized indication for such studies is documented. See MS-24: Hip in the Musculoskeletal Imaging Guidelines.

References


SP-7: Myelopathy

SP-7.1: Myelopathy

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**SP-7.1: Myelopathy**

- Myelopathy is the development of abnormal spinal cord function with long tract signs usually secondary to spinal cord compression, but also inflammation (transverse myelitis, MS, etc.), neoplastic disease or spinal cord infarction.

- Examination findings may include loss of manual dexterity, spastic legs and ataxia with hyperreflexia and upgoing toes (positive Babinski), Hoffmann’s sign, sustained clonus, Lhermitte’s sign, crossed radial reflex, inverted radial reflex and finger escape sign. Sensory level and urinary incontinence/retention may be seen. Advanced imaging is generally appropriate in the initial evaluation of documented or reasonably suspected myelopathy.

- Cervical and thoracic spine MRI without contrast, or without and with contrast, are appropriate for:
  - Evaluation of reasonably suspected myelopathy.
  - Suspected tethered cord.
  - Post-traumatic syrinx with increased spinal pain or a worsening neurological symptoms.
  - Sustained, prominent, and unexplained Lhermitte’s sign.
  - Unexplained Babinski’s sign or Hoffmann’s signs.
  - Unexplained hyperreflexia.
  - Unexplained bilateral motor weakness.

- Cervical, thoracic, and lumbar spine MRI without contrast, or without and with contrast, are appropriate for:
  - Suspected tethered cord and/or low lying conus medullaris.

- Conservative treatment is not a requirement for advanced imaging in patients with potential myelopathy.

- CT/Myelography scan can also be considered, especially for surgical planning.

- For surgery criteria, see the following:
  - **CMM-601: Anterior Cervical Discectomy and Fusion**
  - **CMM-602: Cervical Total Disc Arthroplasty**
  - **CMM-604: Posterior Cervical Decompression with or without Fusion**
  - **CMM-605: Cervical Microdiscectomy**

**Practice Notes**

**Lhermitte’s sign** – With the patient in the long leg sitting position on the examination table, the examiner passively flexes the patient’s head and one hip simultaneously with the leg kept straight. A positive test occurs if there is sharp pain down the spine and into the upper or lower extremities.

**Babinski’s sign** – The examiner runs a sharp instrument along the plantar surface of the foot from the calcaneus along the lateral border to the forefoot. A positive test occurs with extension of the great toe with flexion and splaying of the other toes. A negative test occurs with no movement of the toes at all or uniform bunching up of the toes.
**Hoffman’s sign** – The examiner holds the patient’s middle finger and briskly flicks the distal phalanx. A positive test is noted if the interphalangeal joint of the thumb of the same hand flexes.

**References**

## SP-8: Lumbar Spine
### Spondylolysis/Spondylolisthesis

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**SP-8.1: Spondylolysis**

- Spondylolysis is most often an incidental finding on plain x-rays, and advanced imaging is generally not indicated.

- If plain x-rays are negative, equivocal or indeterminate and clinical suspicion is high:
  - 99mTc-MDP SPECT bone scan (CPT® 78803) is indicated to identify stress reaction in early spondylolysis cases which are radiographically occult.
  - Lumbar spine MRI without contrast (CPT® 72148) is appropriate for **ANY** of the following:
    - SPECT bone scan is negative
    - To evaluate for stress reaction in bone, to visualize nerve roots
    - There is a documented need for preoperative planning
    - There is treatment failure following 6 weeks immobilization with a spinal orthosis and provider-directed treatment with clinical re-evaluation.
      - **Note:** MRI is not appropriate in the early diagnosis of spondylolysis due to the potential for false negative results.

- Lumbar spine CT without contrast (CPT® 72131) for **ANY** of the following:
  - MRI is contraindicated
  - SPECT bone scan is negative
  - To evaluate bony anatomy
  - To state a lesion seen on SPECT bone scan
  - There is a documented need for preoperative planning
  - There is treatment failure following 6 weeks immobilization with a spinal orthosis and provider-directed treatment with clinical re-evaluation. See **SP-1.2: Red Flag Indications**.

- For pediatric spondylolysis, See **PEDSP-2.4: Spondylolysis**

  - Bony healing cannot be achieved non-surgically in an established well defined isthmic pars interarticularis defect whether it is developmental or the result of a pars interarticularis fracture non-union. Repeat advanced diagnostic imaging is not medically necessary in this setting.
  - Repeat lumbar spine CT without contrast (CPT® 72131) of the symptomatic spinal level is indicated to monitor healing of a pars interarticularis fracture that was determined to have healing potential on a prior CT (i.e., non-sclerotic lesion).

- For surgery criteria, see the following:
  - **CMM-603: Electrical and Low Frequency Ultrasound Bone Growth Stimulation (Spine)**
  - **CMM-609: Lumbar Fusion (Arthrodesis)**
SP-8.2: Spondylolisthesis

CT lumbar spine without contrast (CPT® 72131) or MRI lumbar spine without contrast (CPT® 72148) can be considered after plain x-ray for the following:

- Failure of 6 week trial of provider-directed treatment and clinical re-evaluation (see SP-1.1: General Considerations; or
- Preoperative evaluation; or
- See SP-1.2: Red Flag Indications

For surgery criteria, see the following:

- CMM-608: Lumbar Decompression
- CMM-609: Lumbar Fusion (Arthrodesis)

Practice Notes

Stress reactions and stress fractures of the pars interarticularis are most common in athletes and others whose activities involve repetitive flexion/extension loading of the lumbar spine and may be acute or chronic and unilateral or bilateral. Pars interarticularis defects can be an incidental finding on plain x-rays and is frequently asymptomatic.

Spondylolisthesis is the forward (anterolisthesis) or backward (retrolisthesis, usually not clinically significant) displacement of one vertebra in relation to an adjacent vertebra, most commonly at L4-5 and L5-S1, although other levels of the spine may be involved. Spondylolisthesis is often an incidental finding on plain x-ray and is frequently asymptomatic.

References

SP-9: Lumbar Spinal Stenosis

SP-9.1: Lumbar Spinal Stenosis  43
SP-9.1: Lumbar Spinal Stenosis

MRI lumbar spine without contrast (CPT® 72148) or CT Lumbar Spine without contrast (CPT® 72131) is appropriate for those patients with clinical suspicion of lumbar spinal stenosis if:

- Failure of 6 week trial of provider-directed treatment and clinical re-evaluation (see SP-1.1: General Considerations); or
- Red Flag Indications (see: SP-1.2: Red Flag Indications); or
- Severe symptoms of neurogenic claudication restricting normal activity or requiring the frequent use of narcotic analgesics.

A CT/Myelogram lumbar spine (CPT® 72132) may also be considered for patients who have failed 6-weeks of provider-directed treatment if requested by the operating surgeon for surgical planning, especially for multi-level lumbar spinal stenosis.

For surgery criteria, see the following:
- CMM-608: Lumbar Decompression
- CMM-609: Lumbar Fusion (Arthrodesis)

Practice Notes

Lumbar spinal stenosis refers to a decrease in the space available for the neural elements within the spinal canal that include spinal nerve roots and the cauda equina. It is usually a degenerative condition of the aging spine which can be asymptomatic or a common cause of buttock/low back and/or leg pain (neurogenic claudication) in this population. Neurogenic claudication is a common symptom of lumbar spinal stenosis that is aggravated by walking, especially down hills or stairs, with prolonged standing and is often relieved by sitting and bending forward. Neurogenic claudication should be differentiated from vascular claudication (leg/calf pain) that is often aggravated by walking and relieved fairly rapidly by stopping and rest. The differential diagnosis for lumbar spinal stenosis should include peripheral vascular disease, hip disorders and peripheral neuropathy.

References

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| SP-10.2: Inflammatory Spondylitis                 | 45 |
| SP-10.3: Fibromyalgia                            | 45 |
**SP-10.1: Sacro-Iliac (SI) Joint Pain/Sacroiliitis**

- Pelvis CT without contrast (CPT® 72192) or MRI pelvis without contrast (CPT® 72195) is appropriate if:
  - Initial plain x-rays are equivocal or not diagnostic; and
  - Failure of 6 weeks of provider-directed treatment and clinical re-evaluation (See: **SP-1.1: General Considerations**); or
  - Any one of the following:
    - Fractures of the sacrum or sacroiliac joint(s); or
    - See: **SP-1.2: Red Flag Indications**; or
    - Preoperative planning
  - MRI pelvis without and with contrast as indicated for pediatric patients with juvenile idiopathic arthritis.
  - Suspicion of neoplastic, inflammatory, or infectious disease:
    - MRI pelvis without and with contrast (CPT® 72197) or MRI pelvis without contrast (CPT® 72195)
    - Pelvis CT without contrast (CPT® 72192) if MRI is contraindicated

See also: **MS-15.1: Rheumatoid Arthritis and Inflammatory Arthritis**

**SP-10.2: Inflammatory Spondylitis**

- Initial plain x-rays are equivocal or not diagnostic.
  - MRI without and with contrast or MRI without contrast of the affected spinal region.
    - CT without contrast of the affected spinal region if MRI is contraindicated
  - MRI Cervical Spine without contrast (CPT® 72141) and CT Cervical Spine without contrast (CPT® 72125) if a patient with documented ankylosing spondylitis reports neck pain following any head/maxillofacial/neck injury.

**SP-10.3: Fibromyalgia**

- Advanced diagnostic imaging is not supported by the scientific evidence for the evaluation and treatment of fibromyalgia.

**Practice Notes**

- Sacroiliitis can present with pain localized to the SI joint or referred pain to the buttock and/or posterior thigh without neurologic signs or symptoms. Affected individuals can often point to the SI joint as the pain source. Provocative and/or therapeutic SI joint anesthetic/corticosteroid injections can have diagnostic value.

- There is no evidence demonstrating that advanced diagnostic imaging substantiates changes to patient management decisions in patients with proven SI joint disorders when visible on routine plain x-rays.

- MRI has shown inflammatory changes in the SI joints prior to visible x-ray changes in several studies. However, the ability of MRI to characterize inflammation in early ankylosing spondylitis, the ability of MRI to predict erosive changes, and the value of monitoring treatment effects using serial MRI studies remains controversial and investigational in adults.
References


SP-11: Pathological Spinal Compression Fractures

SP-11.1: Pathological Spinal Compression Fractures
SP-11.1: Pathological Spinal Compression Fractures

- MRI without contrast or CT without contrast of the affected spinal region can be considered after plain x-ray evaluation and the location of the patient's spinal pain is concordant with the spinal x-rays for any one of the following:
  - X-rays reveal a new spinal compression fracture; or
  - X-rays are non-diagnostic and severe spinal pain persists for more than one week in a patient already predisposed to low energy/insufficiency fractures; or
  - The acuity of the spinal compression fracture deformity on plain x-ray is indeterminate, or
  - Surgical planning following known insufficiency spinal compression fractures in individuals who are candidates for kyphoplasty, vertebroplasty or other spine surgical procedures; or
  - See SP-1.2: Red Flag Indications

- For surgery criteria, see CMM-607: Primary Vertebral Augmentation

Practice Notes

Insufficiency/low energy spinal compression fractures of the spine occur due to the lack of structural integrity to withstand physiologic loads and minor spinal trauma. Low bone mineral density is the primary etiology for most of these fractures but could also occur in the setting of other bone disease and medical conditions, in addition to neoplastic disease and infection. Sudden localized back pain, with or without trauma, is a typical presentation of insufficiency/low energy spinal compression fractures and can often be an incidental finding on plain x-rays and can be asymptomatic.

References

For guidelines regarding advanced diagnostic imaging in this clinical setting, See **ONC-31.6: Spinal Cord Compression**.

For metastatic disease of the spine without neurological signs or symptoms:
- See: **ONC-31.5: Bone (including Vertebral) Metastases** for advanced diagnostic imaging guidelines in patients with spinal pain with a history of primary or metastatic neoplastic disease, especially cancer of the breast, lung, thyroid, kidney and prostate.
SP-13: Spinal Canal/Cord Disorders (e.g. Syringomyelia)

| SP-13.1: Initial Imaging Pathway | 51 |
| SP-13.2: Follow-up Imaging       | 51 |
**SP-13.1: Initial Imaging Pathway**

- MRI cervical spine without and with contrast (CPT® 72156) is appropriate when syringomyelia is suspected.
- Once a syrinx is identified by the initial MRI cervical spine without and with contrast:
  - MRI of the brain, usually without contrast (CPT® 70551) to evaluate for syringobulbia; **and**
  - MRI of the thoracic spine without and with contrast (CPT® 72157) and MRI of the lumbar spine without and with contrast (CPT® 72148) to define the lower most extent of the syrinx or to identify a skip lesion.

**SP-13.2: Follow-up Imaging**

- MRI cervical spine without contrast (CPT® 72141) and MRI brain without contrast (CPT® 70551) and/or MRI thoracic spine without contrast (CPT® 72146) when involved.
  - If there is a concern for malignancy, imaging can be performed without and with contrast.
  - Annual imaging until non-progression of the syringomyelia is established.
  - Following surgical treatment (including posterior fossa decompression).
  - Advanced diagnostic imaging every three years for life can be performed once non-progression of the syringomyelia is established.
  - Repeat advanced diagnostic imaging is appropriate when there is evidence of neurologic deterioration.
  - Repeat advanced diagnostic imaging in spinal cord injury patients with post-traumatic syrinx is not appropriate without evidence of neurological deterioration.

**Practice Notes**
Syringomyelia may begin to form in childhood but rarely becomes symptomatic before the adult years.

**Reference**
### SP-14: Spinal Deformities (e.g. Scoliosis/Kyphosis)

| SP-14.1: Spinal Deformities (e.g., Scoliosis/Kyphosis) | 53 |
| SP-14.2: Revision Spinal Deformity Surgery | 53 |
**SP-14.1: Spinal Deformities (e.g., Scoliosis/Kyphosis)**

- MRI without contrast or MRI without and with contrast of the affected spinal regions is appropriate after plain x-rays (e.g., Cobb radiographs) of the affected spinal regions:
  - For preoperative evaluation; **or**
  - For cases of congenital scoliosis and other atypical curves that may be associated with spinal canal/cord pathology such as tethered cord, syringomyelia, diastematomyelia, or tumors; **or**
  - For cases of scoliosis when there are associated neurologic signs and symptoms on physical examination; **or**
  - Scoliosis with a convex left thoracic curve due to a high association of a convex left thoracic curve with underlying spinal canal/cord pathology.

- CT of the affected spinal regions (contrast as requested) is appropriate in cases with a complex osseous deformity for preoperative evaluation.

- CTA or MRA is not medically necessary for preoperative planning for initial anterior spinal surgery for surgical correction of spinal deformities.

**SP-14.2: Revision Spinal Deformity Surgery**

- If requested by the operating surgeon, the following studies can be performed for preoperative planning for revision anterior spinal surgery:
  - CTA pelvis (CPT® 72191) and/or CTA abdomen (CPT® 74175); **or**
  - MRA pelvis (CPT® 72198) and/or MRA abdomen (CPT® 74185)

**Practice Notes**

Scoliosis is defined as a curvature of the spine in the coronal plane. Scoliosis can involve any or all levels of the spine but generally involves the thoracic and/or lumbar spine. Scoliosis initially occurs in the pediatric and adolescent population and persists throughout life. If scoliosis begins in adulthood, it is usually secondary to neurologic disorders (e.g., posttraumatic paralysis) or degenerative spondylosis. Sagittal plane spinal deformity (e.g., kyphosis, hyperlordosis) may be associated with scoliosis.

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*Following plain x-rays of the affected spinal regions post-surgical, See SP-2.1: Anatomic Guidelines.

**SP-15.1: Greater than Six Months Post-Operative**

- MRI without and with contrast, MRI without contrast, or CT without contrast of the affected spinal region(s) is appropriate when:
  - Patient is more than six months post-operative; **and**
  - No significant improvement after a recent (within 3 months) six week trial of provider-directed treatment with clinical re-evaluation; **or**
  - See SP-1.2: Red Flag Indications

**SP-15.2: Routine Post-Fusion Imaging**

- Requests will be forwarded to Medical Director Review. Following a clinically successful spinal fusion, advanced diagnostic imaging is generally not indicated.
- **PET** is not currently indicated for the routine assessment of spinal fusions or unsuccessful spine surgery (see: SP-2.10: Spine PET). Requests for PET will be forwarded to Medical Director Review.

**SP-15.3: Prolonged Intractable Pain Following Spinal Surgery Within Six Months**

**Open discectomy and laminectomy:**

- MRI without and with contrast of the affected spinal region(s) if there are residual, new, recurrent, or worsening symptoms related to the surgical site.
- CT/Myelography of the affected spinal region(s) if MRI is contraindicated.

**Spinal fusions with or without Open Discectomy and/or Laminectomy:**

- These can be challenging problems that may require more than one advanced imaging study. Requests will be forwarded to Medical Director Review.
- For surgery criteria, see the following:
  - CMM-601: Anterior Cervical Discectomy and Fusion
  - CMM-604: Posterior Cervical Decompression with or without Fusion
  - CMM-605: Cervical Microdiscectomy
  - CMM-606: Lumbar Microdiscectomy
  - CMM-608: Lumbar Decompression
  - CMM-609: Lumbar Fusion (Arthrodesis)
**SP-15.4: Revision Fusion Surgery**

- If requested by the operating surgeon, the following studies can be performed for preoperative planning prior to surgical revision of a lumbar anterior spinal arthrodesis.
  - CTA pelvis (CPT® 72191) and/or CTA abdomen (CPT® 74175); or
  - MRA pelvis (CPT® 72198) and/or MRA abdomen (CPT® 74185)

- For surgery criteria, see the following:
  - **CMM-601: Anterior Cervical Discectomy and Fusion**
  - **CMM-604: Posterior Cervical Decompression with or without Fusion**
  - **CMM-609: Lumbar Fusion (Arthrodesis)**

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**SP-16.1: Prior to Spine Surgery**

- MRI/CT should be performed within the past six (6) months for preoperative planning prior to spine surgery when the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines. (See: SP-2.2: MRI of the Spine, SP-2.3: CT of the Spine, SP-2.4: CT/Myelography)

- MRA and CTA are generally not indicated for preoperative planning of initial anterior spinal surgery unless abnormal vasculature is known or reasonably anticipated. Requests will be forwarded to Medical Director Review.

- For surgery criteria, see the following:
  - CMM-601: Anterior Cervical Discectomy and Fusion
  - CMM-604: Posterior Cervical Decompression with or without Fusion
  - CMM-605: Cervical Microdiscectomy
  - CMM-606: Lumbar Microdiscectomy
  - CMM-608: Lumbar Decompression
  - CMM-609: Lumbar Fusion (Arthrodesis)

**SP-16.2: Prior to Interventional Spinal Injections**

- Advanced diagnostic imaging studies of the spine are not required prior to facet joint injections, medial branch blocks or radiofrequency ablations unless the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.

- Advanced diagnostic imaging studies of the cervical spine and/or thoracic spine are indicated within 24 months prior to interlaminar or transforaminal epidural steroid injections of the cervical and/or thoracic spine when the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.

- Advanced diagnostic imaging studies of the lumbar spine are indicated prior to transforaminal epidural steroid injections of the lumbar spine when the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.

- Advanced diagnostic imaging studies of the lumbar spine are not required prior to lumbar spine interlaminar or caudal epidural steroid injections unless the criteria for advanced imaging studies of the spine are met as otherwise stated in the Spine Imaging Guidelines.

- For an individual with evidence of symptomatic spinal stenosis, MRI or CT with or without myelography demonstrating severe spinal stenosis at the level to be treated within the past twelve (12) months is required for an initial trial of a transforaminal, interlaminar or caudal epidural steroid injection when ALL of the following criteria are met:
  - Diagnostic evaluation has ruled out other potential causes of pain
  - Significant functional limitations resulting in diminished quality of life and impaired age-appropriate activities of daily living (ADLs)
- Failure of at least four (4) weeks of conservative treatment (e.g., exercise, physical methods including physical therapy and/or chiropractic care, NSAIDs, and/or muscle relaxants).

- See **SP-1.2: Red Flag Indications** for severe radicular pain

- For interventional pain criteria, see the following:
  - CMM-200: Epidural Steroid Injection
  - CMM-201: Facet Joint Injections
  - CMM-208: Radiofrequency Joint Ablation/Denervation

**SP-16.3: Prior to Spinal Cord Stimulator (SCS) Placement/Removal**

- MRI thoracic spine without contrast (CPT® 72146) is generally the study of choice prior to SCS placement. CT thoracic spine without contrast (CPT® 72128) or CT/Myelography thoracic spine (CPT® 72129) are acceptable alternatives.

- Imaging of the lumbar spine is not indicated for placement nor removal of spinal cord stimulators.

- Requests for advanced diagnostic imaging of the cervical spine prior to SCS placement will be forwarded to Medical Director Review.

- For interventional pain criteria, see the following:
  - CMM-211: Spinal Cord Stimulators

**SP-16.4: Following Vertebral Augmentation Procedures**

- CT without contrast of the affected spinal region(s) within 24 hours post-procedure to evaluate neurologic sequelae resulting from cement extravasation.

- For surgery criteria, see the following
  - CMM-607: Primary Vertebral Augmentation

**Practice Note**

MRI has not been shown to change the outcome of interventional pain procedures in recent scientific evidence-based studies and without substantial change in the clinical picture or intervening surgery. Repeat advanced diagnostic imaging studies are not necessary with each spinal injection or series of spinal injections.
References


Nuclear Medicine

Nuclear medicine studies are rarely used in the evaluation of the spine, but are indicated in the following circumstances:

- Bone scan (CPT® 78315) or Distribution of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of suspected loosening of orthopedic implants when recent plain x-ray is nondiagnostic.
- Radiopharmaceutical Localization SPECT (CPT® 78803, or 78831) or SPECT/CT (CPT® 78830) can be used if there is back pain with suspected failed fusion surgery with suspected painful pseudoarthrosis and MRI/CT are nondiagnostic.

Any of the following studies are indicated for initial evaluation of suspected osteomyelitis:

- Bone scan (one of CPT® codes: 78300, 78305, 78306, or 78315) or Distribution of Radiopharmaceutical Agent SPECT (CPT® 78803)
- Nuclear Bone Marrow imaging (one of CPT® codes: 78102, 78103, or 78104)
- Radiopharmaceutical inflammatory imaging (one of CPT® codes: 78800, 78801, 78802) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803)

For follow-up imaging, any of the following studies are indicated for evaluation of response to treatment in established osteomyelitis. The appropriate follow-up advanced imaging time frame will depend on the nature of the underlying disease and prior imaging. Follow-up advanced imaging requests will be forwarded for medical director review:

- Bone scan (one of CPT® codes: 78300, 78305, 78306, or 78315)
- Nuclear Bone Marrow imaging (one of CPT® codes: 78102, 78103, or 78104)

Radiopharmaceutical Localization Inflammatory Imaging (one of CPT® codes: 78800, 78801, 78802, or 78803) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of facet arthropathy in patients with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis.

Radiopharmaceutical Agent SPECT (CPT® 78803, or 78831) or SPECT/CT (CPT® 78830) is indicated for the evaluation of back pain and suspected spondylolysis.

SPECT has been described to identify spinal pain generators, pseudoarthrosis of spinal fusion or hardware failure when conventional advanced diagnostic imaging studies are inconclusive, non-diagnostic or equivocal. Requests for SPECT for these indications will be reviewed on a case-by-case basis by the Medical Director.

Reference
### Pediatric Abdomen Imaging Guidelines

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# PEDAB-1: General Guidelines

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PEDAB-1.1: Pediatric Abdominal Imaging Age Considerations

Many conditions affecting the abdomen in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients age <18 years old should be imaged according to the Pediatric Abdomen Imaging Guidelines, and patients age ≥18 years should be imaged according to the Abdomen Imaging Guidelines, except where directed otherwise by a specific guideline section.

PEDAB-1.2: Pediatric Abdomen Imaging Appropriate Clinical Evaluation and Conservative Treatment

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the patient is undergoing guideline-supported follow-up imaging evaluation.

- These guidelines are based upon using advanced imaging to answer specific clinical questions that will affect patient management. Imaging is not indicated if the results will not affect patient management decisions. Standard medical practice would dictate continuing conservative therapy prior to advanced imaging in patients who are improving on current treatment programs.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the abdomen is not supported. Advanced imaging should only be approved in patients who have documented active clinical signs or symptoms of disease.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the same body area are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.
PEDAB-1.3: Pediatric Abdomen Imaging Modality General Considerations

- Ultrasound
  - Ultrasound should be the initial imaging study of choice in most children with abdominal conditions and should be done prior to advanced imaging.
  - For those patients who do require advanced imaging after ultrasound, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the patient.
  - CPT® codes vary by body area and presence or absence of Doppler imaging and are included in the table at the beginning of this guideline.

- MRI
  - MRI Abdomen is generally performed without and with contrast (CPT® 74183) unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years) as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
      - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
      - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If multiple body areas are supported by eviCore’s guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same session.
    - The presence of surgical hardware or implanted devices may preclude MRI.
    - The selection of best examination may require coordination between the provider and the imaging service. CT may be the procedure of choice in these cases.
CT

- CT Abdomen typically extends from the dome of the diaphragm to the upper margin of the sacroiliac joints, and CT Abdomen and Pelvis extends from the dome of the diaphragm through the ischial tuberosities.
  - In general, CT Abdomen is appropriate when evaluating solid abdominal organs.
  - In general, CT Abdomen and Pelvis is appropriate when evaluating inflammatory or infectious processes, hematuria, or conditions which appear to involve both the abdomen and the pelvis.
  - In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
- The contrast level in pediatric CT imaging is specific to the clinical indication, as listed in the specific guideline sections.
- CT Abdomen or Abdomen and Pelvis may be indicated for further evaluation of abnormalities suggested on prior US or MRI studies.
- CT may be indicated without prior MRI or US, as indicated in specific sections of these guidelines.
- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
- The selection of the best examination may require coordination between the provider and the imaging service.

Nuclear Medicine

- Nuclear medicine studies are commonly used in evaluation of the pediatric kidney and gallbladder. Other less common indications exist as well:
  - Esophageal motility study (CPT® 78258) and/or Gastroesophageal reflux study (CPT® 78262) is indicated in the evaluation of gastroesophageal reflux.
  - Nuclear intestinal imaging (Preferred code for Meckel’s Scan, CPT® 78290) or Gastric mucosa imaging (Alternate code Meckel’s scan, CPT® 78261) is indicated for the following:
    - Suspected Meckel’s diverticulum.
    - Gastric mucosa imaging (CPT® 78261) is also indicated for:
      - Barrett’s esophagus.
      - Thoracic masses suspected of containing gastric mucosa.
- Gastric emptying study (CPT® 78264) is indicated for evaluation of either suspected delayed or rapid gastric emptying.
- Gastric emptying study with small bowel transit (CPT® 78265) is indicated for evaluation of suspected abnormalities in both total and regional times for gastrointestinal transit in the small bowel.
- Gastric emptying study with small bowel and colon transit (CPT® 78266) is indicated for evaluation of suspected abnormalities in both total and regional times for gastrointestinal transit to the colon.
- Gastrointestinal bleeding scintigraphy (CPT® 78278) is indicated for evaluation of brisk active GI bleeding with indeterminate endoscopy.
- Gastrointestinal protein loss study (CPT® 78282) is indicated for decreased serum albumin or globulins and no evidence of GI bleeding.
- Peritoneal-venous shunt patency study (CPT® 78291) is indicated for evaluation of shunt patency and function in a patient with ascites.
- Nuclear renal imaging (CPT® 78701, CPT® 78707, CPT® 78708, or CPT® 78709) is indicated for evaluation of the following:
  - Renal transplant follow-up.
  - Kidney salvage vs. nephrectomy surgical decisions.
  - Acute renal failure with no evidence of obstruction on recent ultrasound.
  - Chronic renal failure to estimate prognosis for recovery.

3D Rendering
- 3D Rendering indications in pediatric abdomen imaging are identical to those for adult patients. See Preface-4.1: 3D Rendering in the Preface Imaging Guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References
**PEDAB-2: Generalized Abdominal Pain**

- Children with generalized abdominal pain and physical examination and laboratory studies, including stool for blood (and stool culture if diarrhea), should initially be evaluated by ultrasound (CPT® 76700 or CPT® 76705) and treated conservatively.
  - Gastroenterology (GI) specialist evaluation is helpful in determining the need for advanced imaging.

- Children with abdominal pain that can be localized to a particular area of the abdomen should be imaged according to the relevant guideline section:
  - **PEDAB-3: Right Lower Quadrant Pain.**
  - **PEDAB-4: Flank Pain, Renal Stone.**
  - **PEDAB-8: Right Upper Quadrant Pain.**
  - **PEDAB-25: Left Upper Quadrant Pain.**
  - **PEDAB-29: Left Lower Quadrant Pain.**

- Children with generalized abdominal pain AND ANY of the following red flag signs or symptoms require additional investigation (which may include advanced imaging). CT Abdomen (CPT® 74160) or Abdomen and Pelvis (CPT® 74177) with contrast is indicated unless otherwise specified in a specific guideline section:
  - Pain that wakes the child from sleep.
  - Unexplained fever (T >100.4°F).
  - Dysphagia.
  - GI bleeding.
  - Significant vomiting.
  - Guarding, rebound tenderness, or other peritoneal signs.
  - Severe chronic diarrhea or nocturnal diarrhea in a toilet-trained child.
  - Failure to thrive, involuntary weight loss, or delay in linear growth or pubertal development.
  - Family history of inflammatory bowel disease, familial polyposis syndrome, celiac disease, or peptic ulcer disease.
  - Abdominal mass, hepatomegaly, and/or splenomegaly on exam.
  - Jaundice.
  - Arthritis.
  - Costovertebral angle tenderness.
  - Perianal disease.
  - Spinal tenderness.
References


PEDAB-3: Right Lower Quadrant Pain

For patients age ≤14 years:
- Ultrasound (CPT® 76700 or CPT® 76705) is indicated as the initial examination. If positive or negative, no further diagnostic imaging is necessary.
  - If the appendix is not visualized on ultrasound and the white blood cell count is not elevated, no further imaging is necessary in nearly all cases, although the referring physician should make the final determination of the need for advanced imaging.
- If insufficient local ultrasound expertise exists or the ultrasound findings are inconclusive, any of the following studies are indicated for evaluation of right lower quadrant pain:
  - CT Abdomen and Pelvis with contrast (CPT® 74177).
  - CT Abdomen and Pelvis without contrast (CPT® 74176).
  - MRI Pelvis without contrast (CPT® 72195).
  - MRI Pelvis without and with contrast (CPT® 72197).

For patients age ≥15 years:
- Any of the following studies are indicated:
  - CT Abdomen and Pelvis with contrast (CPT® 74177).
  - CT Abdomen and Pelvis without contrast (CPT® 74176).
  - MRI Pelvis without contrast (CPT® 72195).
  - MRI Pelvis without and with contrast (CPT® 72197).

If the appendix is absent, follow guidelines in: PEDAB-2: Generalized Abdominal Pain
References


PEDAB-4: Flank Pain, Renal Stone

- Flank Pain imaging indications in pediatric patients are very similar to those for adult patients. See **AB-4: Flank Pain, Rule Out or Known Renal/Ureteral Stone** in the Abdomen Imaging Guidelines.

- Pediatric-specific imaging considerations include the following:
  - In children, ultrasound (CPT® 76770 or CPT® 76775) is the preferred initial study.
  - If ultrasound is inconclusive, CT Abdomen and Pelvis without contrast (CPT® 74176) is indicated.
  - If CT is inconclusive or there is significant concern for radiation exposure from frequent CT use for a particular patient, MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast is indicated.
  - If hematuria is present, see **PEDAB-7: Hematuria** for imaging guidelines.

- Nuclear kidney imaging (CPT® 78707, CPT® 78708, CPT® 78709, or CPT® 78803) is indicated for evaluation of recurrent flank pain when CT and ultrasound are non-diagnostic, or for suspected obstructive uropathy.

References

<table>
<thead>
<tr>
<th>PEDAB-5: Urinary Tract Infection (UTI)</th>
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<tr>
<td>PEDAB-5.1: Upper Urinary Tract</td>
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<tr>
<td>PEDAB-5.2: Lower Urinary Tract</td>
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</table>
PEDAB-5.1: Upper Urinary Tract

- All children with first time UTI should undergo ultrasound evaluation (CPT® 76770 or CPT® 76775), as the initial imaging modality to diagnose hydronephrosis, pyelonephritis, or congenital renal anomaly.
  - If hydronephrosis is present, this should be further evaluated with voiding cystourethrography (VCUG), to evaluate for vesicoureteral reflux. In boys, this is generally accomplished using fluoroscopic imaging and iodinated contrast to exclude urethral abnormalities. In girls, Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram) (CPT® 78740) is commonly used as urethral abnormalities are rare and this technique results in lower radiation exposure.

- Diuretic renography using Tc-99m MAG 3 (CPT® 78707, CPT® 78708, or CPT® 78709) is the study of choice for the following indications:
  - Differentiating a dilated non-obstructed urinary system from a true stenosis (e.g., UPJ obstruction; ureteral-vesical junction [UVJ] obstruction).
  - Quantifying renal parenchymal function.
  - Ultrasound findings that are compatible with a multicystic dysplastic kidney to evaluate function of the affected kidney or a ureteral-pelvic junction (UPJ) obstruction of the contralateral kidney.
  - Diagnostic evaluation of upper tract dilatation when VCUG is negative.
  - Renal function evaluation in patients with hydronephrosis.

- Post-contrast CT Abdomen (CPT® 74160) is sensitive in diagnosing pyelonephritis has a role in evaluation of renal abscess or unusual complications such as xanthogranulomatous pyelonephritis but has no role in the routine evaluation of UTI

- Magnetic resonance urography (MRU) (CPT® 74183 and CPT® 72197), is not a first line test for the routine evaluation of a UTI, but may be appropriate (where available) for investigation of a dilated upper urinary tract.
  - NOTE: MRU requires sedation in young children.
  - MRU can also quantitate renal function.

- Technetium-99m-dimercaptosuccinic acid (Tc-99m DMSA) scintigraphy (CPT® 78700, CPT® 78701, or CPT® 78803), is sensitive for the diagnosis of UTI but there is little benefit in using this after the first episode of a UTI:
  - DSMA is recommended for Detection of post-pyelonephritic renal scarring at least 6 months after the documented upper tract UTI in high risk patients with recurrent UTIs.

- Radiopharmaceutical nuclear medicine imaging (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, CPT® 78830, CPT® 78831, or CPT® 78832) is indicated for evaluation of suspected pyelonephritis or diffuse interstitial nephritis.

- Nuclear non-imaging renal function study (CPT® 78725) is a quantitative study that can be used to evaluate renal function.
PEDAB-5.2: Lower Urinary Tract

All children with first time UTI should undergo ultrasound evaluation (CPT® 76770 or CPT® 76775), as the initial imaging modality to diagnose hydronephrosis, pyelonephritis, or congenital renal anomaly.

- Fluoroscopic Voiding cystourethrography (VCUG) is indicated for detection of possible vesico-ureteral reflux (VUR) in neonates or young children when hydronephrosis is seen on ultrasound.

The American Academy of Pediatrics clinical practice guidelines no longer recommend routine VCUG for infants and young children from 2 to 24 months of age after the first febrile UTI.

- The current recommendation is to postpone the VCUG until the second febrile UTI UNLESS there are:
  - Atypical or complex clinical circumstances.
  - Renal/bladder ultrasound reveals hydronephrosis, scarring, or obstructive uropathy.

Vesicoureteral Reflux (VUR)

- Fluoroscopic VCUG is typically performed for diagnosis and grading of VUR, and should be the first modality used for diagnosis.
- Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram) (CPT® 78740), because of its lower radiation exposure and higher sensitivity for reflux > Grade I, is recommended for follow-up imaging of VUR, and investigation of VUR in siblings of affected patients.

Male patients with first UTI should be evaluated with fluoroscopic VCUG studies rather than radionuclide cystography, to visualize the male urethra for possible abnormalities such as posterior urethral valves, strictures, or diverticula.

For female patients, radionuclide cystography (CPT® 78740) may replace fluoroscopic VCUG as the initial study, since urethral anatomy is rarely abnormal except in complex malformations.

MR urography is indicated for evaluation of ectopic distal ureteral insertion, or other complex lower urinary tract anatomy.

Siblings of patients with known vesicoureteral reflux can undergo Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram) (CPT® 78740) if they have renal scarring on ultrasound or history of UTI and no prior evaluation for VUR.
References


PEDAB-6: Pediatric Acute Gastroenteritis

- Imaging is not indicated in pediatric acute gastroenteritis unless there is a concern for diagnosis other than acute gastroenteritis.

- When necessary, imaging in children with suspected gastroenteritis should begin with plain x-rays of the abdomen, including supine and left lateral decubitus views. The left lateral decubitus view is useful for the detection of air-fluid levels and for detection of gas in the rectum and to exclude obstruction or bowel perforation.

- Ultrasound (CPT® 76700 or CPT® 76705) should be performed if there is organomegaly, palpable mass, or suspicion for complications in the form of intussusception. See PEDAB-27: Intussusception
  - While ultrasound (CPT® 76700 or CPT® 76705) may detect findings of gastroenteritis, imaging is not necessary to make the diagnosis of uncomplicated gastroenteritis.

- CT Abdomen and Pelvis with contrast (CPT® 74177) is indicated if abdominal red flag symptoms are present as listed in PEDAB-2: Generalized Abdominal Pain.

References
PEDAB-7: Hematuria

Hematuria is a relatively common complaint in pediatric patients, and the imaging considerations are different than those occurring in adult patients.

- For patients with asymptomatic gross hematuria or microscopic hematuria with proteinuria present, ultrasound kidneys (CPT® 76770 or CPT® 76775) and bladder (CPT® 76856 or CPT® 76857) are indicated.

- No imaging is appropriate for asymptomatic microscopic hematuria without proteinuria.

- For patients with painful hematuria and no recent trauma, ANY of the following studies can be approved:
  - CT Abdomen and Pelvis without contrast (CPT® 74176)
  - Ultrasound kidneys (CPT® 76770 or CPT® 76775)
  - Ultrasound bladder (CPT® 76856 or CPT® 76857)

- For patients with hematuria and recent trauma, the following studies are indicated:
  - CT Abdomen and Pelvis with contrast (CPT® 74177)
  - CT Cystography (CT Pelvis with bladder contrast – CPT® 72193), if gross hematuria is present and pelvic fracture or traumatic bladder injury is suspected.

References

PEDAB-8: Right Upper Quadrant Pain

- Right upper quadrant pain imaging indications in pediatric patients are very similar to those for adult patients. See AB-2: Abdominal Pain in the Abdomen Imaging Guidelines.

- Pediatric-specific imaging considerations include the following:
  - In patients with complaints of RUQ pain with fever, elevated white blood cell count, positive Murphy sign with suspicion of acute cholecystitis or suspicion of acalculous cholecystitis, the diagnosis should be confirmed or excluded using US abdomen (CPT® 76700) and/or Nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226 or CPT® 78227).
    - MRI Abdomen with and without contrast (CPT® 74183) when US or NM is equivocal.
    - CT Abdomen with contrast (CPT® 74160) when US or NM is equivocal.
  - In patients with complaints of RUQ pain with no fever and normal white blood cell count where a diagnosis of stones and bile duct obstruction are suspected, the diagnosis should be confirmed with US abdomen (CPT® 76700) and/or Nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226 or CPT® 78227).
    - MRI Abdomen with and without contrast (CPT® 74183) when US or NM is equivocal.
    - CT Abdomen with contrast (CPT® 74160) when US or NM is equivocal.
  - In patients with complaints of RUQ pain with no fever and an ultrasound shows only gallstones, MRI Abdomen without contrast (CPT® 74181), MRI Abdomen without and with contrast (CPT® 74183) or Nuclear medicine imaging of the hepatobiliary system (HIDA scan, CPT® 78226) is indicated to exclude other sources of pain.

References
PEDAB-9: Inflammatory Bowel Disease, Crohn Disease, or Ulcerative Colitis

Enterography is the most appropriate advanced imaging study for patients with inflammatory bowel disease (IBD).

▶ For children with suspected IBD, MR enterography (CPT® 74183 and CPT® 72197) is preferred to avoid radiation exposure.
  ◦ CT enterography (CPT® 74177) is indicated if MR enterography is inconclusive or unavailable.

▶ For children with established IBD, MR enterography (CPT® 74183 and CPT® 72197) is indicated for the following:
  ◦ Monitoring response to disease-modifying treatment on an annual basis or when treatment change is being considered.
  ◦ Patients with new or worsening symptoms or suspected complications including abscess, perforation, fistula, or obstruction.
  ◦ CT enterography (CPT® 74177) can be approved if MR enterography is inconclusive or unavailable.

References
PEDAB-10: Abdominal Sepsis (Suspected Abdominal Abscess)

- Abdominal sepsis imaging indications in pediatric patients are identical to those for adult patients. See **AB-3: Abdominal Sepsis (Suspected Abdominal Abscess)** in the Abdomen Imaging Guidelines.
PEDAB-11: Postoperative Pain within 60 Days Following Abdominal Surgery

CT Abdomen and Pelvis with contrast (CPT® 74177) is indicated in patients with suspected postoperative complications (e.g. bowel obstruction, abscess, anastomotic leak, etc.).
- Children can also be evaluated with ultrasound (CPT® 76700 or CPT® 76705) initially (especially in small children or in thin older children) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197).
- Because MRI may not be practical for the timely evaluation of post-operative abscesses, MRI should only replace CT when the study can be completed in a similar time frame as CT.

Radiopharmaceutical nuclear medicine imaging (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, CPT® 78830, CPT® 78831, or CPT® 78832) is indicated for evaluation of any of the following:
- Peritonitis.
- Postoperative fever without localizing signs or symptoms.

Beyond 60 days postoperatively, See PEDAB-2: Generalized Abdominal Pain.

References
**PEDAB-12: Constipation, Diarrhea, and Irritable Bowel Syndrome**

- Constipation and diarrhea are extremely common complaints in children. The overwhelming majority of patients do not require advanced imaging for evaluation of constipation or diarrhea.

- Irritable bowel is rare in young children, but more common in adolescents. The overwhelming majority of patients do not require advanced imaging for evaluation of irritable bowel syndrome.
  - In most cases, causes of constipation can be excluded on the basis of a careful history and physical examination. Advanced Imaging should be performed if warning signs of other diseases are present.

- Constipation associated with red flag signs or symptoms may require advanced imaging:
  - Red flag symptoms for abdominal pain: See **PEDAB-2: Generalized Abdominal Pain**.
  - Clinical suspicion of tethered cord based on abnormal physical findings over the spine or failure of maximal laxative therapy: See **PEDSP-5: Tethered Cord** in the Pediatric Spine Imaging Guidelines.

- Diarrhea that is associated with additional red flag signs or symptoms may require advanced imaging: See **PEDAB-2: Generalized Abdominal Pain**.

- Irritable bowel syndrome that is associated with additional red flag signs or symptoms may require advanced imaging: See **PEDAB-2: Generalized Abdominal Pain**.

- A barium enema and rectal biopsy are indicated for diagnosis of Hirschsprung disease in children with features suggestive of this disorder. MRI Pelvis without and with contrast (CPT® 72197) may be indicated in post-operative patients who have signs of complications related to treatment to assess the position of the pulled-through bowel, the sphincter muscles, and the area of the posterior urethra.

**References**


<table>
<thead>
<tr>
<th>PEDAB-13: Abdominal Mass</th>
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<tr>
<td>PEDAB-13.2: Intra-Abdominal Mass</td>
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</table>
**PEDAB-13.1: Abdominal Wall Mass**

- For initial imaging of a newly discovered abdominal wall mass, ANY of the following studies are indicated:
  - Ultrasound (CPT® 76700 or CPT® 76705).
  - MRI Abdomen without contrast (CPT® 74181) or without and with contrast (CPT® 74183).
  - If below the umbilicus, MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) may be added to MRI Abdomen.

- If ultrasound and/or MRI are inconclusive or insufficient for preoperative planning, ANY of the following studies are indicated:
  - CT Abdomen with contrast (CPT® 74160) or without contrast (CPT® 74150).
  - If below the umbilicus, CT Abdomen and Pelvis with contrast (CPT® 74177) or without contrast (CPT® 74176).

**PEDAB-13.2: Intra-Abdominal Mass**

- Ultrasound (CPT® 76700) should be the initial imaging study for children with an intra-abdominal mass.

- Additional imaging studies will be determined by the results of the ultrasound, and will depend on the location and organ involvement associated with the mass as well as history, physical exam, and laboratory findings. See the following sections for additional imaging guidelines:
  - **PEDONC-1: General Guidelines** in the Pediatric Oncology Imaging Guidelines.
  - **PEDONC-5: Pediatric Lymphomas** in the Pediatric Oncology Imaging Guidelines.
  - **PEDONC-6: Neuroblastoma** in the Pediatric Oncology Imaging Guidelines.
  - **PEDONC-7: Pediatric Renal Tumors** in the Pediatric Oncology Imaging Guidelines.
  - **PEDONC-10: Pediatric Germ Cell Tumors** in the Pediatric Oncology Imaging Guidelines.
  - **PEDONC-11: Pediatric Liver Tumors** in the Pediatric Oncology Imaging Guidelines.
  - **PEDONC-14: Pediatric Adrenocortical Carcinoma** in the Pediatric Oncology Imaging Guidelines.
  - **PEDAB-15: Liver Lesion Characterization**.
  - **PEDAB-17: Adrenal Lesions**.
  - **PEDAB-19: Indeterminate Renal Lesion**.
  - **PEDAB-26: Spleen**.
References
PEDAB-14: Renovascular Hypertension and Other Secondary Causes of Hypertension

Clinical evaluation for suspected hypertension should include repeated blood pressure measurements (generally ≥3 measurements). If these measurements are at or above the age-dependent systolic or diastolic blood pressures requiring further evaluation, as listed in the following table, further evaluation is warranted. Blood pressure may be obtained in-clinic, at home, or by using a wearable ambulatory blood pressure measurement (ABPM) device which records blood pressure at frequent intervals during normal activities and is downloaded later for computer analysis.

<table>
<thead>
<tr>
<th>Age</th>
<th>Boys Systolic</th>
<th>Boys Diastolic</th>
<th>Girls Systolic</th>
<th>Girls Diastolic</th>
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ANY of the following studies are indicated for initial evaluation of a pediatric patient with suspected secondary hypertension.
- Doppler or Duplex Ultrasound (CPT® 93975 or CPT® 93976).
- Complete retroperitoneal ultrasound (CPT® 76770).
- Captopril renography (CPT® 78709) has largely been abandoned in clinical practice, replaced by CTA and MRA Abdomen, but may be supported for unusual circumstances. All such requests should be forwarded to Medical Directors Review.

All follow-up requests for pediatric hypertension will go to Medical Directors Review.
Other considerations for imaging evaluation:

- MRA (CPT® 74185) or CTA (CPT® 74175) Abdomen may be indicated for pediatric patients with hypertension to exclude fibromuscular dysplasia or other blood-flow restricting lesions of the renal arteries.

- Echocardiography (CPT® 93306) is indicated at initial evaluation to screen for cardiac abnormalities, coarctation of the aorta, and end-organ damage such as left ventricular hypertrophy.

- Nuclear renal imaging (CPT® 78707, CPT® 78708, or CPT® 78709) is indicated for evaluation of the following:
  - Severe hypertension with progressive renal insufficiency or failure to respond to 3 drug therapy.
  - Malignant or accelerated hypertension.
  - Acute worsening of previously stable hypertension.
  - Diastolic BP >100 in patient <35 years old.
  - New onset severe hypertension.
  - Hypertension in presence of asymmetric kidneys.
  - Hypertension in presence of acute elevation in creatinine either unexplained or after treatment with ACE inhibitor.
  - Abdominal bruit.
  - Recurrent acute pulmonary edema and hypertension.
  - Hypokalemia with normal or elevated plasma renin level in absence of diuretic therapy.
  - Hypertension with known neurofibromatosis.
References


PEDAB-15: Liver Lesion Characterization

- Liver lesion characterization imaging indications in pediatric patients are very similar to those for adult patients. See AB-29: Liver Lesion Characterization in the Abdomen Imaging Guidelines.

- Nuclear medicine liver imaging (ONE of CPT® codes: CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215, or CPT® 78216) is rarely performed, but can be approved for the following when ultrasound, CT, and MRI are unavailable or contraindicated:
  - Evaluation of liver mass, trauma, or suspected focal nodular hyperplasia (FNH).
  - Differentiation of hepatic hemangioma from FNH.
  - Diffuse hepatic disease or elevated liver function tests.
  - Suspected accessory spleen (CPT® 78215 or CPT® 78216 only).

- Pediatric-specific imaging considerations includes:
  - US abdomen (CPT® 76700 or CPT® 76705) is the initial study of choice in children. MRI is preferred over CT when possible to reduce radiation exposure.

References
Elevated liver function testing imaging indications in pediatric patients are very similar to those for adult patients. See AB-30: Elevated Liver Function (LFT) Levels in the Abdomen Imaging Guidelines.

Causes of liver failure or cirrhosis in pediatric patients are different from adults, and are frequently idiopathic, but commonly due to ONE of the following:
- Biliary dysfunction (biliary atresia, cystic fibrosis, etc.).
- Metabolic disease.
- Post-infectious.

Liver ultrasound (CPT® 76700) with duplex Doppler (CPT® 93975) is indicated as an initial study for patients prior to approving CT or MRI for pediatric patients.
- MRI Abdomen without and with contrast (CPT® 74183) is indicated for evaluation of ultrasound findings that are inconclusive or technically limited, and is preferred over CT when possible to reduce radiation exposure.

Repeat liver ultrasound (CPT® 76705) with duplex Doppler (CPT® 93975) is indicated in pediatric patients in the following circumstances:
- Known chronic liver dysfunction or cirrhosis of any cause may be reimaged on an annual basis in the absence of new or worsening findings.
- New or worsening findings on history, physical exam, or laboratory results that suggest progression of liver disease.
- Doppler ultrasound liver (CPT® 93975 or CPT® 93976) is indicated when portal venous congestion or portal hypertension is suspected.

Nuclear medicine liver imaging (ONE of CPT® codes: CPT® 78201, CPT® 78202, CPT® 78803, CPT® 78215, or CPT® 78216) is rarely performed, but can be approved for the following when ultrasound, CT, and MRI are unavailable or contraindicated:
- Diffuse hepatic disease or elevated liver function tests.

References
PEDAB-17: Adrenal Lesions

Adrenal masses in infants and young children usually present as palpable abdominal masses or are detected on in utero US. In the neonates, the common masses are adrenal hemorrhage and neuroblastoma. Abdominal US is the initial imaging study of choice.

- If an adrenal mass is detected, it can often be adequately evaluated with short interval follow-up retroperitoneal ultrasound (CPT® 76770) in 7 to 10 days.
  - If repeat ultrasound is concerning for neuroblastoma or there is high clinical concern for neuroblastoma, MRI Abdomen without and with contrast (CPT® 74183) or CT Abdomen without and with contrast (CPT® 74170) are indicated to confirm the diagnosis. MRI is preferred over CT when possible to reduce radiation exposure. If these studies, confirm neuroblastoma 123I-Metaiodobenzylguanidine (MIBG) scintigraphy is indicated for staging.

- Neuroblastoma is the most common primary adrenal tumor in pediatric patients between day 1 and 5 years of age. See PEDONC-6: Neuroblastoma in the Pediatric Oncology Imaging Guidelines.

- Additional adrenal imaging considerations include the following:
  - Adrenal Nuclear Imaging of the cortex and/or medulla (CPT® 78075) is indicated for the following:
    - Distinguishing adrenal adenoma from adrenal hyperplasia.
    - Evaluation of suspected pheochromocytoma or paraganglioma.
      - MIBG preferred (ONE of CPT® codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804).
      - For known pheochromocytoma or paraganglioma, See ONC-15: Neuroendocrine Cancers and Adrenal Tumors in the Oncology Imaging Guidelines.
    - Evaluation of suspected neuroblastoma, ganglioneuroblastoma, or ganglioneuroma.
      - MIBG preferred (ONE of CPT® codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804, or hybrid SPECT/CT CPT® 78830, CPT® 78831, or CPT® 78832), See PEDONC-6: Neuroblastoma in the Pediatric Oncology Imaging Guidelines.
    - History of multiple endocrine neoplasia syndromes: See PEDONC-2.8: Multiple Endocrine Neoplasias (MEN) in the Pediatric Oncology Imaging Guidelines.
    - History of neurofibromatosis: See PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2) in the Pediatric Oncology Imaging Guidelines.
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**PEDAB-18.1: Hereditary (Primary) Hemochromatosis**

- Hereditary hemochromatosis imaging indications in pediatric patients are identical to those for adult patients. See AB-11.2: Hereditary (Primary) Hemochromatosis (HH) and Other Iron Storage Diseases in the Abdomen Imaging Guidelines.

**PEDAB-18.2: Transfusion-Associated (Secondary) Hemochromatosis**

- Transfusion-associated hemochromatosis is a common complication of exposure to repeated red blood cell transfusions. This can occur in any patient with exposure to >20 transfusion episodes, but is most common among sickle cell disease, thalassemia, bone marrow failure (aplastic anemia, Fanconi anemia, etc.), oncology patients, and hematopoietic stem cell transplant patients.

- T2* MRI has been well established in the determination of organ iron burden in transfusion-associated hemochromatosis. Contrast use is not necessary for evaluation of iron burden. The following studies are indicated for evaluation of transfusion-associated hemochromatosis:
  - MRI Abdomen without contrast (CPT® 74181) for liver iron evaluation.
  - MRI Cardiac without contrast (CPT® 75557) for cardiac iron evaluation.
  - MRI Chest without contrast (CPT® 71550) can be approved as a single study to evaluate both heart and liver iron burden.
  - CPT® 74181 and CPT® 75557 can be approved alone, or together.
  - If requested, CPT® 71550 will evaluate both heart and liver and should not be approved with any other codes.

- Screening MRI is indicated every 12 months for chronically transfused patients at risk of hemochromatosis.

- Imaging is indicated every 3 months for treatment response in patients receiving active treatment (chelation and/or phlebotomy).

**References**

PEDAB-19: Indeterminate Renal Lesion

Indeterminate renal lesion characterization imaging indications in pediatric patients are very similar to those for adult patients. See **AB-35: Indeterminate Renal Lesion** in the Abdomen Imaging Guidelines

Indeterminate renal lesion imaging indications in pediatric patients are uncommon and are usually cysts or congenital anomalies.

Pediatric-specific imaging considerations include the following:
- Pediatric renal cysts have a lower risk of malignant progression than do renal cysts in adults.
- For patients who have simple cysts but are symptomatic and surgical intervention is being considered, CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) is indicated.
- For pediatric patients with complex renal cyst identified on ultrasound, CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is indicated.
- For patients with congenital anomalies, nuclear medicine studies with diuretic renography (CPT® 78708 or CPT® 78709) can be performed to determine function and cystography to determine presence of associated reflux.
- Patients with solid renal masses should be imaged according to guidelines in section **PEDONC-7: Pediatric Renal Tumors** in the Pediatric Oncology Imaging Guidelines.

References

**PEDAB-20: Hydronephrosis**

Hydronephrosis is a relatively common finding in pediatric patients, with the following imaging considerations:

- Patients with prenatal hydronephrosis can be evaluated with retroperitoneal ultrasound (CPT® 76770) within the first week of life, and again after 6 weeks of age.

- Patients with known hydronephrosis can be followed with retroperitoneal ultrasound (CPT® 76770) every 3 to 12 months.
  - This imaging represents a guideline-supported, scheduled follow-up imaging evaluation, as described in **PREFACE-3: Clinical Information** in the Preface Imaging Guidelines. A Current evaluation (within 60 days) would not be required for authorization.

- For patients with hydronephrosis associated with urinary tract infection or vesicoureteral reflux, see **PEDAB-5: Urinary Tract Infection (UTI)** for imaging guidelines.

- Patients with obstructive uropathy (including ureteropelvic junction obstruction (UPJO), ureterovesical junction obstruction (UVJO), and bladder outlet obstruction) can be evaluated with retroperitoneal ultrasound (CPT® 76770), and diuretic renography (CPT® 78707, CPT® 78708, or CPT® 78709) for preoperative planning and postoperatively at 3 to 12 months.
  - If hydronephrosis has resolved on postoperative imaging then no further routine imaging is indicated.

- Magnetic resonance urography (MRU) (CPT® 74183 and CPT® 72197) is rarely indicated, but can be approved in patients with inconclusive ultrasound and diuretic renography.

- CT Abdomen with contrast (CPT® 74160) is rarely indicated, but can be approved in patients with inconclusive ultrasound and a suspected vascular cause of UPJO.
References


**PEDAB-21: Polycystic Kidney Disease**

- An abdominal ultrasound (CPT® 76700) or a retroperitoneal ultrasound (CPT® 76770) is indicated if there is clinical concern for polycystic kidney disease, or for screening individuals who are at risk for autosomal dominant polycystic kidney disease (ADPCKD).

**References**

PEDAB-22: Blunt Abdominal Trauma

- Blunt abdominal trauma imaging indications in pediatric patients are identical to those for adult patients. See AB-10.1: Blunt Abdominal Trauma in the Abdomen Imaging Guidelines.
PEDAB-23: Hernias

- Hernia imaging indications in pediatric patients are identical to those for adult patients. See AB-12: Hernias in the Abdomen Imaging Guidelines.
PEDAB-24: Abdominal Lymphadenopathy

- Abdominal lymphadenopathy imaging indications in pediatric patients are identical to those for adult patients. See AB-8: Abdominal Lymphadenopathy in the Abdomen Imaging Guidelines.
PEDAB-25: Left Upper Quadrant Pain

- Left upper quadrant pain imaging indications in pediatric patients are identical to those for adult patients. See AB-2: Abdominal Pain in the Abdomen Imaging Guidelines.

- Nuclear medicine spleen imaging (CPT® 78185) is rarely performed, but can be approved for left upper quadrant pain when neither ultrasound nor CT is available.

References

PEDAB-26: Spleen

- Spleen imaging indications in pediatric patients are very similar to those for adult patients. See AB-34: Spleen in the Abdomen Imaging Guidelines.

- Nuclear medicine spleen imaging (CPT® 78185) is rarely performed, but can be approved for the following indications when CT is unavailable:
  - Splenic trauma.
  - Evaluation of splenic function.
  - Suspected splenic mass, cyst, abscess, infarct, or metastasis.
  - Radiation treatment planning.
  - Asplenia.
  - Suspected functional accessory spleen:
    - Can approve CPT® 78215 or CPT® 78216 instead of CPT® 78185, if requested.

- Pediatric-specific imaging considerations include the following:
  - MRI is preferred over CT when possible to reduce radiation exposure.

References
PEDAB-27: Intussusception

Intussusception, telescoping of one bowel loop into another, is a frequent cause of abdominal pain in young children. It may be associated with bloody stool. Plain x-rays (supine and left lateral decubitus views) should be performed initially to exclude mass or bowel obstruction from other causes and to detect possible bowel perforation which may be an indication for emergent surgical intervention.

- Ultrasound (CPT® 76700 or CPT® 76705) is indicated as an initial study if there is a strong suspicion for intussusception, but if negative, plain x-rays of the abdomen should follow.
- In some institutions, Ultrasound guidance (CPT® 76942) may be used for reduction of colonic or ileocolic intussusception. Generally, this is an urgent or emergent procedure and may not require prior authorization.

References
PEDAB-28: Bowel Obstruction

- Bowel obstruction imaging indications in pediatric patients are identical to those for adult patients. See **AB-20: Bowel Obstruction and Gastroparesis** in the Abdomen Imaging Guidelines.
**PEDAB-29: Left Lower Quadrant Pain**

Diverticulitis is the most common cause of left lower quadrant pain in adults but is extremely rare in children.

Gastroenterologist evaluation is helpful in determining the appropriate diagnostic pathway in patients with left lower quadrant pain with or without heme-positive stools or rectal bleeding, since advanced imaging is rarely helpful in the initial evaluation of these patients.

- Pelvic ultrasound (CPT® 76856) is the initial imaging study of choice for children for detecting gynecologic abnormalities that may cause left lower quadrant pain.
- For male patients or if ultrasound is inconclusive, advanced imaging may be appropriate for management as directed by gastroenterologic evaluation.

**References**


PEDAB-30: Celiac Disease (Sprue)

- Celiac disease imaging indications in pediatric patients are identical to those for adult patients. See AB-24: Celiac Disease (Sprue) in the Abdomen Imaging Guidelines.
Liver and kidney transplant imaging indications in pediatric patients are identical to those for adult patients. See **AB-42: Transplant** in the Abdomen Imaging Guidelines.

For post-transplant lymphoproliferative disorder in pediatric patients, See **PEDONC-5.3: Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL)** in the Pediatric Oncology Imaging Guidelines.
PEDAB-32: Gaucher Disease

See PEDPN-4: Gaucher Disease in the Pediatric Peripheral Nerve Disorders Imaging Guidelines.
Vomiting in infants is generally classified as either bilious (implying obstruction distal to the Sphincter of Oddi) or non-bilious.

Bilious vomiting may be a true emergency, as some of the conditions causing this could result in compromise of blood supply to the intestines, a potentially life-threatening situation.

Suspected malrotation is an indication for emergent imaging. If malrotation with mid-gut volvulus is suspected, acute abdominal series (Chest X-ray and abdominal views, including supine and upright or supine and left lateral decubitus views), followed by Ultrasound abdomen, limited (CPT® 76705) and/or UGI series should be performed. If the abdominal X-rays suggest distal bowel obstruction, water soluble contrast enema should be considered.

Hypertrophic Pyloric Stenosis is an idiopathic condition wherein the circular muscle controlling emptying of the stomach thickens, causing a relative obstruction of the gastric outlet. The condition can occur at any age (including occasionally in adults), but the typical child is male, aged 2 to 6 weeks. Projectile non-bilious vomiting is the most common presenting complaint, but the description of projectile vomiting is subjective. The differential diagnosis for non-bilious vomiting includes common conditions such as viral gastroenteritis and gastro-esophageal reflux.

Infants with projectile non-bilious vomiting should be evaluated with Ultrasound abdomen, limited (CPT® 76705). If initial studies are not diagnostic, repeat studies should be performed, as frequently as daily, until the vomiting resolves or the diagnosis is made. UGI series may be useful as a confirmatory test, may be preferred if ultrasound expertise is not available for this condition, or if the clinical presentation is atypical for Hypertrophic Pyloric Stenosis. Ultrasound is preferred when available, as it involves no contrast or ionizing radiation use.

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**PEDCD-1.1: Pediatric Cardiac Imaging Age Considerations**

- Heart disease in the pediatric population involves predominantly congenital lesions. Pediatric patients can have acquired heart disease unique to children. For those diseases which occur in both pediatric and adult populations, differences exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Individuals who are < 18 years old should be imaged according to the Pediatric Cardiac Imaging Guidelines, and individuals who are age ≥ 18 years should be imaged according to the Cardiac Imaging Guidelines, except where directed otherwise by a specific guideline section.

**PEDCD-1.2: Pediatric Cardiac Imaging Appropriate Clinical Evaluation**

- A recent (within 60 days) face-to-face evaluation should be performed prior to considering advanced imaging unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation. This evaluation should include:
  - A detailed history
  - Physical examination
  - Appropriate laboratory studies

- Patients for whom routine imaging is anticipated at the next visit (for example on year follow-up echo for a 10 year old with a VSD) may have these imaging studies approved without face to face evaluation if study was already indicated.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the heart is not supported.

- Patients starting ADHD medications, in the absence of other appropriate indications listed in these guidelines, imaging is not indicated.

- Asymptomatic Patients with known or suspected syndromes, which may be associated with congenital heart disease, can have an initial echocardiogram.

- Asymptomatic patients with family history of aortopathy, cardiomyopathy, congenital heart disease with known inheritance pattern, can have an echocardiogram as an initial study. Additional studies are determined based on findings.

- Asymptomatic patients with exposure to cardiotoxic drugs can have serial echocardiograms as per **PEDONC-19.2: Cardiotoxicity and Echocardiography**

- Advanced imaging of the heart should only be approved in patients who have documented active clinical signs or symptoms of disease involving the heart or as follow-up for findings on echocardiograms.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the heart are not necessary unless:
  - There is evidence for progression of disease
  - New onset of disease and/or documentation of how repeat imaging will affect patient management or treatment decisions.
PEDCD-1.3: Pediatric Cardiac Imaging Modality General Considerations

- **MRI**
  - MRI and MRA studies are frequently indicated for evaluation of congenital heart defects not well visualized on echocardiography, thoracic arteries and veins not visualized on echocardiography, cardiomyopathies, and right ventricular disease, as well as in follow-up for these indications.
  - Due to the length of time for image acquisition and the need for the patient to be motionless during the acquisition, anesthesia is required for almost all infants and young children (age < 7 years), as well as older children with delays in development or maturity. In this patient population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:
    - MRI is typically performed without and with contrast.
    - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.

- **CT**
  - CT is primarily used to evaluate the coronary and great vessels in congenital heart disease if cardiac MR is contraindicated.
  - Coding considerations are listed in PEDCD-10: CT Heart and Coronary Computed Tomography Angiography (CCTA) – Other Indications)

- **Ultrasound**
  - Echocardiography is the primary modality used to evaluate the anatomy and function of the pediatric heart, and is generally indicated before considering other imaging modalities.
  - Coding considerations are listed in PEDCD-8: Echocardiography Other Indications.

- **Nuclear Medicine**

SPECT, **PET stress** may be indicated for patients with anomalous CA, angina chest pain, and follow-up for Kawasaki. See specific sections for those indications.
- Multi Gated Acquisition (MUGA) studies (CPT® 78472, CPT® 78473, CPT® 78481, CPT® 78483, CPT® 78494, or CPT® 78496) are rarely performed in pediatrics, but can be approved for the following:
  - Certain pediatric oncology patients when echocardiography is insufficient: See: PEDONC-1.2: Appropriate Clinical Evaluations for imaging guidelines.
  - Quantitation of left ventricular function when recent echocardiogram shows ejection fraction of < 50% and MUGA results will impact acute patient care decisions.
- SPECT/CT fusion imaging involves SPECT (MPI) imaging and CT for optimizing location, accuracy, and attenuation correction combines functional and anatomic information.
- There is currently no evidence-based data to formulate appropriateness criteria for SPECT/CT fusion imaging.
- Combined use of nuclear imaging, including SPECT, along with diagnostic CT (fused SPECT/CT) is considered investigational.
  - Central C-V Hemodynamics (CPT® 78414) is not an imaging study and is an outdated examination
  - Cardiac Shunt Detection (CPT® 78428) is rarely performed in pediatrics but can be approved for patients in whom Cardiac MR is not diagnostic
- Calculation of left and right ventricular ejection fractions
- Assessment of wall motion
- Quantitation of right to left shunts

- Myocardial Tc-99m Pyrophosphate Imaging
  - Infarct Avid Myocardial Imaging studies (CPT® 78466, CPT® 78468, and CPT® 78469), historically this method of imaging the myocardium, Myocardial Tc-99m Pyrophosphate Imaging, was used to identify recent infarction, hence, the term "infarct-avid scan." Although still available, the sensitivity and specificity for identifying infarcted myocardial tissue is variable and the current use for this indication is limited
  - CPT® 78466, CPT® 78468, and CPT® 78469, CPT® 78800 or CPT® 78803 may be used, for identification of myocardial ATTR (transthyretin) amyloidosis. Refer to CD-3.7: Myocardial Tc-99m Pyrophosphate Imaging and CD-3.8: Cardiac Amyloidosis

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- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.
References


### PEDCD-2: Congenital Heart Disease

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PEDCD-2.1: Congenital Heart Disease General Considerations

- Congenital heart disease accounts for the majority of cardiac problems occurring in the pediatric population. Patients may be diagnosed any time spanning prenatal evaluation to adolescence. For patients over 18 year of age, see Adult Congenital Guidelines.

- There are a number of variables that influence the modality and timing of imaging patients with congenital heart disease, which results in a high degree of individuality in determining the schedule for imaging these patients, including:
  - Gestational age
  - Patient age
  - Physiologic effects of the defect
  - Status of interventions (catheterization and surgical)
  - Rate of patient growth
  - Stability of the defect on serial imaging
  - Comorbid conditions
  - Activity level

PEDCD-2.2: Congenital Heart Disease Echocardiography Coding

- Any of the following echocardiography code combinations are appropriate for re-evaluation of patients with known congenital heart disease:
  - CPT® 93303, CPT® 93320, and CPT® 93325
  - CPT® 93304, CPT® 93321, and CPT® 93325
  - CPT® 93303
  - CPT® 93304

- CPT® 93306 is not indicated in the evaluation of known congenital heart disease.

- All requested CPT® combinations other than those listed in this section should be forwarded for Medical Director Review.

PEDCD-2.3: Congenital Heart Disease Modality Considerations

- Echocardiography is the primary imaging modality used for diagnosing and monitoring congenital heart disease and is generally required before other imaging modalities are indicated unless otherwise indicated in a specific guideline section.

- Cardiac MRI either without contrast (CPT® 75557) or without and with contrast (CPT® 75561) is indicated, when a recent echocardiogram is inconclusive, needs confirmation of findings, or does not completely define the disease (for subsequent follow-up studies, a recent echocardiogram is not a requirement):
  - CPT® 75565 is also indicated for patients with valvular disease or a need to evaluate intracardiac blood flow. These patients will usually have CPT® 93320 and CPT® 93325 performed with their echocardiography studies.
  - MRA Chest (CPT® 71555) may be added if the aorta or pulmonary artery needs to be visualized beyond the root, or if aortopulmonary collaterals, pulmonary veins, or systemic veins need to be visualized.
MRA Chest alone (CPT® 71555) should be performed if the patient cannot cooperate with full cardiac MRI exam.

MRA Chest (CPT® 71555) is assessment of the great arteries, pulmonary veins, and systemic chest veins, including the following.

- Coarctation of the aorta, tetralogy of Fallot, anomalous pulmonary veins,
- Transposition of the great arteries, Truncus arteriosus, vascular rings, and other lesions of the great arteries, with inconclusive recent echocardiography findings

CT imaging is indicated, when recent echocardiogram is inconclusive, for the following:

- Report CPT® 75574 for evaluating coronary artery anomalies
- Report CPT® 75573 for congenital heart disease
- CPT 71275 Determination of vascular extra-cardiac anatomy in patients with complex congenital heart disease
- Pulmonary artery (PA) and Pulmonary vein (PV) assessment
- CTA of the chest is indicated to assess, Coarctation of the aorta, tetralogy of Fallot, anomalous pulmonary veins, and other lesions of the great arteries, vascular rings, with inconclusive recent echocardiography findings

**PEDCD-2.4: Congenital Heart Disease Timing Considerations**

Echocardiography is repeated frequently throughout a child’s life, and can generally be approved regardless of symptoms according to the following schedule, with some modifications listed below:

- Patients 0-2 months:
  - Can have one repeat echocardiogram if prior echocardiogram is abnormal (either in hospital or as newborn outpatient)
- Patient’s age 0 to 2 years:
  - every 3 months
  - Patients with single ventricle physiology (e.g., Hypoplastic left heart syndrome [HLHS], Mitral atresia, Unbalanced atroventricular septal defect [uAVSD]) may require echocardiograms very frequently and can be approved:
    - Birth to 6 months of life: every 2 weeks
    - 7-12 months of life: 1 per month
    - Then every 3 months until 2 years of age
  - Patients with unrepaired asymptomatic isolated secundum atrial septal defect (ASD) without syndromes (such as Down Syndrome) or evidence of pulmonary hypertension:
    - Every 3 months until they are 1 year
    - Then once a year, unless consideration for surgery
- Patient’s age 3 to 12 years:
  - Non-ASD patients: every 6 months
  - Patients with unrepaired asymptomatic isolated secundum atrial septal defect (ASD), without syndromes (such as Down Syndrome) or evidence of pulmonary hypertension:
    - Follow the above schedule until they are 1 year
Then they can have echocardiogram once a year, unless consideration for surgery.

- Patient’s age 13 years and older: every 12 months
- Modifiers to the above schedule:
  - Some congenital conditions may require more frequent testing, especially with more complex heart disease, congestive heart failure, obstructive heart lesions, ductal dependent lesions, changes in clinical status, repeat interventions, and/or in neonates
  - Any patient being treated for heart failure, with consideration for changing medical regimen can have an echocardiogram

Echocardiography is performed during the physician office visit, and these studies should not be denied because of lack of contact within 60 days

References


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**PEDCD-3.1: Heart Murmur General**

- Heart murmurs are extremely common in pediatric patients. The thinner chest wall in children allows clearer auscultation of blood flowing through the chambers of the heart, which may result in a murmur on physical exam.

- The majority of murmurs are innocent and do not require further evaluation. More than 30% of children may have an innocent murmur detected during physical examination. Innocent murmurs are typically systolic ejection murmurs with a vibratory or musical quality, and generally change in quality when the patient changes position.

- Other types of murmurs can be pathologic and require additional evaluation, usually by a pediatric cardiologist. Echocardiography is indicated, and is performed as part of the office visit. When evaluating a patient with a murmur for the first time, it will not be known whether the patient has congenital heart disease or not. The cardiologist only submits charges for the procedure actually performed.

- The following echocardiography code combinations should be approved for evaluation of any pathologic murmur or any innocent murmur with associated cardiac signs or symptoms:
  - CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
  - CPT® 93303, CPT® 93306
  - CPT® 93306, CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately.

- Repeat echocardiography is not indicated if the initial echocardiogram was normal and the murmur has not changed in quality.

**References**

PEDCD-4.1: Chest Pain General

Chest pain in pediatric patients is caused by a cardiac etiology in < 5% of cases, yet causes great anxiety for parents resulting in requests for testing.

ʯ A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, EKG, and appropriate laboratory studies should be performed prior to considering advanced imaging.

ʯ Echocardiography is indicated for pediatric patients with chest pain and one or more of the following:
  ♦ Exertional chest pain
  ♦ Non-exertional chest pain with abnormal EKG
  ♦ Chest pain with signs or symptoms of pericarditis
  ♦ First-degree relative with sudden unexplained death or cardiomyopathy
  ♦ Recent onset of fever
  ♦ Recent illicit drug use
  ♦ Other signs or symptoms of cardiovascular disease

ʯ Echocardiography is performed as part of the office visit. When evaluating a patient for the first time, it will not be known whether the patient has congenital heart disease or not. The cardiologist only submits charges for the procedure actually performed.

ʯ The following echocardiography code combinations should be approved for evaluation of chest pain:
  ♦ CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
  ♦ CPT® 93303, CPT® 93306
  ♦ CPT® 93306
  ♦ CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately.

ʯ Repeat echocardiography is not indicated if the initial echocardiogram is normal unless one of the following conditions is present:
  ♦ Increased severity or change in quality of the chest pain
  ♦ New signs or symptoms of cardiovascular disease other than pain
  ♦ New abnormality on EKG

ʯ Cardiac MR is indicated for chest pain if prior evaluation suggests any coronary artery abnormalities, cardiomyopathy, myocarditis or aortic dissection. Cardiac MR with stress should be approved if ischemia is suggested on prior evaluation.
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</table>
**PEDCD-5.1: Syncope**

Syncope in pediatric patients is common, with up to 15% of patients experiencing at least one episode by age 21. Syncope is caused by neurocardiogenic syndrome (vasovagal syncope) in 75 to 80% of cases, which is a benign and self-limiting condition. Despite this, syncope causes great anxiety for parents resulting in requests for testing.

- A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, EKG, and appropriate laboratory studies should be performed prior to considering advanced imaging.
- Echocardiography is not indicated for most patients with isolated syncope.
- Echocardiography is indicated for pediatric patients with syncope and one or more of the following:
  - Exertional syncope
  - Unexplained post-exertional syncope
  - Abnormal EKG
  - First-degree relative with any of the following before age 50:
    - Sudden cardiac arrest or death
    - Pacemaker or implantable defibrillator placement
  - First-degree relative with cardiomyopathy
  - Known congenital heart disease
  - History of Kawasaki disease, or other coronary pathology.
  - Pathologic murmur, irregular rhythm, gallop, or click on physical examination
- Echocardiography is performed as part of the office visit. When evaluating a patient for the first time, it will not be known whether the patient has congenital heart disease or not. The cardiologist only submits charges for the procedure actually performed.
- The following echocardiography code combinations should be approved for evaluation of syncope:
  - CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
  - CPT® 93303, CPT® 93306
  - CPT® 93306
  - CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately.
- Repeat echocardiography is not indicated if the initial echocardiogram is normal unless one of the following conditions is present:
  - Increased severity or change in quality of the syncope
  - New signs or symptoms of cardiovascular disease other than syncope
  - New abnormality on EKG
- Cardiac MR is indicated for syncope if prior evaluation suggests any coronary artery abnormalities, cardiomyopathy, myocarditis or aortic dissection. Cardiac MR with stress should be approved if ischemia is suggested on prior evaluation.
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PEDCD-6.1: Kawasaki Disease Initial Imaging

- Kawasaki disease (KD) is the leading cause of acquired pediatric cardiac disease in the developed world. It is an acute febrile illness characterized by a medium vessel vasculitis, which predominantly affects the coronary arteries.
  - A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging.
  - Scheduled indicated follow-up imaging does not require 60 day contact, if indicated based on the below follow-up schedule.
  - Patients who do not fulfill the diagnostic criteria for classic KD may be considered to have incomplete (atypical) KD.
  - If Kawasaki disease is strongly suspected, treatment will often begin even before cardiac evaluation, since early treatment is associated with a lower risk for coronary aneurysm development.

- Echocardiography (CPT® 93306) is indicated for initial assessment for suspected or known Kawasaki disease
  - Coronary CTA (CPT® 75574), Cardiac MRI without contrast (CPT® 75557), Cardiac MRI without and with contrast (CPT® 75561), or MRA Chest (CPT® 71555) are indicated for evaluation of inconclusive echocardiogram findings, or significant coronary artery abnormalities.
  - Screening of other body areas for aneurysms is not routinely indicated in Kawasaki disease, but MRA or CTA (contrast as requested) of the affected body area can be approved for evaluation of signs or symptoms suggesting aneurysm development.
  - See acute and chronic phase for imaging
**PEDCD-6.2: Acute Phase**

- The acute phase of Kawasaki disease (KD) can last up to 4-6 weeks from the onset of fever until acute systemic inflammation has resolved and coronary artery dimensions are no longer expanding.

- Based on AHA recommendations, the following classifications are used in risk stratification of coronary artery abnormalities:
  - Z-Score classification accounts for the effects of body size and age through use of baseline coronary dimensions adjusted for body surface area. The Z score value represents the number of standard deviation above the mean. (e.g., \( z=0 \) pt. has coronary artery dimension value equal to mean, \( z=2 \) person has value 2 standard deviation above the mean, based on age, gender, BSA).
  - Coronary Artery Abnormalities Risk Classification based on Z-Score:
    1. No involvement at any time point (Z score always <2)
    2. Dilation only (Z score 2 to <2.5)
    3. Small aneurysm (Z score ≥2.5 to <5)
      - 3.1 - Current or persistent
      - 3.2 - Decreased to dilation only or normal luminal dimension
    4. Medium aneurysm (Z score ≥5 to <10, and absolute dimension <8 mm)
      - 4.1 - Current or persistent
      - 4.2 - Decreased to small aneurysm
      - 4.3 - Decreased to dilation only or normal luminal dimension
    5. Large and giant aneurysm (Z score ≥10, or absolute dimension ≥8 mm)
      - 5.1 - Current or persistent
      - 5.2 - Decreased to medium aneurysm
      - 5.3 - Decreased to small aneurysm
      - 5.4 - Decreased to dilation only or normal luminal dimension
  - Additional Clinical Features That May Increase the Long-Term Risk of Myocardial Ischemia:
    - Greater length and distal location of aneurysms that increase the risk of flow stasis
    - Greater total number of aneurysms
    - Greater number of branches affected
    - Presence of luminal irregularities
    - Abnormal characterization of the vessel wall (calcification, luminal myofibroblastic proliferation)
    - Presence of functional abnormalities (impaired vasodilation, impaired flow reserve)
    - Absence or poor quality of collateral vessels
    - Previous revascularization performed
    - Previous coronary artery thrombosis
    - Previous myocardial infarction
    - Presence of ventricular dysfunction

Echocardiography should be performed when the diagnosis of KD is considered, Uncomplicated patients, echocardiography can be repeated after treatment both: Within 1 to 2 weeks Within 4 to 6 weeks For patients with important and evolving coronary artery abnormalities (Z score >2.5) detected during the acute illness, more frequent echocardiography (at least twice per week) should be performed until luminal dimensions have stopped progressing to determine the risk for and presence of thrombosis. Expanding large or giant aneurysms: Twice per week while dimensions are expanding rapidly Once weekly after dimension is stabilized for the first 45 days of illness Then monthly until the third month after illness onset It is reasonable to obtain advanced imaging studies such as computed tomographic angiography (CTA), cardiac magnetic resonance imaging (CMRI), or invasive angiography on patients’ severe proximal coronary artery abnormalities in the acute phase when results will impact management decisions. Transesophageal echocardiography, invasive angiography, CMRI, and CTA can be of value in the assessment of selected patients but are not routinely indicated for diagnosis and management of the acute illness. Invasive angiography is rarely performed during the acute illness. Transesophageal echocardiography, CTA, and CMRI can be useful for the evaluation of older children and adolescents in whom visualization of the coronary arteries with transthoracic echocardiography is inadequate and results will impact immediate management decisions. These requests will be forwarded to Medical Director for evaluation Evaluation of potential aneurysmal involvement in other arterial beds can be assessed with CMRI, CTA, and, rarely, invasive angiography after recovery from the acute illness for patients with severe coronary artery involvement or symptoms or signs, such as the presence of a pulsatile axillary mass. All other requests during the acute phase will be forwarded for review Atypical or incomplete Kawasaki. Echo is indicated when atypical KD is being considered, may require repeat echocardiograms if treatment decisions will be affected by results (e.g., treating with ivig), if new signs or symptoms (such as typical peeling) develop.
PEDCD-6.3: Chronic phase

- Long-term management begins at the end of the acute illness, usually at 4 to 6 weeks after fever onset. Management is based on two pieces of data:
  - The dimensions of the largest Aneurysm at any point during the disease
  - The dimensions of the largest current aneurysm

- Additional risk factors that may be considered for imaging
  - Greater length and distal location of aneurysms that increase the risk of flow stasis
  - Greater total number of aneurysms
  - Greater number of branches affected
  - Presence of luminal irregularities
  - Abnormal characterization of the vessel wall (calcification, luminal myofibroblastic proliferation)
  - Presence of functional abnormalities (impaired vasodilation, impaired flow reserve)
  - Absence or poor quality of collateral vessels
  - Previous revascularization performed
  - Previous coronary artery thrombosis
  - Previous myocardial infarction
  - Presence of ventricular dysfunction
  - Long term routine surveillance in asymptomatic imaging for Kawasaki disease—see chart

- Long term routine surveillance in asymptomatic imaging for Kawasaki disease

<table>
<thead>
<tr>
<th>AHA risk level</th>
<th>Largest Aneurysm At Any Point</th>
<th>Largest Current Aneurysm</th>
<th>Routine Echo</th>
<th>Routine Stress Imaging</th>
<th>Routine Coronary Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
<td>All risk levels 4-6 weeks after acute illness</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>1</td>
<td>Normal</td>
<td>Normal</td>
<td>one echo 2-12 months after acute illness</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>2</td>
<td>Dilation</td>
<td>Dilation</td>
<td>6 months One year If dilation remains echo every 2-5 yrs until resolves.</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>3.1</td>
<td>Small</td>
<td>Small</td>
<td>6 months 2-12 months One echocardiogram at one year. No echocardiogram after one year</td>
<td>2-3 years</td>
<td>3-5 years</td>
</tr>
</tbody>
</table>
## Pedicatric Cardiac Imaging

<table>
<thead>
<tr>
<th>AHA risk level</th>
<th>Largest Aneurysm At Any Point</th>
<th>Largest Current Aneurysm</th>
<th>Routine Echo</th>
<th>Routine Stress Imaging</th>
<th>Routine Coronary Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.2</td>
<td>Small</td>
<td>Normal or dilated</td>
<td>6 months 12 months then yearly</td>
<td>3-5 years</td>
<td>none</td>
</tr>
<tr>
<td>4.1</td>
<td>Medium</td>
<td>Medium</td>
<td>3 months 6 months 12 months every 6-12 months after that</td>
<td>1-3 years</td>
<td>2-5 years</td>
</tr>
<tr>
<td>4.2</td>
<td>Medium</td>
<td>Small</td>
<td>6 months and 12 months, every 1 year.</td>
<td>2-3 years</td>
<td>3-5 years</td>
</tr>
<tr>
<td>4.3</td>
<td>Medium</td>
<td>Normal Or Dilated</td>
<td>every 1-2 yrs</td>
<td>2-4 years</td>
<td>none</td>
</tr>
<tr>
<td>5.1</td>
<td>Large</td>
<td>Large</td>
<td>1 month 3 months 6 months 9 months 12 months then every 3-6 months</td>
<td>6-12 months</td>
<td>at 2-6 months, every 1-5 years</td>
</tr>
<tr>
<td>5.2</td>
<td>Large</td>
<td>Medium</td>
<td>every 6-12 months</td>
<td>yearly</td>
<td>2-5 years</td>
</tr>
<tr>
<td>5.3</td>
<td>Large</td>
<td>Small</td>
<td>6-12 month</td>
<td>1-2 years</td>
<td>2-5 years</td>
</tr>
<tr>
<td>5.4</td>
<td>Large</td>
<td>Normal Or Dilation</td>
<td>1-2 years</td>
<td>2-5 years</td>
<td>none</td>
</tr>
</tbody>
</table>

- **Symptomatic patients**
  - Echocardiogram can be performed at any time with new or progressing cardiac symptoms
  - Stress imaging when there are new or progressing symptoms of ischemia or ventricular dysfunction
  - Invasive or coronary imaging [Coronary angiography (CT, MRI, invasive)] when the above studies are Positive, inconclusive, or otherwise lead to a conclusion that intervention is needed

References
PEDCD-7.0: Pediatric Pulmonary Hypertension General

- Pulmonary hypertension in children can be caused by cardiac, pulmonary, or systemic diseases, and idiopathic disease occurs as well.

- A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging.

- If pulmonary hypertension is suspected, initial evaluation should consist of chest x-ray, EKG, and echocardiography (CPT® 93306, or CPT® 93303, with CPT® 93320, and CPT® 93325, see: PEDCD-8.1: Transthoracic Echocardiography (TTE) Coding for echocardiography coding considerations).

- Repeat echocardiography intervals are variable depending on age of patient, etiology, and severity.
  - After a comprehensive initial evaluation, echocardiograms using PH-specific protocols may be performed every 4 to 6 months.
  - Echocardiography is indicated at any time for new or worsening symptoms or to evaluate a recent change in therapy.
  - Right heart and /or left heart catheterization may be utilized for PAH patients, including before and after initiation of PAH-targeted therapy, and for patients with concomitant congenital heart disease

- Chest CT (CPT® 71250) may be indicated in addition to Chest CTA (CPT® 71275) or Chest MRA (CPT® 71555) for initial evaluation of all pediatric patients with pulmonary hypertension to evaluate for pulmonary vascular or interstitial disease, or other intrathoracic causes.

- Cardiac MRI without and with contrast (CPT® 75561) is indicated for evaluation of inconclusive echocardiogram findings, or for monitoring right ventricular function during follow-up.

- Stress echocardiograms may be indicated (as in adult guidelines) see CD-2.7: Stress Echocardiography – Indications, other than ruling out CAD.
References
### PEDCD-8: Echocardiography – Other Indications

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<td>PEDCD-8.4: Transesophageal Echocardiography (TEE)</td>
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**PEDCD-8.1: Transthoracic Echocardiography (TTE) Coding**

- CPT® codes for echocardiography are listed in [PEDCD-1: General Guidelines](#).

<table>
<thead>
<tr>
<th>Echocardiogram coding Notes</th>
<th>CPT®</th>
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<tr>
<td>The most commonly performed study is a complete transthoracic echocardiogram with spectral and color flow Doppler (CPT® 93306).</td>
<td>93306</td>
</tr>
<tr>
<td>- CPT® 93306 includes CPT® 93320 and CPT® 93325, so those codes should not be approved along with CPT® 93306.</td>
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</table>
| Doppler codes (CPT® 93320, CPT® 93321, and CPT® 93325) are add-on codes and are assigned in addition to code for the primary procedure, and should not be approved alone. | +93320  
+93321  
+93325 |
| For a 2D transthoracic echocardiogram without Doppler, report CPT® 93307. | 93307 |
| A limited transthoracic echocardiogram is reported with CPT® 93308. | 93308 |
| - Limited transthoracic echocardiogram should be billed if the report does not “evaluate or document the attempt to evaluate” all of the required structures. | |
| - Unlike CPT® 93306, the Doppler CPT® 93321 and CPT® 93325 are not included with CPT® 93308. | |
| - CPT® 93321 (not CPT® 93320) should be reported with CPT® 93308 if Doppler is included in the study. | |
| - CPT® 93325 should also be reported with CPT® 93308 if color flow Doppler is included in the study. | |
| For patients with known congenital heart disease, a limited transthoracic echocardiogram is reported with CPT® 93304, +/- CPT® 93321 and CPT® 93325. | 93304 |

- Providers performing an initial echo on a pediatric patient will not know what procedure codes they will be reporting until the initial study is completed.
  - If congenital heart disease is found on the initial echo, a complete echo is reported with codes CPT® 93303, CPT® 93320, and CPT® 93325 because CPT® 93303 does NOT include Doppler and color flow mapping.
  - If no congenital issue is discovered, then CPT® 93306 is reported alone and includes 2-D, Doppler and color flow mapping.

- Since providers may not know the appropriate code/s that will be reported at the time of the pre-authorization request, they may request multiple codes.
  - The following echocardiography code combinations should be approved for any initial echocardiogram:
    - CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325
    - CPT® 93303, CPT® 93306
    - CPT® 93306
      - CPT® 93320 and CPT® 93325 are included with CPT® 93306 and should not be approved separately.
PEDCD-8.2: Initial Transthoracic Echocardiography (TTE) Indications

- In addition to indications listed in previous guideline sections, initial TTE evaluation is indicated for any of the following:
  - Any signs/symptoms that are possibly cardiac in nature, including (but not limited to) central cyanosis, dyspnea, edema, poor peripheral pulses, feeding difficulty, decreased urine output, hepatomegaly, or desaturation on pulse oximetry.
  - Abnormal EKG or cardiac biomarkers
  - Abnormal chest x-ray suggesting cardiovascular disease
  - Palpitations and one of the following:
    - Abnormal EKG
    - First-degree relative with any of the following before age 50:
      - Sudden cardiac arrest or death
      - Pacemaker or implantable defibrillator placement
    - First-degree relative with cardiomyopathy
  - Supraventricular Tachycardia (SVT), Ventricular Tachycardia, or Premature Ventricular Contractions (PVCs)
  - Known or suspected valvular dysfunction
  - Persistent systemic hypertension
  - Obesity (BMI > 30) with additional cardiovascular risk factors
  - Stroke
  - Renal failure
  - Preoperative evaluation of patients with chest wall deformities or scoliosis
  - Known or suspected vascular ring
  - Planned administration of cardiotoxic chemotherapy
    - Generally anthracyclines (doxorubicin, daunorubicin, mitoxantrone, idarubicin, epirubicin)
  - Planned radiation therapy involving heart muscle or hematopoietic stem cell transplant
  - Sickle cell disease or other hemoglobinopathy causing chronic anemia
  - Known or suspected vasculitis, acute rheumatic fever, or other systemic autoimmune disease
  - Muscular dystrophy
  - Metabolic, mitochondrial, and storage disorders
  - Abnormalities of cardiac or other viscera situs
  - Signs, symptoms, or blood culture suggestive of endocarditis
  - Known or suspected mass lesion involving the heart or great vessels
  - Known or suspected clot in atrium or ventricle
  - Known or suspected pulmonary hypertension
  - Known or suspected pericardial effusion
  - Complications during prenatal development:
    - Known or suspected cardiovascular abnormality on fetal echocardiogram
    - Maternal phenylketonuria (PKU)
    - Maternal diabetes with no fetal echo
    - Maternal teratogen exposure
    - Maternal infection during pregnancy with potential cardiac sequelae
- Genetic abnormality known to be associated with cardiovascular disease
- First-degree relative family history of:
  - Unexplained sudden death before age 50
  - Hypertrophic cardiomyopathy
  - Non-ischemic dilated cardiomyopathy
  - Genetic abnormality known to be associated with cardiovascular disease
  - Congenital left-sided heart lesion
  - Heritable pulmonary arterial hypertension

PEDCD-8.3: Repeat Transthoracic Echocardiography Indications

- Repeat echocardiograms may be required for patients with no new symptoms.
- In addition to indications listed in previous guideline sections, repeat TTE evaluation is indicated for any of the following:
  - New or worsening symptoms in a patient with known cardiac disease, previously normal echocardiogram with one of the following:
    - New or worsening cardiac symptoms
    - New EKG abnormality
    - Newly recognized family history suggestive of heritable heart disease
  - Every 12 months for patients age 12 to 18 years with first-degree family history of hypertrophic cardiomyopathy.
  - Patients who are status post heart transplant can have echocardiograms repeated as often as requested by heart transplant team.
  - Every 12 months for patients receiving active therapy for ventricular hypertrophy, valvular dysfunction, cardiomyopathy.
    - One time repeat TTE can be approved at 6 months to assess response to a change in therapy.
  - Every 12 months for patients with chronic pericardial effusions
  - Every 12 months for sickle cell disease or other hemoglobinopathy causing chronic anemia and one of the following:
    - High risk genotype (Hgb SS or Sß0, severe thalassemia, etc.)
    - History of acute chest syndrome or intrinsic lung disease
    - History of stroke
    - Receiving chronic transfusion therapy
  - As needed for monitoring cardiotoxicity during chemotherapy administration
  - After completion of chemotherapy and/or radiation therapy. See PEDONC-19.2: Cardiotoxicity and Echocardiography for imaging guidelines.

PEDCD-8.4: Transesophageal Echocardiography (TEE)

- Transesophageal echocardiography imaging indications in pediatric patients are identical to those for adult patients. See CD-2.5: Transesophageal Echocardiography (TEE) – Indications in the Cardiac Imaging Guidelines.
References


## PEDCD-9: Cardiac MRI – Other Indications

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**PEDCD-9.1: Cardiac MRI General Guidelines**

- Requests for cardiac MRI that contain only one CPT® code can be completed by the Nurse Reviewer. If the request contains more than one cardiac/chest MRI CPT® code, it should be forwarded for Medical Director Review.

**PEDCD-9.2: Cardiac MRI Coding**

<table>
<thead>
<tr>
<th>Cardiac MRI</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast.</td>
<td>75557</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences.</td>
<td>75561</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast; with stress imaging (rarely used in pediatrics).</td>
<td>75559</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without and with contrast and further sequences; with stress imaging (rarely used in pediatrics).</td>
<td>75563</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure).</td>
<td>+75565</td>
</tr>
</tbody>
</table>

- Only one procedure code from the set: CPT® 75557, CPT® 75559, CPT® 75561, and CPT® 75563 should be reported per session.

- Only one flow velocity measurement (CPT® +75565) should be reported per session.

**PEDCD-9.3: Indications for Cardiac MRI**

- In addition to indications listed in previous guideline sections, Cardiac MRI evaluation is indicated for any of the following, when a recent TTE is inconclusive:
  - Assessment of global ventricular function and mass if a specific clinical question is left unanswered by recent TTE and the MRI results will affect the management of the patient’s condition
  - Patients with complex congenital heart disease (e.g. Tetralogy of Fallot [TOF], single ventricle, truncus arteriosus, Transposition of the Great Arteries [TGA]) may require a baseline MRI, or routine cardiac MRI, especially as they approach their teenage years, due to poor imaging windows on echocardiogram, and the need for specific clinical information not seen on prior echocardiograms due to these known limitations, and these studies should be forwards to the medical director. Once these patients reach age 18, they can be imaging by adult congenital heart disease guideline.
  - Clinical suspicion of arrhythmogenic right ventricular dysplasia (ARVD) or arrhythmogenic cardiomyopathy (ARVC).
  - For pericardial disease (including constrictive pericarditis, restrictive pericarditis, and perimyocarditis), MRI should not be utilized to diagnose pericarditis but only to answer the question regarding possible constriction or restriction suggested clinically or by other techniques (TTE, etc.)
- MRI without and with contrast (CPT® 75561) is considered the optimal test for this disorder.
- Evaluate cardiac tumor or mass
  - MRI without and with contrast (CPT® 75561) is considered the optimal test for this disorder.
- Evaluate anomalous coronary artery
  - After echocardiogram, MRI without and with contrast (CPT® 75561) or CCTA (CPT® 75574) is considered the optimal test for this disorder.
- For Fabry’s disease, late enhancement MRI may predict the effect of enzyme replacement therapy on myocardial changes that occur with this disease.
  - MRI without and with contrast (CPT® 75561) is considered the preferred test for this disorder.
- Cardiac MRI can be performed to evaluate patients with congenital cardiomyopathy (muscular dystrophy, glycogen storage disease, fatty acid oxidation disorders, mitochondrial disorders, etc.) or unexplained cases of cardiomyopathy in order to characterize the myocardium.
- Cardiac stress perfusion study (CPT® 75559 or CPT® 75563) can be considered on a case by case basis for patients with any of the following:
  - Anomalous coronary artery
  - Kawasaki disease
  - TGA
  - Ross operation
  - or other disorder with the potential for coronary ischemia
  - Patients in whom an exercise stress test (EST) without imaging is indicated, but they cannot perform
  - Patients in whom an exercise stress test (EST) is equivocal, positive, or concern for a false negative
- Assessment of cardiac iron overload such as in hemochromatosis, thalassemia, sickle cell (either CPT® 75557 or CPT® 71550, T2* MRI, contrast not necessary).
  - Screening imaging may be approved every 12 months
  - Imaging may be approved every 3 months for treatment response in patients receiving active treatment (chelation +/- phlebotomy)
  - Frequently performed along with MRI Abdomen (CPT® 74181) to assess liver iron deposition. See PEDAB-18.2: Transfusion-Associated (Secondary) Hemochromatosis for additional imaging guidelines.
**PEDCD-9.4: Aortic Root and Aorta**

- For screening due to family history of aortic aneurysm or dissection, see: [PVD-2.2 Screening for Vascular related genetic connective tissue Disorders (Familial Aneurysm Syndromes/Spontaneous Coronary Artery Dissection (SCAD)/Ehlers-Danlos/Marfan/Loeys-Dietz)].

- For patients who have both cardiac and ascending aorta abnormalities (e.g., truncus arteriosus), the following studies may be indicated following TTE:
  - Cardiac MRI (CPT® 75557 or CPT® 75561) when TTE is inconclusive.
  - If aorta is involved, MRI Chest (CPT® 71552) or MRA Chest (CPT® 71555) is also indicated.

- For patients with aortic abnormalities without cardiac abnormalities, any of the following studies is indicated:
  - MRI Chest (CPT® 71552)
  - MRA Chest (CPT® 71555)

**PEDCD-9.5: Evaluation of Pericardial Effusion or Diagnosis of Pericardial Tamponade**

- Echocardiogram is the initial imaging study of choice to evaluate pericardial effusions or diagnose pericardial tamponade.

- If a specific clinical question is left unanswered by another recent imaging study and the answer to the clinical question will affect the management of the patient's clinical condition, contrast-enhanced cardiac MRI is useful for evaluating:
  - Pericarditis
  - Neoplastic effusion
  - Tamponade
  - Myocardial infiltration.

- Cancers that can metastasize to the pericardium or myocardium and can cause a malignant effusion include lung, breast, renal cell, lymphoma and melanoma.


References


**PEDCD-10: CT Heart and Coronary Computed Tomography Angiography (CCTA) – Other Indications**

| PEDCD-10.1: CT Heart and Coronary Computed Tomography Angiography (CCTA) General Considerations | 43 |
| PEDCD-10.2: Anomalous Coronary Artery | 43 |
| PEDCD-10.3: Indications for CCTA (CPT® 75574) | 44 |
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| PEDCD-10.5: Radiation Dose | 45 |
**PEDCD-10.1: CT Heart and Coronary Computed Tomography Angiography (CCTA) General Considerations**

- Metal artifact reduces the accuracy of CCTA. Devices that can cause this issue include, but are not limited to, surgical clips, pacemaker devices, defibrillator devices, and tissue expanders.
- Cardiac testing that does not involve exposure to ionizing radiation should be strongly considered.

**Practice Note**

<table>
<thead>
<tr>
<th>Relative Contraindications to CCTA Include:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Very obese patients (body mass index &gt; 40 kg/m²)</td>
</tr>
<tr>
<td>Elevated calcium score: CCTA should not be performed if there is extensive coronary calcification (calcium score &gt;1000).</td>
</tr>
<tr>
<td>Renal insufficiency</td>
</tr>
<tr>
<td>Inability to follow breath-holding instructions</td>
</tr>
</tbody>
</table>

**PEDCD-10.2: Anomalous Coronary Artery**

- Evaluating coronary artery anomalies and other complex congenital heart disease of cardiac chambers or great vessels is an appropriate indication for CCTA, or cardiac MRI
  - Report CPT® 75574 for evaluating coronary artery anomalies
  - Report CPT® 75573 for congenital heart disease
  - Can add CPT® 71275 (chest CTA) to evaluate great vessels
- Congenital anomalies of the coronary arteries are an important cause of sudden death in pediatric patients. Coronary arteries may arise from the wrong coronary artery cusp leading to ischemic changes during exercise. These lesions may be found incidentally during a murmur evaluation. Anomalous coronary arteries may be seen on echocardiogram during an evaluation for chest pain or syncope or palpitations. In addition patients with no echocardiographic findings, but symptoms concerning for angina chest pain may require stress testing. Patients who have positive echocardiographic findings, regardless of symptoms, and patients who have classical typical angina chest pain regardless of echocardiographic findings, may require treadmill stress testing, stress imaging, of advanced imaging such as Cardiac MRI, Stress echocardiogram, PET, Cardiac CT, and/or cardiac catheterization.
- Patients with congenital heart disease such as TOF, Truncus Arteriosus, and TGA have increased incidence of coronary artery anomalous and may require the above imaging as well
- Patients with confirmed coronary artery anomalies may require repeat imaging based on the clinical scenario
- The use of CCTA to rule out anomalous coronary artery should be limited to one of the following:
Patients who need to have an anomalous coronary artery mapped prior to an invasive procedure.
Patients who have not had a previous imaging study that clearly demonstrates an anomalous coronary artery
Patients with a history that includes one or more of the indications in **PEDCD-10.3: Indications for CCTA (CPT® 75574)**

**PEDCD-10.3: Indications for CCTA (CPT® 75574)**
- In addition to indications listed in previous guideline sections, CCTA is indicated for any of the following, when a recent TTE and/or MRI is inconclusive:
  - Persistent exertional chest pain and normal stress test
  - Full sibling(s) with history of sudden death syndrome before age 30 or with documented anomalous coronary artery
  - Resuscitated sudden death and contraindication to conventional coronary angiography
  - Unexplained new onset of heart failure if CCTA will replace conventional invasive coronary angiography
  - Documented ventricular tachycardia (6 beat runs or greater) if CCTA will replace conventional invasive coronary angiography
  - Equivocal coronary artery anatomy on conventional cardiac catheterization
  - In infants: otherwise unexplained dyspnea, tachypnea, wheezing, episodic pallor, irritability, sweating, poor feeding, and/or failure to thrive
    - The presence of other congenital heart disease is not a separate indication for CCTA to rule out anomalous coronary artery (except when coronary artery surgery is pending, i.e. Transposition of the great arteries, Tetralogy of Fallot, Truncus arteriosus, aortic root surgery)
  - Evaluation of the arterial supply and venous drainage in children with bronchopulmonary sequestration

**PEDCD-10.4: Indications for Cardiac CT (CPT® 75572)**
- In addition to indications listed in previous guideline sections, CCTA is indicated for any of the following, when a recent TTE and/or MRI is inconclusive:
  - Cardiac or pericardial mass
  - Pericarditis
  - Complications of cardiac surgery or evaluation of post-operative anatomy
  - Cardiac thrombus in patients with technically limited TTE, TEE, or MRI
  - Clinical suspicion of arrhythmogenic right ventricular dysplasia (ARVD) or arrhythmogenic cardiomyopathy (ARVC)
  - Native aortic abnormalities if echocardiogram is indeterminate
**PEDCD-10.5: Radiation Dose**

- ACR–NASCI–SPR Practice Parameter For The Performance And Interpretation Of Cardiac Computed Tomography (CT) states “Cardiac CT should be performed only for a valid medical indication and with the minimum radiation exposure that provides diagnostic image quality”

- ACR–NASCI–SPR Practice Parameter for the Performance of Quantification of Cardiovascular Computed Tomography (CT) And Magnetic Resonance Imaging (MRI) states “In younger patients, MRI may be the preferred modality, particularly when functional assessment with CT would require retrospective ECG gating and relatively high radiation doses. Further, the use of time-resolved MRA and phase contrast MRI methods offer significant advantages whose relative importance will depend on the specific application”

  - See table: Practice Estimate of Effective Radiation Dose chart for Selected Imaging Studies in *CD-1: General Guidelines*

**References**


| PEDCD-11: Cardiac Catheterization                  |  
|-----------------------------------------------|---|
| PEDCD-11.1: Cardiac Catheterization General Information | 48 |
| PEDCD-11.2: Cardiac Catheterization Indications | 49 |
### PEDCD-11.1: Cardiac Catheterization General Information

#### Cardiac Catheterization Procedure Codes

<table>
<thead>
<tr>
<th>Cardiac Cath Procedures</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Congenital Heart Disease Code “Set”</td>
<td>93530-93533</td>
</tr>
<tr>
<td>Right Heart Catheterization (CHD)</td>
<td>93530</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CHD)</td>
<td>93531</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CHD-TS)</td>
<td>93532</td>
</tr>
<tr>
<td>Right/Left Heart Catheterization (CAD-ASD)</td>
<td>93533</td>
</tr>
<tr>
<td>Anomalous coronary arteries, patent foramen ovale, mitral valve prolapse, and bicuspid aortic valve</td>
<td>93451-93464, 93566-93568</td>
</tr>
<tr>
<td>RHC without LHC or coronaries</td>
<td>93451</td>
</tr>
<tr>
<td>LHC without RHC or coronaries</td>
<td>93452</td>
</tr>
<tr>
<td>RHC and retrograde LHC without coronaries</td>
<td>93453</td>
</tr>
<tr>
<td>Native coronary artery catheterization;</td>
<td>93454</td>
</tr>
<tr>
<td>with bypass grafts</td>
<td>93455</td>
</tr>
<tr>
<td>with RHC</td>
<td>93456</td>
</tr>
<tr>
<td>with RHC and bypass grafts</td>
<td>93457</td>
</tr>
<tr>
<td>with LHC</td>
<td>93458</td>
</tr>
<tr>
<td>with LHC and bypass grafts</td>
<td>93459</td>
</tr>
<tr>
<td>with RHC and LHC</td>
<td>93460</td>
</tr>
<tr>
<td>with RHC and LHC and bypass grafts</td>
<td>93461</td>
</tr>
<tr>
<td>LHC by trans-septal or apical puncture</td>
<td>+93462</td>
</tr>
<tr>
<td>Angiography of non-coronary arteries and veins performed as a distinct service</td>
<td></td>
</tr>
</tbody>
</table>

Select appropriate codes from the Radiology and Vascular Injection Procedures sections.

CPT® 93530 to 93533 are appropriate for invasive evaluation of congenital heart disease

- These guidelines apply to individuals with stable conditions and who are not in the acute setting. Individuals in acute settings or with unstable angina should be handled as medical emergencies.

- Pediatric catheterizations are done for many purposes, including diagnosis and intervention of congenital and acquired heart disease.

- When device placement is planned (ASD/VSD device, transcatheter valve implantation, pda device), the procedure codes for those devices include all cardiac catheterization(s), intraprocedural contrast injection(s), fluoroscopic radiological supervision and interpretation, and imaging guidance performed to complete the procedure. For coarctation or aortic arch stenting, or other endovascular procedures with no intracardiac issues that require clarification by left heart cath, a left heart cath is not required along with these endovascular procedures. A right heart cath can be approved for pulmonary artery interventions (e.g., stents, coils).
PEDCD-11.2: Cardiac Catheterization Indications

• Diagnostic catheterization is indicated:
  • When other advanced imaging has failed to resolve a clinical issue and results will impact patient management
  • For preoperative assessment in complex heart disease
    ▪ Norwood procedure
    ▪ Bidirectional Glenn shunt
    ▪ Fontan procedure
    ▪ Pulmonary atresia
  • Pulmonary hypertension
  • With some interventions such as:
    ▪ Valvuloplasty
    ▪ Stents
  • See PEDCD-6.1: Kawasaki Disease Initial Imaging for specific intervals in Kawasaki Disease
  • On a patient who is having a device placed when:
    ▪ A diagnostic catheterization, or stenting is needed in addition to the device
    ▪ The diagnostic catheterization is indicated separate from the device placement

References
### Procedure Codes Associated with Cardiac or PVD Imaging

<table>
<thead>
<tr>
<th>MRI/MRA</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast material</td>
<td>75557</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast material; with stress imaging</td>
<td>75559</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences</td>
<td>75561</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for morphology and function without contrast material(s), followed by contrast material(s) and further sequences; with stress imaging</td>
<td>75563</td>
</tr>
<tr>
<td>Cardiac magnetic resonance imaging for velocity flow mapping (List separately in addition to code for primary procedure)</td>
<td>75565</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CT</th>
<th>CPT®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Computed tomography, heart, without contrast material, with quantitative evaluation of coronary calcium</td>
<td>75571</td>
</tr>
<tr>
<td>Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology (including 3D image postprocessing, assessment of cardiac function, and evaluation of venous structures, if performed)</td>
<td>75572</td>
</tr>
<tr>
<td>Computed tomography, heart, with contrast material, for evaluation of cardiac structure and morphology in the setting of congenital heart disease (including 3D image postprocessing, assessment of LV cardiac function, RV structure and function and evaluation of venous structures, if performed)</td>
<td>75573</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission, analysis of fluid dynamics and simulated maximal coronary hyperemia, generation of estimated FFR model, with anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
<td>0501T</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; data preparation and transmission</td>
<td>0502T</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; analysis of fluid dynamics and simulated maximal coronary hyperemia, and generation of estimated FFR model</td>
<td>0503T</td>
</tr>
<tr>
<td>Noninvasive estimated coronary fractional flow reserve (FFR) derived from coronary computed tomography angiography data using computation fluid dynamics physiologic simulation software analysis of functional data to assess the severity of coronary artery disease; anatomical data review in comparison with estimated FFR model to reconcile discordant data, interpretation and report</td>
<td>0504T</td>
</tr>
<tr>
<td>Procedure</td>
<td>CPT®</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Computed tomographic angiography, heart, coronary arteries and bypass grafts (when present), with contrast material, including 3D image postprocessing (including evaluation of cardiac structure and morphology, assessment of cardiac function, and evaluation of venous structures, if performed)</td>
<td>75574</td>
</tr>
<tr>
<td>Computed tomographic angiography, abdominal aorta and bilateral iliofemoral lower extremity runoff, with contrast material(s), including noncontrast images, if performed, and image postprocessing</td>
<td>75635</td>
</tr>
<tr>
<td><strong>Computed tomographic angiography (CTA)</strong></td>
<td></td>
</tr>
<tr>
<td>Determination of central c-v hemodynamics (non-imaging) (eg, ejection fraction with probe technique) with or without pharmacologic intervention or exercise, single or multiple determinations</td>
<td>78414</td>
</tr>
<tr>
<td>Cardiac shunt detection</td>
<td>78428</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), single study; with concurrently acquired computed tomography transmission scan</td>
<td>78429</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); single study, at rest or stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan</td>
<td>78430</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion study (including ventricular wall motion[s] and/or ejection fraction[s], when performed); multiple studies at rest and stress (exercise or pharmacologic), with concurrently acquired computed tomography transmission scan</td>
<td>78431</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability);</td>
<td>78432</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), combined perfusion with metabolic evaluation study (including ventricular wall motion[s] and/or ejection fraction[s], when performed), dual radiotracer (eg, myocardial viability); with concurrently acquired computed tomography transmission scan</td>
<td>78433</td>
</tr>
<tr>
<td>Absolute quantitation of myocardial blood flow (AQMBF), positron emission tomography (PET), rest and pharmacologic stress (List separately in addition to code for primary procedure)</td>
<td>78434</td>
</tr>
<tr>
<td>Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)</td>
<td>78451</td>
</tr>
<tr>
<td>Myocardial perfusion imaging, tomographic (SPECT) (including attenuation correction, qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection</td>
<td>78452</td>
</tr>
<tr>
<td>Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); single study, at rest or stress (exercise or pharmacologic)</td>
<td>78453</td>
</tr>
<tr>
<td>Procedure</td>
<td>Code</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Myocardial perfusion imaging, planar (including qualitative or quantitative wall motion, ejection fraction by first pass or gated technique, additional quantification, when performed); multiple studies, at rest and/or stress (exercise or pharmacologic) and/or redistribution and/or rest reinjection</td>
<td>78454</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), metabolic evaluation study (including ventricular wall motion and/or ejection fraction, when performed), single study</td>
<td>78459</td>
</tr>
<tr>
<td>Myocardial imaging, infarct avid, planar; qualitative or quantitative</td>
<td>78466</td>
</tr>
<tr>
<td>Myocardial imaging, infarct avid, planar; with ejection fraction by first pass technique</td>
<td>78468</td>
</tr>
<tr>
<td>Myocardial imaging, infarct avid, planar; tomographic SPECT with or without quantification</td>
<td>78469</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium; planar, single study at rest or stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without additional quantitative processing</td>
<td>78472</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium; multiple studies, wall motion study plus ejection fraction, at rest and stress (exercise and/or pharmacologic), with or without additional quantification</td>
<td>78473</td>
</tr>
<tr>
<td>Cardiac blood pool imaging (planar), first pass technique; single study, at rest or with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification</td>
<td>78481</td>
</tr>
<tr>
<td>Cardiac blood pool imaging (planar), first pass technique; multiple studies, at rest and with stress (exercise and/or pharmacologic), wall motion study plus ejection fraction, with or without quantification</td>
<td>78483</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion (including ventricular wall motion and/or ejection fraction, when performed); single study at rest or stress (exercise or pharmacologic)</td>
<td>78491</td>
</tr>
<tr>
<td>Myocardial imaging, positron emission tomography (PET), perfusion (including ventricular wall motion and/or ejection fraction, when performed); multiple studies at rest and/or stress (exercise or pharmacologic)</td>
<td>78492</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium, SPECT, at rest, wall motion study plus ejection fraction, with or without quantitative processing</td>
<td>78494</td>
</tr>
<tr>
<td>Cardiac blood pool imaging, gated equilibrium, single study, at rest, with right ventricular ejection fraction by first pass technique (List separately in addition to code for primary procedure)</td>
<td>78496</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging Limited area</td>
<td>78800</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging Multiple areas</td>
<td>78801</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging Whole Body</td>
<td>78802</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging SPECT</td>
<td>78803</td>
</tr>
<tr>
<td>Radiopharmaceutical Localization Imaging Whole Body, requiring 2 or more days imaging</td>
<td>78804</td>
</tr>
<tr>
<td>Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment</td>
<td>0331T</td>
</tr>
<tr>
<td>Myocardial sympathetic innervation imaging, planar qualitative and quantitative assessment; with tomographic SPECT</td>
<td>0332T</td>
</tr>
<tr>
<td>Procedure</td>
<td>CPT</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Transthoracic echocardiography for congenital cardiac anomalies; complete</td>
<td>93303</td>
</tr>
<tr>
<td>Transthoracic echocardiography for congenital cardiac anomalies; follow-up or limited study</td>
<td>93304</td>
</tr>
<tr>
<td>Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, with spectral Doppler echocardiography, and with color flow Doppler echocardiography</td>
<td>93306</td>
</tr>
<tr>
<td>Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, complete, without spectral or color Doppler echocardiography</td>
<td>93307</td>
</tr>
<tr>
<td>Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, follow-up or limited study</td>
<td>93308</td>
</tr>
<tr>
<td>Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); including probe placement, image acquisition, interpretation and report</td>
<td>93312</td>
</tr>
<tr>
<td>Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); placement of transesophageal probe only</td>
<td>93313</td>
</tr>
<tr>
<td>Echocardiography, transesophageal, real-time with image documentation (2D) (with or without M-mode recording); image acquisition, interpretation and report only</td>
<td>93314</td>
</tr>
<tr>
<td>Transesophageal echocardiography for congenital cardiac anomalies; including probe placement, image acquisition, interpretation and report</td>
<td>93315</td>
</tr>
<tr>
<td>Transesophageal echocardiography (TEE) for congenital cardiac anomalies; placement of transesophageal probe only</td>
<td>93316</td>
</tr>
<tr>
<td>Transesophageal echocardiography for congenital cardiac anomalies; placement of transesophageal probe only</td>
<td>93317</td>
</tr>
<tr>
<td>Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); complete</td>
<td>93320</td>
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<tr>
<td>Doppler echocardiography, pulsed wave and/or continuous wave with spectral display (List separately in addition to codes for echocardiographic imaging); follow-up or limited study (List separately in addition to codes for echocardiographic imaging)</td>
<td>93321</td>
</tr>
<tr>
<td>Doppler echocardiography color flow velocity mapping (List separately in addition to codes for echocardiography)</td>
<td>93325</td>
</tr>
<tr>
<td>Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report;</td>
<td>93350</td>
</tr>
<tr>
<td>Echocardiography, transthoracic, real-time with image documentation (2D), includes M-mode recording, when performed, during rest and cardiovascular stress test using treadmill, bicycle exercise and/or pharmacologically induced stress, with interpretation and report; including performance of continuous electrocardiographic monitoring, with supervision by a physician or other qualified health care professional</td>
<td>93351</td>
</tr>
<tr>
<td>Use of echocardiographic contrast agent during stress echocardiography (List separately in addition to code for primary procedure)</td>
<td>+ 93352</td>
</tr>
<tr>
<td>Procedure Description</td>
<td>Code</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Myocardial strain imaging using speckle tracking-derived assessment of myocardial</td>
<td>+ 93356</td>
</tr>
<tr>
<td>mechanics (List separately in addition to codes for echocardiography imaging)</td>
<td></td>
</tr>
<tr>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with</td>
<td>C8921</td>
</tr>
<tr>
<td>contrast, for congenital cardiac anomalies; complete</td>
<td></td>
</tr>
<tr>
<td>Transthoracic echocardiography with contrast, or without contrast followed by with</td>
<td>C8922</td>
</tr>
<tr>
<td>contrast, for congenital cardiac anomalies; follow-up or limited study</td>
<td></td>
</tr>
<tr>
<td>Transthoracic echocardiography with contrast, real-time with image documentation</td>
<td>C8923</td>
</tr>
<tr>
<td>(2D), includes M-mode recording, when performed, complete, without spectral or color</td>
<td></td>
</tr>
<tr>
<td>doppler echocardiography</td>
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<tr>
<td>Transthoracic echocardiography with contrast, real-time with image documentation</td>
<td>C8924</td>
</tr>
<tr>
<td>(2D), includes M-mode recording when performed, follow-up or limited study</td>
<td></td>
</tr>
<tr>
<td>Transesophageal echocardiography (TEE) with contrast, or without contrast followed</td>
<td>C8925</td>
</tr>
<tr>
<td>by with contrast, real-time with image documentation (2D) (with or without M-mode</td>
<td></td>
</tr>
<tr>
<td>recording); including probe placement, image acquisition, interpretation and report</td>
<td></td>
</tr>
<tr>
<td>Transesophageal echocardiography (TEE) with contrast, or without contrast followed</td>
<td>C8926</td>
</tr>
<tr>
<td>by with contrast, for congenital cardiac anomalies; including probe placement, image</td>
<td></td>
</tr>
<tr>
<td>acquisition, interpretation and report</td>
<td></td>
</tr>
<tr>
<td>Transthoracic echocardiography with contrast, real-time with image documentation</td>
<td>C8928</td>
</tr>
<tr>
<td>(2D), includes M-mode recording when performed, during rest and cardiovascular</td>
<td></td>
</tr>
<tr>
<td>stress test using treadmill, bicycle exercise and/or pharmacologically induced</td>
<td></td>
</tr>
<tr>
<td>stress, with interpretation and report</td>
<td></td>
</tr>
<tr>
<td>Transthoracic echocardiography with contrast, real-time with image documentation</td>
<td>C8929</td>
</tr>
<tr>
<td>(2D), includes M-mode recording when performed, complete, with spectral doppler</td>
<td></td>
</tr>
<tr>
<td>echocardiography, and with color flow doppler echocardiography</td>
<td></td>
</tr>
<tr>
<td>Transthoracic echocardiography, with contrast, real-time with image documentation</td>
<td>C8930</td>
</tr>
<tr>
<td>(2D), includes M-mode recording when performed, during rest and cardiovascular</td>
<td></td>
</tr>
<tr>
<td>stress test using treadmill, bicycle exercise and/or pharmacologically induced</td>
<td></td>
</tr>
<tr>
<td>stress, with interpretation and report; including performance of continuous</td>
<td></td>
</tr>
<tr>
<td>electrocardiographic monitoring, with physician supervision</td>
<td></td>
</tr>
<tr>
<td>Myocardial contrast perfusion echocardiography, at rest or with stress, for</td>
<td>+ 0439T</td>
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<tr>
<td>assessment of myocardial ischemia or viability (List separately in addition to code</td>
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<td>for primary procedure)</td>
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<td>RHC without LHC or coronaries</td>
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<tr>
<td>RHC and retrograde LHC without coronaries</td>
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<tr>
<td>Native coronary artery catheterization;</td>
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<td>with bypass grafts</td>
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<td>with RHC</td>
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<td>LHC by transseptal or apical puncture</td>
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## Pediatric Chest Imaging Guidelines

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<td><strong>MRI</strong></td>
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<tr>
<td>MRI Chest with contrast (rarely used)</td>
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<td>MRI Chest without and with contrast</td>
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<td><strong>MRA</strong></td>
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<td>PET Imaging: whole body (this code not used in pediatrics)</td>
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<td>PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)</td>
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<tr>
<td>Quantitative Differential Pulmonary Perfusion, Including Imaging When Performed</td>
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<td><strong>Ultrasound</strong></td>
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<tr>
<td>Ultrasound, axilla</td>
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<tr>
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<tr>
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PEDCH-1.1: Pediatric Chest Imaging Age Considerations

- Many conditions affecting the chest in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are <18 years old should be imaged according to the Pediatric Chest Imaging Guidelines, and patients who are ≥18 years old should be imaged according to the Adult Chest Imaging Guidelines, except where directed otherwise by a specific guideline section.

PEDCH-1.2: Pediatric Chest Imaging Appropriate Clinical Evaluation

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the chest is not supported. Advanced imaging of the chest should only be approved in patients who have documented active clinical signs or symptoms of disease involving the chest.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the chest are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

PEDCH-1.3: Pediatric Chest Imaging Modality General Considerations

- MRI
  - MRI Chest is generally performed without and with contrast (CPT® 71552) unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonate) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
Recent evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast. The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.

- If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently.
- The presence of surgical hardware or implanted devices may preclude MRI.
- The selection of best examination may require coordination between the provider and the imaging service.

CT
- CT Chest is generally performed either with contrast (CPT® 71260) or without contrast (CPT® 71250).
  - There are no generally accepted pediatric indications for CT Chest without and with contrast (CPT® 71270).
- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
- The selection of best examination may require coordination between the provider and the imaging service.

Ultrasound
- Ultrasound chest (CPT® 76604) or axilla (CPT® 76882) is indicated as an initial study for evaluating adenopathy, palpable chest wall lesions, pleural effusion or thickening, patency of thoracic vasculature, and diaphragm motion abnormalities.
- For those patients who do require advanced imaging, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the patient.

Nuclear Medicine
- Nuclear medicine studies other than PET/CT are rarely used in evaluation of the pediatric chest.
- Pulmonary Ventilation-Perfusion Imaging (CPT® 78582) has been replaced by CTA Chest (CPT® 71275) or CT Chest with contrast (CPT® 71260), but can be approved for evaluation of suspected pulmonary embolism if CT is unavailable.
  - See **CH-25: Pulmonary Embolism (PE)** in the Chest Imaging Guidelines.
- Pulmonary Perfusion Imaging (CPT® 78580) should generally not be approved in lieu of CPT® 78582 for initial evaluation of suspected pulmonary embolism, but can be approved for follow up of an equivocal or positive recent ventilation-perfusion lung scan (CPT® 78582) to evaluate for interval change.
Pulmonary Ventilation Imaging (CPT® 78579) should not be approved in lieu of CPT® 78582 for evaluation of suspected pulmonary embolism, but can be approved for additional evaluation of an abnormal perfusion-only scan (CPT® 78580).

Pulmonary split crystal function study (CPT® 78597 or CPT® 78598), also known as Quantitative Differential Pulmonary Perfusion, is indicated for preoperative planning of segmental, lobar, or lung resection.

Quantitative Differential Pulmonary Perfusion Lung Scan (CPT® 78597 or CPT® 78598), can be performed for post lung transplant patients to detect regional perfusion abnormalities.

Radiopharmaceutical nuclear medicine imaging of an inflammatory process (CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803) is rarely performed, but is indicated for evaluation of sarcoidosis or toxicity from drug toxicity (cyclophosphamide, busulfan, bleomycin, amiodarone, or nitrofurantoin).

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References
2. ACR Practice parameter for performing and interpreting of magnetic resonance imaging (MRI) Revised 2017 (Resolution 10).

19. ACR–SPR–STR PRACTICE PARAMETER FOR THE PERFORMANCE OF PULMONARY SCINTIGRAPHY, Revised 2018 (Resolution 30)

PEDCH-2: Lymphadenopathy

Axillary lymphadenopathy imaging indications in pediatric patients are identical to those for adult patients. See CH-2.2: Axillary Lymphadenopathy (and Mass) in the Chest Imaging Guidelines.

Supraclavicular adenopathy in pediatric patients is almost always pathologic, and advanced imaging is indicated prior to excisional biopsy. Fine needle aspiration, while common in adults prior to advanced imaging, is inappropriate for evaluating lymphadenopathy in pediatric patients. Any of the following studies may be approved for evaluation of supraclavicular adenopathy in children:
- CT Chest with contrast (CPT® 71260).
- MRI Chest without and with contrast (CPT® 71552).
- Ultrasound chest (CPT® 76604).

If malignancy is suspected, see the appropriate imaging guidelines as below:
- Soft tissue sarcoma: PEDONC-8: Pediatric Soft Tissue Sarcomas in the Pediatric Oncology Imaging Guidelines.

Reference
Mediastinal Mass

The causes of mediastinal masses in children are generally different than those in adults, and the imaging considerations are different.

▷ Chest x-ray is indicated as an initial study for all patients with suspected mediastinal mass.

▷ CT Chest with contrast (CPT® 71260) is indicated for any pediatric patient with a mediastinal mass identified on Chest x-ray.
  ◦ Masses can be very large and anterior masses frequently cause compression of the trachea and/or mediastinal blood vessels.

▷ MRI Chest without and with contrast (CPT® 71552) is indicated for any pediatric patient with:
  ◦ A posterior (paravertebral) mediastinal mass on CT Chest that invades the spinal canal.
  ◦ CT findings are inconclusive regarding specific anatomy.
  ◦ MRI should not be used for patients with large anterior mediastinal masses if anesthesia is necessary to complete the study.

▷ PET/CT (CPT® 78815) is indicated prior to biopsy in pediatric patients if lymphoma is known or strongly suspected or there is evidence of tracheal compression on CT imaging. See PEDONC-5: Pediatric Lymphoma in the Pediatric Oncology Imaging Guidelines

▷ MIBG (CPT® 78800, CPT® 78802, CPT® 78803, or CPT® 78804) is indicated and can be approved prior to biopsy in pediatric patients if neuroblastoma is known or strongly suspected. See PEDONC-6: Neuroblastoma in the Pediatric Oncology Imaging Guidelines

▷ Ultrasound (CPT® 76604) can be approved in children younger than 5 years old to distinguish prominent but otherwise normal thymus from true mediastinal mass.

▷ A single repeat CT Chest with contrast (CPT® 71260) can be approved to confirm stability and avoid biopsy for patients with NONE of the following features:
  ◦ Anterior mediastinal mass.
  ◦ Enlarged lymph nodes anywhere in the imaging field.
  ◦ Lymphopenia.
  ◦ Pleural effusion.

References

PEDCH-4.1: Hemoptysis – Imaging

True hemoptysis is rare in pediatric patients, and a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging.

- Aspirated blood from epistaxis or emesis frequently presents as hemoptysis, and history and physical examination will aid in this assessment.

- Chest x-ray is indicated as an initial study for stable patients.
  - Advanced imaging is not indicated for patients with epistaxis and a normal chest radiograph and no personal or family history of underlying lung disease or bleeding disorder.
  - CT Chest with contrast (CPT® 71260) is indicated for all other pediatric patients with hemoptysis.
    - CT Chest without contrast (CPT® 71250) can be approved for patients with a documented allergy to CT contrast or significant renal dysfunction.

- MRI is not indicated in the evaluation of pediatric hemoptysis.

References

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**PEDCH-5.1: Cystic Fibrosis**

- Chest x-ray is the primary study for initial evaluation of acute clinical symptoms in patients with cystic fibrosis.
- CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is indicated for the following (without initial Chest x-ray):
  - Hemoptysis.
  - Pneumonia worsening despite antibiotic therapy.
  - Pleural effusion or empyema.
  - Suspected fungal pneumonia.
  - Monitoring treatment changes on bronchiectasis.
  - Expiratory CT for evaluating small airways disease.
  - Pre- and post-lung transplant evaluation.
- Low dose CT Chest without contrast (CPT® 71250) is indicated every 2 years for monitoring of bronchiectasis and small airways disease.

**PEDCH-5.2: Bronchiectasis Not Associated with Cystic Fibrosis**

- Bronchiectasis not associated with cystic fibrosis is rare in pediatric patients, and imaging indications are identical to those for adult patients. See **CH-7: Bronchiectasis** in the Chest Imaging Guidelines.

**References**

PEDCH-6: Bronchiolitis

Bronchiolitis is a self-limiting viral infection causing inflammation of the small airways, most common in infants under 12 months of age.

- Chest x-rays are indicated when there is a clinical suspicion of pneumonia or other complications.

- Advanced imaging is not indicated for routine evaluation or monitoring of bronchiolitis, but CT Chest with contrast (CPT® 71260) can be approved for the following:
  - Pleural effusion or empyema on recent Chest x-ray.
  - Immunocompromised patient with acute pulmonary symptoms.
  - Abnormality on recent Chest x-ray suggesting condition other than bronchiolitis.

References


PEDCH-7: Pneumonia

- Pneumonia imaging indications in pediatric patients are very similar to those for adult patients. See CH-13: Pneumonia in the Chest Imaging Guidelines.

- Pediatric-specific imaging considerations include the following:
  - CT Chest with contrast (CPT® 71260) for immunocompromised patients with acute pulmonary symptoms.
  - CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) for patients with recurrent lower respiratory tract infections.
  - Ultrasound chest (CPT® 76604) can be approved for evaluation of complicated or recurrent childhood pneumonia.

References

The Fleischner Society guidelines for solitary pulmonary nodule management do not apply to pediatric patients. An incidental solitary pulmonary nodule in a child representing a primary lung carcinoma has never been reported in the literature. Similarly, an extrathoracic malignancy presenting with an incidental solitary pulmonary nodule in an otherwise healthy child is very rare.

- CT Chest with contrast (CPT® 71260) as a one-time evaluation for all children with a pulmonary nodule incidentally discovered on other imaging.

- Follow up imaging of incidental solitary pulmonary nodules in asymptomatic healthy children is not necessary.
  - Follow up imaging is indicated for the following:
    - Immunosuppressed patients.
    - Malignancy (see below).
    - Invasive infection.
    - New or worsening pulmonary symptoms.

- Children with a malignant solid tumor who have pulmonary nodules of any size should have imaging according to the guideline section for the specific cancer type. See Pediatric Oncology Imaging Guidelines for specific imaging indications.

- This guideline section does not apply to multiple pulmonary nodules, which are imaged according to the underlying disorder in pediatric patients.

**Practice Notes**

A nodule is any pulmonary or pleural lesion that is a discrete, spherical opacity 2-30 mm in diameter surrounded by normal lung tissue. A larger nodule is called a mass. Entities that are not nodules, and are considered benign, include non-spherical linear, sheet-like, two-dimensional or scarring opacities.

**References**

PEDCH-9: Positive PPD or Tuberculosis

- Positive PPD and tuberculosis imaging indications in pediatric patients are similar to those for adult patients. See CH-14.1: PPD or TB (Mycobacterium tuberculosis and Mycobacterium avium complex (MAC)) in the Chest Imaging Guidelines.

- Pediatric-specific imaging considerations include the following:
  - MRI Spine with and without contrast can be approved at symptomatic levels in patients with concern for spinal involvement of tuberculosis.

References
**PEDCH-10: Asthma**

- Chest x-ray is indicated when the patient's condition does not respond to standard therapy, to identify complications, such as pneumonia or to rule out other causes of respiratory distress.

- Advanced imaging is not indicated for routine evaluation or monitoring of asthma, but CT Chest without (CPT® 71250) or with (CPT® 71260) contrast can be approved for the following:
  - Pleural effusion or empyema on recent Chest x-ray.
  - Immunocompromised patient with acute pulmonary symptoms.
  - Abnormality on recent Chest x-ray suggesting condition other than asthma, including suspected foreign body.
  - Asthma and poor response to bronchodilators or conventional inhaled corticosteroid therapy in whom associated conditions, such as allergic bronchopulmonary aspergillosis and eosinophilic pneumonia can mimic asthma.

**References**

CT Chest without contrast (CPT® 71250), MRI Chest with and without contrast (CPT® 71552), or MRI Chest without contrast (CPT® 71550) is indicated in patients with a pectus deformity for:

- Preoperative planning.
- Significant cardiac displacement after Chest x-ray and echocardiography (CPT® 93306).
- Evidence of pulmonary impingement after Chest x-ray and pulmonary function tests (PFTs) if there is increasing shortness of breath. **Note:** It may not be possible to obtain PFTs in children younger than 9 years old.
- Evaluation of congenital heart disease or Marfan’s syndrome when suspected in those patients with pectus deformities.

**References**

PEDCH-12: Breast Masses

- See PEDONC-17: Pediatric Breast Masses in the Pediatric Oncology Imaging Guidelines.
## PEDCH-13: Vascular Malformations

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<td>PEDCH-13.2: Other Vascular Malformations</td>
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</table>
PEDCH-13.1: Vascular Ring

Vascular rings generally present with either respiratory symptoms (stridor, wheezing, tachypnea, cough) or feeding difficulties (dysphagia, slow feeding, hyperextension of the head while feeding, weight loss, failure to thrive) but can also be discovered incidentally on imaging obtained for other purposes.

➢ Chest x-ray is the recommended initial study in patients with respiratory symptoms.
➢ Barium esophagram is the recommended initial study in patients with feeding difficulties.
➢ CT Chest with contrast (CPT® 71260), CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) can be approved in patients with known or suspected vascular ring after Chest x-ray or barium esophagram.
➢ Echocardiogram can be approved to rule out associated congenital heart disease.
   ❖ CPT® 93303, CPT® 93306, CPT® 93320, and CPT® 93325 can be approved for initial evaluation of patients with vascular ring and no prior echocardiograms.

PEDCH-13.2: Other Vascular Malformations

See PEDCH-14.2: Pulmonary Arteriovenous Malformations for Pulmonary AVMs.


References
PEDCH-14: Congenital Lung Diseases

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| PEDCH-14.2: Pulmonary Arteriovenous Malformations | 25 |
PEDCH-14.1: Congenital Cystic Lung Diseases

This section includes common congenital cystic lung lesions such as:

- Bronchogenic cyst
- Congenital pulmonary airway malformation (congenital cystic adenomatoid malformation)
- Congenital lobar overinflation

Cystic Lung disease may be first identified on prenatal ultrasound, or discovered incidentally on Chest x-ray.

Chest x-ray is indicated before considering advanced imaging.

CT Chest with contrast (CPT® 71260) may be approved when Chest x-ray suggests a cystic lung lesion.

MRI Chest with and without contrast (CPT® 71552) can be approved if CT is inconclusive or if requested for pre-operative planning

PEDCH-14.2: Pulmonary Arteriovenous Malformations

Pulmonary arteriovenous malformations (PAVMs) are vascular structures that most commonly result from abnormal communication between pulmonary arteries and pulmonary veins.

- Chest x-ray are indicated as an initial imaging modality for patients with known AVMs, or patients presenting with hypoxemia and/or hemoptysis
- CTA or MRA may be approved in patients with known AVM or abnormal Chest x-ray suggesting AVM for treatment planning

References

# Pediatric Head Imaging

## Procedure Codes Associated with Head Imaging

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Pediatric Head Imaging Age Considerations

Many conditions affecting the head in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are <18 years old should be imaged according to the pediatric head imaging guidelines and patients who are ≥18 years old should be imaged according to the adult head imaging guidelines, except where directed otherwise by a specific guideline section.

Pediatric Head Imaging Appropriate Clinical Evaluation

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering the use of an advanced imaging (CT, MRI, Nuclear Medicine) procedure. An exception can be made if the patient is undergoing a guideline-supported, scheduled follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the head is not supported. Advanced imaging of the head is only indicated in patients who have documented active clinical signs or symptoms of disease involving the head.

- Advanced imaging of the head is not indicated for evaluation of recurrent isolated vomiting in patients without associated headache or focal neurologic findings unless a gastrointestinal workup (labs, imaging, and endoscopy) does not reveal a cause.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the head are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

Requests for Studies with Overlapping Fields

- There are many CPT® codes for imaging the head that have significantly overlapping fields. In the majority of cases where multiple head CPT® codes are requested, only one CPT® code should be approved unless there is clear documentation of a need for the additional codes to cover all necessary body areas.

- See HD-1.1: General Guidelines - Anatomic Issues in the Head Imaging Guidelines for the correct coding of these studies.
PEDHD-1.3: Pediatric Head Imaging Modality General Considerations

MRI
- MRI is the preferred modality for imaging the pediatric head unless otherwise stated in a specific guideline section.
- Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years) as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
  - MRI procedures can be performed without and/or with contrast use as supported by these condition based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
  - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
  - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
  - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.

CT
- CT is generally inferior to MRI for imaging the pediatric head, but has specific indications in which it is the preferred modality listed in specific sections of these guidelines.
- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.

Ultrasound
- Cranial ultrasound (CPT® 76506) is a non-invasive means of evaluating for intracranial abnormalities in infants with an open anterior fontanelle.
- Transcranial Doppler ultrasonography has some utility in select populations of older children with known or suspected intracranial vascular disease.
Nuclear Medicine

Nuclear medicine studies other than metabolic PET imaging on the pediatric brain or head are rarely performed in an elective outpatient setting, but the following studies can be approved when requested for the following indications:

- Brain Scintigraphy with or without vascular flow (any one of CPT® codes: CPT® 78600, CPT® 78601, CPT® 78605, or CPT® 78606)
  - Establish brain death (rarely done in outpatient setting).
- Radiopharmaceutical Localization Imaging SPECT (CPT® 78803)
  - Immunocompromised patients with mass lesion detected on CT or MRI for differentiation between lymphoma and infection.
- Brain Imaging Vascular Flow (CPT® 78610)
  - Cerebral ischemia.
  - Establish brain death (rarely done in outpatient setting).
- CSF Leakage Detection (CPT® 78650)
  - Evaluation of CSF rhinorrhea or otorrhea, or refractory post-lumbar puncture headache.
- Radiopharmaceutical Dacryocystography (CPT® 78660)
  - Suspected obstruction of nasolacrimal duct due to excessive tearing.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References

# PEDHD-2: Specialized Imaging Techniques

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**PEDHD-2.1: Magnetic Resonance Spectroscopy (MRS, CPT® 76390)**

Magnetic Resonance Spectroscopy involves the analysis of the levels of certain chemicals in pre-selected voxels (small regions) on an MRI scan done at the same time.

Uses in pediatric neuro-oncology: See **PEDONC-4: Pediatric CNS Tumors** in the Pediatric Oncology Imaging Guidelines.

**Uses in Metabolic Disorders:**

- These cases should be forwarded for Medical Director Review.
- MRS is indicated in patients with neonatal hypoxic ischemic encephalopathy to help estimate the age of the injury.
- MRS is associated with disease-specific characteristics findings and is indicated for diagnosis and disease monitoring in the following metabolic disorders:
  - Canavan disease.
  - Creatine deficiency.
  - Nonketotic hyperglycinemia.
  - Maple Syrup Urine disease.
- MRS has nonspecific abnormal patterns that can aid in the diagnosis of the following metabolic disorders, but is not routinely indicated for disease monitoring:
  - Metachromatic leukodystrophy.
  - Pelizaeus-Merzbacher disease.
  - Hypomyelination and Congenital Cataract.
  - Globoid Cell Leukodystrophy (Krabbe disease).
  - X-linked adrenoleukodystrophy.
  - Mitochondrial disorders.
  - Alexander disease.
  - Megalencephalic leukoencephalopathy with subcortical cysts.
  - Vanishing White Matter disease.
- MRS can be approved for disease monitoring of these diagnoses when recent MRI findings are inconclusive and a change in therapy is being considered.
- MRS is considered investigational for all other pediatric indications at this time.

**PEDHD-2.2: Functional Magnetic Resonance Imaging (fMRI, CPT® 70554 and CPT® 70555)**

- These cases should be forwarded for Medical Director Review.
- fMRI is indicated to define eloquent areas of the brain as part of preoperative planning for epilepsy surgery or removal of a mass lesion.
  - The documentation should be clear that brain surgery is planned.
  - Can be approved concurrently with MRI Brain (CPT® 70551 or CPT® 70553) and/or PET Brain Metabolic (CPT® 78608 or CPT® 78609).
- fMRI is considered investigational for all other pediatric indications at this time.
PEDHD-2.3: PET Brain Imaging (CPT® 78608 and CPT® 78609)

- These cases should be forwarded for Medical Director Review.
- Uses in pediatric neuro-oncology: See PEDONC-4: Pediatric CNS Tumors in the Pediatric Oncology Imaging Guidelines.
- PET Brain is indicated to define active areas of the brain as part of preoperative planning for epilepsy surgery.
  - The documentation should be clear that brain surgery is planned.
  - Can be approved concurrently with MRI Brain (CPT® 70551 or CPT® 70553) and/or fMRI (CPT® 70554 or CPT® 70555).
- PET Brain is considered investigational for all other pediatric indications at this time.

References
PEDHD-3: Pediatric Headache

Headache is a very common complaint in school aged children and adolescents. Many of these children have a family history of one of the primary headache disorders, such as migraine or tension headache.

- A recent (within 60 days) evaluation including a detailed headache history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering advanced imaging.

- Advanced imaging is not indicated for pediatric patients with headache in the absence of red flag symptoms. Sensitivity and specificity of MRI are greater than that of CT for intracranial lesions.

- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for children with headaches and at least ONE of the following red flags:
  - Age ≤5 years.
  - Headaches awakening from sleep or always present in the morning.
  - Focal findings on neurologic examination including diplopia.
  - Clumsiness (common description of gait or coordination problems in young children).
  - Headaches associated with morning nausea/vomiting.
  - New onset of seizure activity with focal features.
  - Papilledema on physical exam.
  - Headache precipitated by coughing, sneezing, or Valsalva.
  - Thunderclap headache.
  - Progressive worsening in headache frequency and severity without period of temporary improvement.
  - Systemic symptoms such as persistent fever, weight loss, rash, or joint pain.
  - Immunocompromised patient.
  - Patient with hypercoagulable state or bleeding disorder.
  - Known history of cancer of any type.
  - Known autoimmune or rheumatologic disease.
  - Known genetic disorder with predisposition to intracranial mass lesions.
  - History of stable chronic headaches with recent significant change in frequency or severity.

- Patients requiring sedation should generally have MRI studies without and with contrast. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

- CT Head poorly visualizes the posterior fossa in children and is generally insufficient to evaluate pediatric headaches with red flag symptoms. CT should not be approved in lieu of MRI solely to avoid sedation.

- CT Head without contrast is indicated for pediatric headache with one or more of the following:
  - Recent head trauma.
  - Suspected skull or other bony involvement.
  - MRI is contraindicated due to implantable device or rapid clinical deterioration.
- Ventriculoperitoneal shunt with suspected shunt malfunction. See PEDHD-7: Macrocephaly, Microcephaly, and Hydrocephalus for additional imaging.

- Unless MRI is contraindicated, MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) can be approved if a recent CT is inconclusive.

- MRA Head or CTA Head are not generally medically necessary in the evaluation of headache in children unless a vascular lesion has been seen or suspected on a prior MRI Brain or CT Head.
  - Concurrent approval of both MRI and MRA is generally not indicated.

- MRV Head (CPT® 70544, CPT® 70545, or CPT® 70546) is indicated in pediatric patients with papilledema and headache. See HD-17: Papilledema/Pseudotumor Cerebri in the Head Imaging Guidelines.

References

### PEDHD-4: Pediatric Head and Face Trauma

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**PEDHD-4.1: Head Trauma**

In patients with recent head trauma, a history focused on the incident and careful examination of the head, neck, and neurological function should be performed prior to considering advanced imaging.

- Advanced imaging is indicated for children with head trauma with ANY of the following red flags:
  - Loss of consciousness
  - Altered mental status
  - Known or suspected skull fracture
  - Glasgow Coma Score <15
  - Age younger than 2 years
  - Vomiting
  - Severe mechanism of injury
  - Severe or worsening headache
  - Amnesia
  - Nonfrontal scalp hematoma

- CT Head without contrast (CPT® 70450) is the primary advanced imaging study in patients with acute head trauma.
  - CT Maxillofacial without contrast (CPT® 70486), CT Orbits/Temple Bone without contrast (CPT® 70480), or CT Cervical Spine without contrast (CPT® 72125) is indicated if there has been associated injury to those structures.

- MRI Brain without contrast (CPT® 70551) is indicated for the following:
  - Children with an abnormal neurological exam that is not explained by the CT findings.
  - Children suspected of being the victims of physical abuse. See **PEDMS-7: Suspected Physical Child Abuse** in the Pediatric Musculoskeletal Imaging Guidelines.

- Following a head injury, a repeat CT Head without contrast (CPT® 70450) or MRI Brain without contrast (CPT® 70551) is indicated if the child develops fixed or fluctuating diminished mental acuity or alertness, or new abnormalities on neurological examination.

- Follow-up of known or treated parenchymal subdural or epidural hematoma may require frequent imaging during the initial 8 weeks following injury, and these requests should generally be approved.
  - These cases should be forwarded for Medical Director Review.
**PEDHD-4.2: Facial Trauma**

- CT without contrast is the preferred imaging study in facial trauma.

**Coding of Facial Imaging**

Both CT Orbital/Facial Bone (CPT® 70480) and CT Maxillofacial (CPT® 70486) cover the structures of the orbits, sinuses, and face. Unless there is a grounded suspicion of simultaneous involvement of more posterior lesions, especially of the region involving the middle or inner ear, one of these studies only should be sufficient.

CT Maxillofacial (CPT® 70486) is the usual study (except in obvious orbital or temporal bone trauma), but either study is appropriate.

**References**

# PEDHD-5: Sinusitis and Allergic Rhinitis

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**PEDHD-5.1: General Considerations**

- Acute sinusitis is a clinical diagnosis, and imaging is not indicated to establish a diagnosis. Acute bacterial sinusitis can be presumptively diagnosed in a child with acute upper respiratory infection (URI) symptoms and any of the following:
  - Persistent symptoms lasting >10 days without improvement.
  - Worsening symptoms after initial period of improvement.
  - Severe symptoms including purulent nasal discharge and fever >102.2°F for at least 3 consecutive days.
  - Presumed bacterial infections should be treated empirically with appropriate antibiotics.
  - Imaging of any kind cannot distinguish bacterial from viral sinusitis.

**PEDHD-5.2: Imaging Indications in Sinusitis**

- Mild mucosal thickening in the paranasal sinuses or mastoids is an extremely common incidental finding noted on head imaging studies done for other indications. If there are no other abnormalities of facial structures noted, this finding is not an indication for advanced imaging of the sinuses or temporal bone.

- **CT Sinuses without contrast (CPT® 70486)** is indicated if ANY of the following is present:
  - No improvement after 10 days of appropriate antibiotic treatment.
  - Generally this will be amoxicillin/clavulanate, amoxicillin, cefdinir, cefuroxime, cefpodoxime, or ceftriaxone.
  - Recurrence of a treated infection within 8 weeks of effective treatment.
  - Chronic sinusitis (persistent residual URI symptoms for >90 days).
  - Known or suspected fungal sinusitis.
  - Preoperative evaluation to assess surgical candidacy.

- **CT Sinuses with contrast (CPT® 70487)** can be performed if ANY of the following is present:
  - Orbital or facial cellulitis.
  - Proptosis.
  - Abnormal visual examination.
  - Ophthalmoplegia.
  - Cystic fibrosis.
  - Immunocompromised patient.
  - Fungal or vascular lesions visualized in nasal cavity.

- **CT Head with contrast (CPT® 70460)** or MRI Brain without and with contrast (CPT® 7053) is indicated if ANY of the following are present:
  - Focal neurologic findings.
  - Altered mental status.
  - Seizures.
  - Concern for orbital complications.
  - Concern for invasive fungal sinusitis.
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) can be approved with these findings as well if there is clinical concern for
associated vascular complications including but not limited to mycotic aneurysm or venous sinus thrombosis.

- Repeat sinus imaging is generally not indicated for patients who have responded satisfactorily to treatment, but can be approved with clear documentation of the need for updated CT results to direct acute patient care decisions.
  - These cases should be forwarded for Medical Director Review.

**PEDHD-5.3: Stereotactic CT Localization (CPT® 77011)**

Stereotactic CT localization is frequently obtained prior to sinus surgery. The dataset is then loaded into the navigational workstation in the operating room for use during the surgical procedure. The information provides exact positioning of surgical instruments with regard to the patient’s 3D CT images. In most cases, the preoperative CT is a technical-only service that does not require interpretation by a radiologist.

- The imaging facility should report CPT® 77011 when performing a scan not requiring interpretation by a radiologist.
- If a diagnostic scan is performed and interpreted by a radiologist, the appropriate diagnostic CT code (e.g. CPT® 70486) should be used.
- It is not appropriate to report both CPT® 70486 and CPT® 77011 for the same CT stereotactic localization imaging session.
- 3D Rendering (CPT® 76376 or CPT® 76377) should not be reported in conjunction with CPT® 77011 (or CPT® 70486 if used). The procedure inherently generates a 3D dataset.
- Such operative studies are indicated when ordered by the operating surgeon for this purpose.

**PEDHD-5.4: Requests for both Head and Sinus Imaging**

- CT Head does not visualize all of the sinuses.
- MRI Brain provides excellent visualization of the sinuses sufficient to recognize sinusitis, and addition of sinus CT for this purpose is unnecessary.
- In patients being evaluated for potential sinus surgery, separate CT Sinus is often appropriate even after a MRI Brain in order to visualize obstructions to spontaneous mucous flow. See **PEDHD-5.3: Stereotactic CT Localization (CPT® 77011)**.
- Separate head imaging is not generally indicated in patients with a normal neurological examination who have headaches associated with sinus symptoms.
- CT or MRI Sinus is not indicated for the evaluation of headaches or neurological complaints without a more specific indication pointing to a sinus etiology.

**PEDHD-5.5: Allergic Rhinitis**

- Advanced imaging is not indicated for diagnosis or management of patients with uncomplicated allergic rhinitis.
PEDHD-5.6: Other Indications for Sinus Imaging

See PEDHD-4.2: Facial Trauma for imaging guidelines in trauma.

- Congenital anomalies of facial structures - CT Maxillofacial without contrast (CPT® 70486).

- 3D CT reconstructed images (CPT® 76377) in conjunction with routine CT should be an integral part of the examination in evaluating craniofacial abnormalities.

- Tumors or other disorders of facial structures - CT Maxillofacial without and with contrast (CPT® 70488) or MRI Orbits/Face/Neck without and with contrast (CPT® 70543).

- Obstructive sleep apnea See PEDHD-24: Pediatric Sleep Disorders for imaging guidelines.

References
PEDHD-6: Epilepsy and Other Seizure Disorders

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PEDHD-6: Epilepsy and Other Seizure Disorders
A recent (within 60 days) face to face evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering the use of an advanced imaging (CT, MRI, Nuclear Medicine) procedure. An exception can be made if the patient is undergoing guideline-supported, scheduled follow-up imaging evaluation. This clinical evaluation should also include family history and (whenever possible) the accounts of eyewitnesses to the event(s).

PEDHD-6.1: Initial Imaging of Non-Febrile Seizures

- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for the following:
  - First-time seizure in child that has no known cause and is not associated with fever.
  - Partial seizures.
  - Focal neurologic deficits.
  - Inconclusive findings on recent cranial ultrasound or CT Head.
    - If patient meets criteria for MRI imaging for initial imaging of non-febrile seizure, MRI is approvable even with a recent negative CT.
    - Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

- CT Head without contrast (CPT® 70450) is indicated for the following:
  - First-time seizure in child associated with recent head trauma.
  - Patient cannot safely undergo MRI (avoidance of sedation is not an indication).

- Cranial ultrasound (CPT® 76506) can be approved for the following:
  - First-time seizure in child <12 months of age that has no known cause and is not associated with fever if the infant has an open fontanelle.

The following imaging tests do not generally add valuable information initially and are not indicated for the initial evaluation of seizures in children:

- CTA Head or Neck.
- MRA Head or Neck.
- MRI Cervical, Thoracic, or Lumbar Spine.
**PEDHD-6.2: Repeat imaging indications**

- Repeat MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for the following:
  - Need to perform MRI using Epilepsy Protocol (typically 3T magnet with thin section angled slices through hippocampus and temporal lobes, either without or without and with contrast).
  - New or worsening focal neurologic deficits.
  - Increase in severity or frequency of seizures despite documented therapeutic antiepileptic drug levels.
  - Change in seizure type.
  - Preoperative evaluation for epilepsy surgery.
  - Patients requiring sedation should generally not have non-contrast MRI studies. See **PEDHD-1.3: Pediatric Head Imaging Modality General Considerations**.

**PEDHD-6.3: Special Imaging Studies in Evaluation for Epilepsy Surgery**

For patients with a previous MRI Brain and documentation of intractable epilepsy for which surgical treatment or another interventional modality is under active consideration, ANY of the following are indicated for preoperative planning:

- These cases should be forwarded for Medical Director Review
- PET Brain Metabolic (CPT® 78608 or CPT® 78609).
- Functional MRI Brain (CPT® 70554 or CPT® 70555).
- MR Spectroscopy (CPT® 76390).

**PEDHD-6.4: Febrile Seizures**

A typical febrile seizure is a generalized seizure occurring in the presence of fever (T >100.4°F) and no central nervous system infection in a child between the age of 6 months and 5 years.

- Neuroimaging should not be performed in the routine evaluation of children with simple febrile seizures.
- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for febrile seizures in the presence of one or more of the following:
  - Seizure lasting >15 minutes.
  - Partial seizures.
  - Focal neurologic deficits.
  - Multiple seizures within 24 hours.
  - Macrocephaly (Head circumference that is greater than the 95th percentile for age and sex, established by use of measurements and CDC growth charts. See **PEDHD-7.1: Macrocephaly**)
  - Signs and symptoms of increased intracranial pressure.
References

PEDHD-7: Macrocephaly, Microcephaly, and Hydrocephalus

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**PEDHD-7.1: Macrocephaly**

Macrocephaly is defined as head circumference that is greater than the 95\textsuperscript{th} percentile for age and sex, established by use of measurements and CDC growth charts. An online calculator to determine head circumference percentile is available at: [http://www.infantchart.com/cdc0to3headforage.php](http://www.infantchart.com/cdc0to3headforage.php).

**Birth to age 12 months:**
- Ultrasound Head (CPT\textsuperscript{®} 76506) is indicated initially in patients with an open fontanelle.
- If hydrocephalus or hemorrhage is present on ultrasound, CT Head without contrast (CPT\textsuperscript{®} 70450) is indicated.
- For any abnormality seen on ultrasound, MRI Brain without contrast (CPT\textsuperscript{®} 70551) or without and with contrast (CPT\textsuperscript{®} 70553) is indicated.

**Age 13 months and older, or with closed fontanelle:**
- MRI Brain without contrast (CPT\textsuperscript{®} 70551) or without and with contrast (CPT\textsuperscript{®} 70553) is indicated.
- CT is generally not indicated in this age group since uncomplicated hydrocephalus is less likely after early infancy.

**PEDHD-7.2: Microcephaly**

- Microcephaly is defined as head circumference that is less than the 5\textsuperscript{th} percentile for age and sex, established by use of measurements and CDC growth charts. An online calculator to determine head circumference percentile is available at: [http://www.infantchart.com/cdc0to3headforage.php](http://www.infantchart.com/cdc0to3headforage.php).
- MRI Brain without and with contrast (CPT\textsuperscript{®} 70553) is indicated for all patients.
  - CT is generally not recommended as that modality lacks the sensitivity to detect the relevant anatomical abnormalities.

**PEDHD-7.3: Hydrocephalus**

- This is the most common identifiable cause of macrocephaly. Almost all hydrocephalus is obstructive, except hydrocephalus due to choroid plexus papillomas. See **PEDONC-4.13: Choroid Plexus Tumors** in the Pediatric Oncology Imaging Guidelines for those lesions.
- Hydrocephalus is traditionally divided into non-communicating (the obstruction lies within the course of the brain’s ventricular system) and communicating (the obstruction is distal to the ventricular system).
- Patients requiring sedation should generally not have non-contrast MRI studies. See **PEDHD-1.3: Pediatric Head Imaging Modality General Considerations**.
**Initial Imaging Indications**

**Age 0-6 months:**
- Screening head ultrasound examination (CPT® 76506)
- If ultrasound shows hydrocephalus, MRI Brain without and with contrast (CPT® 70553) is indicated.
- Serial US (CPT® 76506) can be used to monitor ventricular size to determine need and timing of placement of a ventricular catheter, or performance of an endoscopic third ventriculostomy (ETV).

**Greater than 6 months old:**
- MRI Brain without and with contrast (CPT® 70553) is indicated.

**Spine imaging:**
- MRI Spine without and with contrast (CPT® 72156, CPT® 72157, and CPT® 72158) may be indicated in individuals with Chiari malformation (multiple spine segments), Dandy-Walker malformation (cervical spine only), or malignant infiltration of the meninges.

**Repeat Imaging Indications**
- Rapid MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is indicated for any new signs or symptoms suggesting shunt malfunction (or ETV malfunction, including (but not limited to) sepsis, decreased level of consciousness, protracted vomiting, visual or neurologic deterioration, decline of mentation after initial improvement, or new or changing pattern of seizures.
- Rapid MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is indicated in the postoperative period following shunt placement or ETV, with further follow-up imaging 6-12 months after the procedure and then every 12 months for patients with stable clinical findings.
  - Rapid MRI provides more anatomical detail and does not involve radiation exposure, but many providers use CT Head as rapid MRI is not universally available.
  - For routine follow up imaging with CT a low dose protocol should be used.

- Shunting into the peritoneum (VP shunts) can give rise to abdominal complications, but these are generally symptomatic, so surveillance imaging of the abdomen is not indicated.
  - Abdominal ultrasound (CPT® 76700) can be approved for suspicion of CSF pseudocyst formation or distal shunt outlet obstruction.

- Familial screening is not indicated for hydrocephalus except in siblings of individuals with aqueductal stenosis, for whom a one-time CT Head without contrast (CPT® 70450) or Rapid MRI Brain without contrast (CPT® 70551) is indicated.
Additional Rarely Used Studies

- Cisternogram (CPT® 78630) is rarely done in children but can be approved for the following:
  - Known hydrocephalus with worsening symptoms.
  - Suspected obstructive hydrocephalus.
  - Suspected normal pressure hydrocephalus with gait disturbance and either dementia or urinary incontinence.

- Cerebrospinal Ventriculography (CPT® 78635) is rarely done in children but can be approved for the following:
  - Evaluation of internal shunt, porencephalic cyst, or posterior fossa cyst.

- Nuclear Medicine Shunt Evaluation (CPT® 78645) and CSF Flow SPECT (CPT® 78803) are rarely done in children but can be approved for the following:
  - Suspected malfunction of ventriculoperitoneal, ventriculopleural, or ventriculovenous shunts.

References

PEDHD-8.1: Imaging

Craniosynostosis is the premature closure of one or more cranial sutures, usually during infancy. Abnormal head shape is the common clinical feature.

- Skull x-rays should be obtained prior to considering advanced imaging.
- CT Head without contrast (CPT® 70450) is indicated in the diagnosis of craniosynostosis, with reported sensitivity near 100%. CT also detects associated intracranial pathology.
- 3D rendering (CPT® 76376 or CPT® 76377) is indicated with the initial diagnostic CT to evaluate the extent of synostosis and determine surgical candidacy or for preoperative planning.
- CT Maxillofacial (CPT® 70486) and CT Orbits (CPT® 70480) without contrast are generally not necessary to evaluate patients with craniosynostosis but are indicated if the craniosynostosis is part of a larger congenital defect which also involves the bones of the face or orbit.
- Ultrasound Head (CPT® 76506) can be approved as an alternative method of assessing sutural patency in neonates and infants when radiographs are indeterminate. If inconclusive or for pre-operative planning, CT with 3D rendering can be approved as discussed previously in this section.
- A postoperative CT Head without contrast (CPT® 70450) may be performed at the discretion of the specialist coordinating the patient’s care.

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**PEDHD-9.1: Chiari I Malformations**

This involves caudal displacement or herniation of the cerebellar tonsils. Chiari I may be associated with syringomyelia, and rarely with hydrocephalus. Most cases are asymptomatic and discovered incidentally on a head scan performed for another indication. When symptoms are present, they are usually nonspecific but can include headache, lower cranial nerve palsies, or sleep apnea.

- For initial evaluation, MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) and MRI of the entire spine without contrast (CPT® 72141, CPT® 72146, CPT® 72148) or without and with contrast (CPT® 72156, CPT® 72157, CPT® 72158) is indicated.

- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

- Repeat MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for patients with a known Chiari I malformation when any of the following are present:
  - There are new or worsening signs or symptoms documented on a physical examination within 60 days of the imaging request.
  - A surgical procedure is actively being considered.

- Repeat MRI Spine imaging is not indicated for patients with normal initial spine imaging unless there are new or worsening signs or symptoms that suggest spinal cord pathology documented on a physical examination within 60 days of the imaging request.
  - These cases should be forwarded for Medical Director Review.

- Repeat brain and spine imaging in individuals with Chiari I malformations and known syringomyelia or hydromyelia is highly individualized and is indicated at the discretion of the specialist coordinating the patient’s care for this condition.
  - These cases should be forwarded for Medical Director Review.

- Familial screening is not indicated for Chiari I Malformations.

**PEDHD-9.2: Chiari II Malformations (Arnold Chiari Malformation)**

These malformations are more severe than Chiari I malformations. These patients usually present at birth. Myelomeningocele is always present, and syringomyelia and hydrocephalus are extremely common.

- Ultrasound is the initial examination in infants to determine ventricular size and associated anomalies and to provide a baseline for follow up evaluation.

- For initial advance imaging evaluation, MRI Brain without and with contrast (CPT® 70553) and MRI of the entire spine without and with contrast (CPT® 72156, CPT® 72157, CPT® 72158) is indicated.

- Repeat brain and spine imaging in individuals with Chiari II malformations is highly individualized and is indicated at the discretion of the specialist coordinating the patient’s care for this condition.
  - These cases should be forwarded for Medical Director Review.
Familial screening is not indicated for Chiari II Malformations.

**PEDHD-9.3: Chiari III and IV Malformations**

Chiari III malformation includes cerebellar herniation into a high cervical myelomeningocele. Chiari IV malformation refers to complete cerebellar agenesis. Both Chiari III and IV malformations are noted at birth, and are rarely compatible with life.

- Repeat brain and spine imaging in individuals with Chiari III and IV malformations is highly individualized and is indicated at the discretion of the specialist coordinating the patient’s care for this condition.
  - These cases should be forwarded for Medical Director Review.

- Familial screening is not indicated for Chiari III or IV Malformations.

**PEDHD-9.4: Basilar Impression**

Basilar impression involves malformation of the occipital bone in relation to C1-2 (cervical vertebrae 1 and 2). The top of the spinal cord is inside the posterior fossa and the foramen magnum is undersized. Over time, this can lead to brain stem and upper spinal cord compression. Basilar impression can also be associated with the Chiari malformation, producing very complex anatomical abnormalities.

- MRI Brain (CPT® 70551) and Cervical Spine (CPT® 72141) without contrast are indicated.
- If surgery is being considered, CT Head (CPT® 70450) and Cervical Spine (CPT® 72125) without contrast are also indicated.
- Basilar impression appears to be genetic, and one-time screening of first-degree relatives with MRI Brain without contrast (CPT® 70551) can be approved.

**PEDHD-9.5: Platybasia**

Platybasia is a flattening malformation of the skull base, in which the clivus has a horizontal orientation.

- Patients are usually asymptomatic, but either MRI Brain without contrast (CPT® 70551) or CT Head without contrast (CPT® 70450) is indicated to establish a diagnosis when clinically suspected.
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PEDHD-10.1: Pediatric Intracranial Aneurysms

Unlike adults, the majority of pediatric aneurysms are caused by genetic or developmental defects rather than environmental or lifestyle factors.

Pediatric aneurysms most commonly present with subarachnoid hemorrhage, headache, increased intracranial pressure, seizure activity, or focal neurologic findings.

- A recent (within 60 days) evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

- For patients presenting with suspected subarachnoid hemorrhage, CT Head without contrast (CPT® 70450) or MRI Brain without contrast (CPT® 70551) is indicated as an initial study.

  - If subarachnoid hemorrhage is present on CT or MRI, or lumbar puncture findings suggest hemorrhage, additional imaging with CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) is indicated.

- For patients presenting with headache, increased intracranial pressure, seizures, or focal neurologic findings, MRI Brain without and with contrast (CPT® 70553) is indicated as an initial study.

  - If findings suspicious for intracranial aneurysm are present on MRI, additional imaging with CTA Head (CPT® 70496) or MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) is indicated.

- For patients with known unruptured aneurysm presenting with headache, increased intracranial pressure, seizures, or focal neurologic findings, MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) and MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) are indicated.

- For patients with treated aneurysms, CTA Head (CPT® 70496) is preferred.

- For patients with any of the following conditions and headache, increased intracranial pressure, seizures, or focal neurologic findings, MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) and MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) are indicated:
  - Polycystic kidney disease.
  - Fibromuscular dysplasia.
  - Ehlers-Danlos Syndrome.
  - Klippel-Trenaunay-Weber Syndrome.
  - Tuberous Sclerosis.
  - Moyamoya Syndrome.
  - Hereditary Hemorrhagic Telangiectasia (Osler-Weber-Rendu Syndrome).
  - Pseudoxanthoma elasticum.
  - Neurofibromatosis type 1.

- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.
The timing of follow-up imaging for intracranial aneurysms in children is similar to that in adults. See **HD-12.1: Intracranial Aneurysms** in the Head Imaging Guidelines.

Screening MRI Brain or MRA Head for aneurysms is not supported in asymptomatic patients under age 20 since only 0.6 % of ruptured aneurysms occur in the pediatric age range.

Screening MRI Brain or MRA Head for aneurysms is not supported in patients with coarctation of the aorta repaired before age 3 since there is not an increased risk for intracranial aneurysm in this patient population.

**PEDHD-10.2: Pediatric Intracranial Arteriovenous Malformations (AVM)**

A recent (within 60 days) evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

Most intracranial AVMs are congenital, vary widely in their location and type, and are discovered at birth due to associated clinical findings or incidentally later in life. Certain hereditary conditions are associated with an increased risk for AVM development.

Vascular malformations include arteriovenous, venous, cavernous, and capillary malformations. The vein of Galen malformation is the most common arteriovenous malformation, presenting in neonates with signs of high output congestive heart failure or later in infancy of childhood with signs of hydrocephalus. Low flow venous, cavernous, and capillary malformations may be asymptomatic and discovered incidentally or they may present in childhood with seizures or neurologic findings secondary to intracranial hemorrhage.

Ultrasound Head (CPT® 76506) is the study of choice for evaluation of a suspected vein of Galen malformation in the neonate. Once confirmed, MRI or conventional angiography are required to precisely identify the feeding arteries and draining vein, especially if embolization is planned.

MRA or CTA are indicated for diagnosis of low flow malformations.

MRI Brain without and with contrast (CPT® 70553) is the initial study of choice for evaluation of suspected AVM after the neonate period.

- Patients requiring sedation should generally not have non-contrast MRI studies. See **PEDHD-1.3: Pediatric Head Imaging Modality General Considerations**.
- MRA, CTA, or CT are generally not indicated prior to completion of initial MRI.

For patients with known AVM, MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553), and MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) or CTA Head (CPT® 70496) are indicated in the following circumstances:

- New or worsening headaches, seizures, or focal neurologic symptoms.
- Preoperative planning (including embolization).
Head imaging for AVM screening is indicated for the following conditions:

- Hereditary Hemorrhagic Telangiectasia (Osler-Weber-Rendu Syndrome).
  - MRI Brain without and with contrast (CPT® 70553) is indicated as an initial screening study for infants born to a parent with known HHT.
  - MRI Brain without and with contrast (CPT® 70553) at the time of diagnosis, and a single repeat study after the age of 20.
  - Ongoing surveillance imaging is not indicated for patients without new or worsening symptoms.
  - Repeat MRI alone or with MRA or CTA (as above) is indicated for clinical signs or symptoms concerning for progression in a patient with a known AVM.
  - CTA (as above) is indicated for clinical signs or symptoms concerning for progression in a patient with a clipped AVM

- Capillary Malformation-Arteriovenous Malformation (CM-AVM)
  - Caused by RASA1 mutations.
  - MRI Brain without and with contrast (CPT® 70553) at the time of diagnosis.
  - Ongoing surveillance imaging is not indicated for patients without new or worsening symptoms.
  - Repeat MRI alone or with MRA or CTA (as above) is indicated for clinical signs or symptoms concerning for progression in a patient with a known AVM.

- Sturge-Weber Syndrome:
  - MRI Brain without and with contrast (CPT® 70553) and MRI Face/Neck (CPT® 70543) at the time of diagnosis.
  - Ongoing surveillance imaging is not indicated for patients without new or worsening symptoms.
  - Repeat MRI alone or with MRA or CTA (as above) is indicated for clinical signs or symptoms concerning for progression in a patient with a known AVM.

- Cerebral Cavernous Malformations:
  - Also known as cavernomas, cavernous angiomas, or cryptic vascular malformations.
  - MRI Brain without and with contrast (CPT® 70553) and MRI Cervical (CPT® 72156) and Thoracic (CPT® 72157) Spine without and with contrast at the time of diagnosis.
  - Ongoing surveillance imaging is not indicated for patients without new or worsening symptoms.
  - Repeat MRI alone or with MRA or CTA (as above) is indicated for clinical signs or symptoms concerning for progression in a patient with a known AVM.
References
**PEDHD-11: Syncope**

Syncope in children is almost always neurocardiogenic (vasovagal) in nature. Intracranial mass lesions do not cause isolated syncope. Syncope and seizure activity can often be challenging to distinguish for unwitnessed syncope.

- Advanced imaging of the brain is not indicated for patients with isolated syncope without focal neurologic findings. See **PEDCD-5: Syncope** in the Pediatric Cardiac Imaging Guidelines and **PEDHD-6: Epilepsy and Other Seizure Disorders** for additional imaging considerations.

**References**
## PEDHD-12: Pediatric Stroke

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PEDHD-12.1: General Considerations

Imaging indications are the same for neonates as for older children.

PEDHD-12.2: Pediatric Stroke Initial Imaging

- As pediatric strokes may be hemorrhagic, CT Head without contrast (CPT® 70450) is generally the initial study indicated.
  - MRI Brain without contrast (CPT® 70551) can be performed in lieu of initial CT if emergently available for evaluation of acute stroke symptoms.
- After the initial study, ANY of the following studies are indicated for further evaluation of pediatric stroke:
  - These cases should be forwarded for Medical Director Review.
  - MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553).
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) and Neck with contrast (CPT® 70548).
  - CTA Head (CPT® 70496) and Neck (CPT® 70498).

PEDHD-12.3: Pediatric Stroke Subsequent Imaging

- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for any new or worsening neurological findings or seizure activity.
- Most pediatric patients do not benefit from surveillance imaging after stroke, but specific surveillance imaging indications for specified conditions are listed in the disease-specific section.
  - These cases should be forwarded for Medical Director Review.
  - MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553).

PEDHD-12.4: Moyamoya Disease

**Initial imaging**

- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553), MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) and Neck (CPT® 70548) are indicated for all patients. CTA Head and Neck (CPT® 70496 and CPT® 70498) can be approved if MRI is contraindicated or not readily available.

**Repeat imaging**

- MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) every 12 months. CTA Head (CPT® 70496) can be approved if MRI is contraindicated or not readily available.
- MRI Brain without contrast (CPT® 70551) every 12 months.
- Radiopharmaceutical Localization Imaging SPECT (CPT® 78803) with vasodilating agent acetazolamide (Diamox) challenge can be approved when surgery or other vascular intervention is being considered.
**PEDHD-12.5: Sickle Cell Disease**

Patients with sickle cell disease are at significantly increased risk for stroke and silent infarction, beginning at a very young age. Recent advances allow physicians to identify patients at high risk for stroke and begin a primary stroke prevention program. Identification of silent cerebral infarction is important because treatment with prophylactic red cell transfusions to maintain hemoglobin S levels at <30% of total hemoglobin may reduce recurrent stroke and extent of neurologic damage.

- The following imaging is indicated for all sickle cell patients with a severe phenotype (Hgb SS or Hgb Sβ⁰):
  - Transcranial Doppler Ultrasound (CPT® 93886 or CPT® 93888) annually for all patients age 2 to 16. Transcranial Doppler is used to screen for overt and silent infarctions and monitor response to transfusion therapy.
    - A short interval repeat study is indicated for patients with conditional (170-199 cm/sec) flow results, or with patients undergoing transfusion therapy.
    - MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated in patients with persistent abnormal Transcranial Doppler.
  - Transcranial Doppler is not indicated for patients with other phenotypes (Hgb SC, Hgb Sβ⁺).
  - Screening of asymptomatic sickle cell patients with MRI or MRA is no longer recommended.

**PEDHD-12.6: CNS Vasculitis and Stroke**

- MRI Brain without and with contrast is the recommended initial study for all patients with vasculitis and suspected CNS involvement, whether primary or secondary.
  - A normal MRI Brain almost always completely excludes intracranial vasculitis
  - MRA Head (CPT® 70544, CPT® 70545, or CPT® 70546) is indicated for inconclusive MRI findings suggesting medium or large vessel vasculitis.
  - Patients with aggressive disease being treated with systemic therapy can have imaging approved for treatment response every 3 months during active treatment.
  - Annual surveillance imaging can be approved to detect progressive vascular damage that may require intervention.
References
## PEDHD-13: Benign Brain Lesions

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**PEDHD-13.1: Arachnoid Cysts**

Arachnoid cysts arise in the middle or posterior fossa, and the majority of lesions are discovered incidentally and do not require surgical intervention.

- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for initial evaluation of arachnoid cysts if not already completed.
- Repeat MRI Brain is not indicated for most patients with arachnoid cysts, but can be approved for the following:
  - Annual MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) until age 4 if diagnosed at a younger age.
  - New or worsening headache or focal neurologic deficits suggesting progression of cyst.
  - Preoperative planning.

**PEDHD-13.2: Pineal Cysts**

Pineal cysts are generally discovered incidentally and do not require surgical intervention.

- MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for initial evaluation of pineal cysts if not already completed.
- Repeat MRI Brain is not indicated for most patients with pineal cysts, but MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) can be approved for the following:
  - New or worsening headache or focal neurologic deficits suggesting progression of cyst.
  - Preoperative planning.

**PEDHD-13.3: Acoustic Neuromas**

- See **PEDPN-2.2: Neurofibromatosis 2** in the Pediatric Peripheral Nerve Disorders Imaging Guidelines

**References**

PEDHD-14: Pediatric Demyelinating Diseases

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PEDHD-14.1: General Considerations

- MRI Brain without and with contrast (CPT® 70553) is the preferred imaging study for evaluation of pediatric demyelinating disease.
  - MRI Spinal Cord without and with contrast (CPT® 72156 and CPT® 72157) is also indicated for evaluation of pediatric demyelinating disease.
  - MRI Lumbar Spine without and with contrast (CPT® 72158) is not indicated unless the patient has a tethered cord or other anatomic abnormality causing caudal displacement of the filum terminalis.
- CT imaging is generally not indicated in the evaluation of demyelinating disease.
- PET Brain (CPT® 78608 and CPT® 78609) and MR Spectroscopy (CPT® 76390) are considered investigational for evaluation of pediatric demyelinating diseases.

PEDHD-14.2: Multiple Sclerosis (MS)

Multiple sclerosis is less common in children. About 4% of MS cases are diagnosed before age 18, and only ~0.7% of all MS cases begin before age 10.

Ataxia, optic neuritis, diplopia, and transverse myelitis are common presentations. MS can present as an acute encephalitis-like illness, especially in childhood.

Among children with suspected demyelinating diseases, the principal differential diagnosis is often between MS and acute disseminated encephalomyelitis.

- MRI Brain (CPT® 70553) and Spinal Cord (CPT® 72156 and CPT® 72157) without and with contrast is indicated for initial diagnosis in patients with clinical signs and/or symptoms suggestive of MS.
  - MRI Brain (CPT® 70551) and Spinal Cord (CPT® 72141 and CPT® 72146) without contrast can be approved if there is a contraindication to gadolinium administration.
- MRI Brain (CPT® 70553) and Spinal Cord (CPT® 72156 and CPT® 72157) without and with contrast is indicated every 6 months for disease monitoring.
  - MRI Brain (CPT® 70551) and Spinal Cord (CPT® 72141 and CPT® 72146) without contrast can be approved if there is a contraindication to gadolinium.

PEDHD-14.3: Acute Disseminated Encephalomyelitis (ADEM)

- ADEM has an acute onset, and is more common among younger children than MS, but the signs and symptoms overlap significantly, and distinguishing between MS and ADEM can be challenging based on clinical examination alone.
- MRI Brain (CPT® 70553) and Spinal Cord (CPT® 72156 and CPT® 72157) without and with contrast is indicated for initial diagnosis in patients with clinical signs and/or symptoms suggestive of ADEM.
  - MRI Brain (CPT® 70551) and Spinal Cord (CPT® 72141 and CPT® 72146) without contrast can be approved if there is a contraindication to gadolinium.
- MRI Brain (CPT® 70553) and Spinal Cord (CPT® 72156 and CPT® 72157) without and with contrast is indicated every 3 months for 1 year following diagnosis.
MRI Brain (CPT® 70551) and Spinal Cord (CPT® 72141 and CPT® 72146) without contrast can be approved if there is a contraindication to gadolinium.

Most patients will have complete clinical recovery by 12 months, while stable MRI abnormalities (gliosis) may persist. These findings do not require additional imaging unless the patient develops new neurologic symptoms.

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PEDHD-15.1: General Considerations

- The initial step in the evaluation of all potential pituitary masses is a detailed history, recent physical examination, and thorough neurological exam, including evaluation of the visual fields.
- Endocrine laboratory studies should be performed prior to considering advanced imaging.
- When pituitary imaging is indicated, MRI Brain without and with contrast (CPT® 70553) is the correct study.
  - One study (either MRI Brain [CPT® 70553] or MRI Orbit, Face, Neck [CPT® 70543]) is adequate to image the pituitary. The ordering physician should specify that the study is specifically to evaluate the pituitary gland. The reporting of two CPT® codes, to image the pituitary, is not indicated.

PEDHD-15.2: Panhypopituitarism

Endocrine testing should be performed initially.

- MRI Brain without and with contrast (CPT® 70553) with special attention to the pituitary is indicated for newly diagnosed Panhypopituitarism.
- Patients with a normal pituitary on initial MRI do not need routine follow up imaging.
- Patients with mass lesions should have follow up imaging according to the guidelines for the specific diagnosis.

PEDHD-15.3: Isolated Growth Hormone Deficiency

Endocrine testing should be performed initially. For isolated growth hormone deficiency, two measurements of growth hormone stimulation with different stimulation agents are performed. Glucagon, clonidine, levodopa, and arginine are common stimulation agents. Both stimulation tests can be done on the same day, or on separate days.

- MRI Brain without and with contrast (CPT® 70553) with special attention to the pituitary is indicated for newly diagnosed isolated growth hormone deficiency.
- Patients with a normal pituitary on initial MRI do not need routine follow up imaging.
- Patients with mass lesions should have follow up imaging according to the guidelines for the specific diagnosis.
PEDHD-15.4: Diabetes Insipidus (DI) and Other Disorders of Anti-Diuretic Hormone

The principal evaluation of ADH deficiency is by urine and blood electrolyte and osmolality testing - serum osmolality greater than 300 with urine osmolality less than 300. Deficiencies in ADH can either be central or nephrogenic.

Central Diabetes Insipidus (DI)

- MRI Brain without and with contrast (CPT® 70553) is indicated for newly diagnosed central DI.
- CT Head without contrast (CPT® 70450) with attention to the skull base may be approved with history of recent significant head trauma.
- Patients with a normal pituitary on initial MRI can have repeat MRI Brain without and with contrast (CPT® 70553) every 12 months as germinomas may cause central DI while still too small to detect on imaging.
  - Serial measurement of β-hCG is also indicated for these patients, and MRI should be repeated if a significant rise in β-hCG is detected on screening.
- Patients with mass lesions should have follow up imaging according to the guidelines for the specific diagnosis.

Nephrogenic DI

- Once this diagnosis is firmly established, further advanced imaging is usually not indicated.

Syndrome of Inappropriate Antidiuretic Hormone Secretion (SIADH)

Laboratory studies should be obtained prior to considering advanced imaging—urine osmolality should be high and serum osmolality low.

- MRI Brain without and with contrast (CPT® 70553) is indicated for initial evaluation of unexplained central SIADH.
- Patients with a normal pituitary on initial MRI do not need routine follow up imaging.
- Patients with mass lesions should have follow up imaging according to the guidelines for the specific diagnosis.
**PEDHD-15.5: Precocious Puberty**

Defined as the appearance of secondary sexual characteristics before age 8 in girls and before age 9 in boys.

When precocious puberty is documented on physical examination, endocrine lab studies are not necessary prior to advanced imaging. It can be central and gonadotropin dependent in origin or peripheral and gonadotropin independent in origin.

- Initial imaging should include Ultrasound Abdomen (CPT® 76700) in both genders and Ultrasound Pelvis (CPT® 76856) in girls to exclude a peripheral cause of precocious puberty.
- MRI Brain without and with contrast (CPT® 70553) is indicated for evaluation of any child with documented central precocious puberty following ultrasound evaluation.
- Patients with a normal pituitary on initial MRI do not need routine follow up imaging.
- Patients with mass lesions should have follow up imaging according to the guidelines for the specific diagnosis.

**PEDHD-15.6: Benign Pituitary Tumors**

- Benign pituitary tumor indications in pediatric patients are identical to those for adult patients. See **HD-19: Pituitary** in the Head Imaging Guidelines.

**PEDHD-15.7: Pituitary Malignancies**

See **PEDONC-4.10: Craniopharyngioma and Pituitary Tumors** or **PEDONC-18: Histiocytic Disorders** in the Pediatric Oncology Imaging Guidelines

**References**

### PEDHD-16: Pediatric Ear Disorders

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PEDHD-16.1: Hearing Loss

A recent (within 60 days) evaluation including a detailed history, physical examination (including otoscopic examination), and age-appropriate audiology testing should be performed on any child with known or suspected hearing loss prior to considering advanced imaging. The selection of imaging testing will depend on the age of the child and type of hearing loss.

- CT Temporal Bone without contrast (CPT® 70480) is indicated for the following:
  - Conductive hearing loss of any cause.
  - Preoperative planning for resection of mass lesion or cochlear implant placement.
  - Sensorineural hearing loss in patients who cannot safely undergo MRI.
  - Mixed conductive and sensorineural hearing loss.
  - Congenital hearing loss.
  - Total deafness.

- MRI Brain without and with contrast (CPT® 70553) with attention to internal auditory canals (included in CPT® 70553 and does not require a separate CPT code) is indicated for the following:
  - Conductive hearing loss secondary to known or suspected mass lesion.
  - Preoperative planning for resection of mass lesion or cochlear implant placement.
  - Sensorineural hearing loss of any cause.
  - Mixed conductive and sensorineural hearing loss.
  - Congenital hearing loss.
  - Total deafness.
  - Hearing loss associated with tinnitus

- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

PEDHD-16.2: Ear Pain

A recent (within 60 days) evaluation including a detailed history, physical examination (including otoscopic examination), should be performed on any child with ear pain prior to considering advanced imaging. Common causes of ear pain include external and middle ear infections, dental problems, sinus infection, neck problems, tonsillitis, and pharyngitis.

- Advanced imaging is not indicated in the overwhelming majority of pediatric patients with ear pain.

- CT Temporal Bone without contrast (CPT® 70480) or without and with contrast (CPT® 70482), OR, MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553), OR MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is indicated for the following:
  - Persistent ear pain without obvious cause.
  - Clinical suspicion for complicated or invasive infection such as mastoiditis.
  - Clinical suspicion of mass lesion causing ear pain.
  - Significant trauma with concern for hematoma formation.
Preoperative planning.

Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

PEDHD-16.3: Cholesteatoma

Cholesteatomas are expansive cysts of the middle ear filled with cellular debris. They can be congenital or arise from recurrent middle ear infections or trauma to the tympanic membrane. Hearing loss is usually conductive, although if the lesion is large enough combined conductive and sensorineural hearing loss may be present. Otoscopic exam findings and symptoms may include painless drainage from the ear or chronic/recurrent ear infections.

- CT Temporal Bone without contrast (CPT® 70480) or without and with contrast (CPT® 70482), OR MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553), OR MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is indicated for preoperative evaluation in cholesteatoma patients.

- CT Temporal Bone without contrast (CPT® 70480) or without and with contrast (CPT® 70482), OR MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553), OR MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is indicated one time post-operatively to exclude residual or regrown cholesteatoma to avoid the need for a second-look surgery.

Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

PEDHD-16.4: Vertigo

Isolated vertigo is an uncommon complaint during childhood. Middle ear/Eustachian tube problems are the most common cause of isolated vertigo in children. A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination (including otoscopic examination), should be performed on any child with vertigo prior to considering advanced imaging.

- If physical examination is otherwise normal and the vertigo responds to treatment, advanced imaging is not indicated.

- MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553) is indicated for the following:
  - Vertigo with associated headache or ataxia.
  - Vertigo associated with tinnitus.
  - Vertigo that does not respond to vestibular treatment.

Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.
**PEDHD-16.5: Tinnitus**

Tinnitus without hearing loss is a less common complaint during childhood. Children with hearing loss and tinnitus should be imaged according to **PEDHD-16.1: Hearing Loss**. A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination (including otoscopic examination), and age-appropriate audiology testing should be performed on any child with known or suspected tinnitus prior to considering advanced imaging.

- Advanced imaging is not indicated in the overwhelming majority of pediatric patients with isolated tinnitus and normal hearing.
- CT Temporal Bone without contrast (CPT® 70480) or without and with contrast (CPT® 70482), OR MRI Brain without and with contrast with attention to internal auditory canals (CPT® 70553), OR MRI Orbits/Face/Neck without and with contrast (CPT® 70543) is indicated for the following:
  - Clinical suspicion of mass lesion causing tinnitus.
  - Persistent tinnitus after recent significant trauma.
- Patients requiring sedation should generally not have non-contrast MRI studies. See **PEDHD-1.3: Pediatric Head Imaging Modality General Considerations**.

**References**

**PEDHD-17: Autism Spectrum Disorders**

The group of diagnoses, including Asperger syndrome, are classified as pervasive development disorders (PDD). These diagnoses are established on clinical criteria, and no imaging study can confirm the diagnosis.

Comprehensive evaluation for autism might include history, physical exam, audiology evaluation, speech, language, and communication assessment, cognitive and behavioral assessments, and academic assessment.

- MRI Brain without and with contrast (CPT® 70553) is indicated for new or worsening focal neurologic findings documented on a physical examination within 60 days of the imaging request.
- Patients requiring sedation should generally not have non-contrast MRI studies. See **PEDHD-1.3: Pediatric Head Imaging Modality General Considerations**.
- PET imaging is considered investigational in the evaluation of patients with autism spectrum disorders.

**References**

Behavioral and psychiatric disorders of childhood or adolescence generally require no advanced imaging for diagnosis or management.

- MRI Brain without and with contrast (CPT® 70553) is indicated for new or worsening focal neurologic findings documented on a physical examination within 60 days of the imaging request.

- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

Reference
# PEDHD-19: Intellectual Disability, Cerebral Palsy, and Developmental Motor Delay

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| PEDHD-19.3: Developmental Motor Delay| 62 |
PEDHD-19.1: Intellectual Disability

Intellectual disability was formerly known as mental retardation, and may be primary or secondary to a variety of heterogeneous disorders.

- MRI Brain without and with contrast (CPT® 70553) is indicated for new or worsening focal neurologic findings documented on a physical examination within 60 days of the imaging request.
- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

PEDHD-19.2: Cerebral Palsy

Many patients with intellectual disability also have cerebral palsy, but not all patients with cerebral palsy have intellectual disability.

Cerebral palsy is a static motor encephalopathy caused by a variety of entities spanning developmental, metabolic, genetic, infectious, ischemic, and other acquired etiologies.

- MRI Brain without and with contrast (CPT® 70553) is indicated for:
  - Initial evaluation of newly diagnosed cerebral palsy.
  - New or worsening focal neurologic findings documented on a physical examination within 60 days of the imaging request, including the presence of developmental delay.
- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

PEDHD-19.3: Developmental Motor Delay

There are many causes for developmental motor delay. Patients with motor delay can have decreased, normal, or increased muscular tone. Patients with low or normal tone do not require imaging unless they have focal neurologic findings.

- MRI Brain without and with contrast (CPT® 70553) is indicated for:
  - Initial evaluation of newly diagnosed developmental motor delay with increased muscle tone.
  - Toe walking, when associated with upper motor neuron signs including hyperreflexia, spasticity, or positive Babinski sign.
  - New or worsening focal neurologic findings documented on a physical examination within 60 days of the imaging request.
- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.
References
**PEDHD-20: Ataxia**

Ataxia refers to an abnormally ill-coordinated or unsteady gait for age. “Limb ataxia” refers to impaired coordination (for age) of limbs, especially arms. Developmental failure to acquire the ability to walk is a form of developmental delay, not ataxia.

(See PEDHD-19: Intellectual Disability, Cerebral Palsy, and Developmental Motor Delay)

- A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination with a thorough neurologic examination, and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

- MRI Brain without and with contrast (CPT® 70553) can be performed to evaluate ataxia, hereditary ataxia, and slowly progressive ataxia.
  - MRI Cervical Spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) is indicated if MRI Brain is non-diagnostic.

- Patients requiring sedation should generally not have non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Considerations.

- CT Head without and with contrast (CPT® 70470) or with contrast (CPT® 70460) is indicated for patients who have a contraindication to MRI.
  - CT should not be used in place of MRI solely to avoid sedation in young children because MRI is superior for imaging the posterior fossa.

- CT Head without contrast (CPT® 70450) or without and with contrast (CPT® 70470) or MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated for patients with acute ataxia following significant head trauma.

- Repeat imaging may be appropriate no more frequently than every 12 months when requested by a specialist.

**References**

**PEDHD-21.1: Imaging**

Initial evaluation of epistaxis (nosebleed), including recurrent epistaxis that is refractory to medical management is by direct or endoscopic visualization of the relevant portions of the upper airway.

- If a mass lesion is detected on direct visualization, any ONE of the following imaging studies is indicated:
  - CT Maxillofacial without contrast (CPT® 70486) or without and with contrast (CPT® 70488).
  - MRI Orbits/Face/Neck without and with contrast (CPT® 70543).

**Reference**

PEDHD-22: Pseudotumor Cerebri

- Pseudotumor cerebri indications in pediatric patients are identical to those for adult patients. See HD-17: Papilledema/Pseudotumor Cerebri in the Head Imaging Guidelines.
PEDHD-23: Cranial Neuropathies

- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients with new or worsening specific cranial nerve abnormalities.
- MRI Neck without and with contrast (CPT® 70543) is also indicated for patients with abnormalities in cranial nerves IX, X, XI, or XII.

References
PEDHD-24: Pediatric Sleep Disorders

- See SL-3: Pediatric Sleep Guidelines in the Sleep Apnea and Treatment Clinical Guidelines

- Advanced imaging is not indicated for the following:
  - Parasomnias.
  - Bed wetting (if child is otherwise neurologically normal).
  - Insomnia.
  - Narcolepsy.
  - Restless Leg Syndrome (polysomnography is useful).

- For Obstructive Sleep Apnea, endoscopic examination of the upper airway and lateral upper airway x-rays should be performed initially.
  - CT Maxillofacial without contrast (CPT® 70486) may be indicated for evaluation of obstructive anatomy if operative intervention is being considered.

- For Central Sleep Apnea, MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated if the clinical picture and/or polysomnography study suggests central sleep apnea.

Reference

PEDHD-25: Temporomandibular Joint (TMJ) Imaging in Children

- Temporomandibular Joint (TMJ) Imaging in Children indications in pediatric patients are very similar to those for adult patients. See **HD-30.1: Temporomandibular Joint Disease (TMJ)** in the Head Imaging Guidelines.

- Pediatric-specific imaging considerations include the following:
  - There is a paucity of clinical symptoms and poor sensitivity of conventional x-rays in diagnosing TMJ arthritis in pediatric patients with arthritis
    - MRI TMJ (CPT® 70336) is indicated annually for detecting silent TMJ arthritis in children with juvenile idiopathic arthritis (JIA).

**References**


PEDHD-26: Tourette’s Syndrome

The diagnosis of Tourette’s syndrome is made clinically and advanced neuroimaging is not indicated for either diagnosis or management.

Reference
PEDHD-27: Tuberous Sclerosis

See PEDONC-2.9: Tuberous Sclerosis Complex (TSC) in the Pediatric Oncology Imaging Guidelines.
PEDHD-28: Von Hippel-Lindau Syndrome (VHL)

See PEDONC-2.10: Von Hippel-Lindau Syndrome (VHL) in the Pediatric Oncology Imaging Guidelines.
CNS infection imaging indications in pediatric patients are similar to those for adult patients. See HD-14: CNS Infection in the Head Imaging Guidelines.

Pediatric-specific imaging considerations include suspected congenital brain infection and neonatal meningitis. The common causes of prenatal infections of the central nervous system are cytomegalovirus, Toxoplasma gondii, herpes simplex type 2 virus and most recently zika virus. The findings suggesting prenatal brain infection include microcephaly, microphthalmia, chorioretinitis, cataracts, hypotonia, and seizures. The following are performed for congenital brain infections:

- The following imaging is considered for newborn infants with suspected prenatal brain infection regardless of inciting organism. (For additional information see CDC’s Areas with risk of Zika site: https://wwwnc.cdc.gov/travel/page/zika-information)
  - Ultrasound Head (CPT® 76506) can be approved as an initial imaging study.
  - If the ultrasound is abnormal, MRI Brain without and with contrast (CPT® 70553) is indicated.

- Newborn infants with microcephaly should be evaluated as discussed in PEDHD-7: Macrocephaly, Microcephaly, and Hydrocephalus.

Neonatal meningitis is most often caused by bacterial pathogens and usually occurs as a complication of sepsis in the first week of life. In older infants and children, meningeal inoculation occurs secondary to hematogenous spread or penetrating trauma.

The following imaging is considered for newborns or older infants with an open fontanelle and suspected meningitis.

- Ultrasound Head (CPT® 76506) can be approved as an initial imaging study.
- If the ultrasound is abnormal, MRI Brain without and with contrast (CPT® 70553) is indicated.

Patients requiring sedation should generally not have only non-contrast MRI studies. See PEDHD-1.3: Pediatric Head Imaging Modality General Consideration.
References
6. Vepraskas SA. Zika Virus – an emerging arbovirus associated with fetal abnormalities. CDC’s response to Zika.
Scalp and skull lesion imaging indications in pediatric patients are identical to those for adult patients with the exception of neonates. See HD-20: Scalp and Skull Lesions in the Head Imaging Guidelines.

In neonates and young infants, scalp masses include:
- Congenital lesions (cephalocele-discussed above, dermoid cysts, epidermoid cyst)
- Vascular lesions (hemangioma, sinus pericranii)
- Extracranial hemorrhage related to birth trauma (caput succedaneum, cephalohematoma, subgaleal hematoma)
- After the first year of life, malignant tumors, such as Langerhans cell histiocytosis metastases from neuroblastoma and rhabdomyosarcoma are an additional cause of a scalp mass.

The following imaging is considered for newborns with palpable scalp and skull lesions.
- Ultrasound Head (CPT® 76506) can be approved as an initial imaging study.
- If the ultrasound is abnormal and associated anomalies are suspected, MRI Brain without and with contrast (CPT® 70553) (preferred) or CT Head without and with contrast (CPT® 70470) is indicated.

References
Eye disorder imaging indications in pediatric patients are identical to those for adult patients. See HD-32: Eye Disorders and Visual Loss in the Head Imaging Guidelines.
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<tr>
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<tr>
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<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, 2 or more areas (eg, abdomen and pelvis, head and chest), 1 or more days imaging or single area imaging over 2 or more days</td>
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<td>Ultrasound, extremity, nonvascular; limited, anatomic specific for focal abnormality</td>
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**PEDMS-1.1: Age Considerations**

- Many conditions affecting the musculoskeletal system in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are < 18 years old should be imaged according to the Pediatric Musculoskeletal Imaging Guidelines, and patients who are ≥18 years old should be imaged according to the adult Musculoskeletal Imaging Guidelines, except where directed otherwise by a specific guideline section.

**PEDMS-1.2: Appropriate Clinical Evaluation and Conservative Treatment**

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the patient is undergoing guideline-supported scheduled imaging evaluation.

- Plain x-ray should be done prior to advanced imaging for musculoskeletal conditions to rule out those situations that do not require advanced imaging, such as acute/healing fracture, osteomyelitis, and tumors of bone amenable to biopsy or radiation therapy (in known metastatic disease), etc.
  - Even in soft tissue masses, plain x-rays are helpful in evaluating for calcium/bony deposits, e.g. myositis ossificans and invasion of bone.

- Provider-directed conservative care may include any or all of the following: R.I.C.E (rest, ice, compression, and elevation), NSAIDs (non-steroidal anti-inflammatory drugs), narcotic and non-narcotic analgesic medications, oral or injectable corticosteroids, viscosupplementation injections, a provider-directed home exercise program, cross-training, physical medicine, or immobilization by splinting/casting/bracing.

- These guidelines are based upon using advanced imaging to answer specific clinical questions that will affect patient management. Imaging is not indicated if the results will not affect patient management decisions. Standard medical practice would dictate continuing conservative therapy prior to advanced imaging in patients who are improving on current treatment programs.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the same body area are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.
PEDMS-1.3: Modality General Considerations

MRI

- MRI without contrast is the preferred modality for pediatric musculoskeletal imaging unless otherwise stated in a specific guideline section, as it is superior in imaging the soft tissues and can also define physiological processes in some instances, e.g. edema, loss of circulation (AVN), and increased vascularity (tumors).
- MRI without and with contrast is frequently recommended for evaluation of tumors, infection, post-operative evaluation, arthrography, and juvenile idiopathic arthritis, as described in the disease-specific guideline sections.
- Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous route. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
  - MRI procedures can be performed without and/or with contrast use as supported by these condition based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
  - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
  - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
  - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same imaging session.
- The presence of surgical hardware or implanted devices may preclude MRI, as magnetic field distortion may limit detail in adjacent structures. CT may be the procedure of choice in these cases.
- The selection of best examination may require coordination between the provider and the imaging service.

CT

- CT without contrast is generally superior to MRI for imaging bone and joint anatomy; thus it is useful for studying complex fractures (particularly of the joints,
dislocations, and assessing delayed union or non-union of fractures, integration of bone graft material, if plain x-rays are equivocal.

- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
- CT beam attenuation can result in streak artifact which can obscure adjacent details. This can occur with radiopaque material such as metal objects or dense bones.
- The selection of best examination may require coordination between the requesting provider and the rendering imaging facility.

Ultrasound

- Ultrasound is frequently used to evaluate infants for hip dysplasia, to detect and/or aspirate joint effusion, and as an initial evaluation of extremity soft tissue masses.
- CPT® codes vary by body area and the use of Doppler imaging. These CPT® codes are included in the table at the beginning of this guideline.

Nuclear Medicine

- Nuclear medicine studies are commonly used in evaluation of the peripheral musculoskeletal system, and other rare indications exist as well:
  - Bone scan (CPT® 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of suspected loosening of orthopedic prostheses when recent plain x-ray is nondiagnostic.
  - Nuclear medicine bone marrow imaging (CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104) is indicated for detection of ischemic or infarcted regions in sickle cell disease.
  - Triple phase bone scan (CPT®78315) is indicated for evaluation of complex regional pain syndrome or reflex sympathetic dystrophy.

3D Rendering

- 3D Rendering indications in pediatric musculoskeletal imaging are identical to those for adult patients. See MS-3: 3D Rendering for imaging guidelines.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References


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A recent (within 60 days) evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging.

**PEDMS-2.1: Acute Fracture**
- Plain x-rays should be performed initially in any obvious or suspected acute fracture or dislocation.
  - If plain x-rays are positive, no further imaging is generally indicated except in complex (comminuted or displaced) joint fractures where MRI or CT without contrast can be approved for preoperative planning.
  - 3D Rendering may sometime be indicated for complex fracture repairs. See **MS-3: 3D Rendering** for imaging guidelines.
- If plain x-rays are negative or equivocal for fracture, and fracture or bone marrow edema is still clinically suspected, CT or MRI without contrast is indicated if the results will determine immediate treatment decisions as documented by the treating physician.
- Bone scan may be approved for evaluation of suspected fracture when two x-rays are negative at least 10 days apart, using any of the following CPT® code combinations:
  - CPT® 78300, CPT® 78305, or CPT® 78306 as a single study
  - See **PEDMS-2.5: Stress/Occult Fracture** for bone scan indications

**PEDMS-2.2: Joint Fracture**
- CT can be approved in complex (comminuted or displaced) fractures involving a joint for preoperative planning.
- CT can be approved when there is clinical concern for delayed union or non-union of fracture or joint fusions on follow-up plain x-ray.

**PEDMS-2.3: Growth Plate Injuries (Salter-Harris Fractures)**
- These fractures can generally be diagnosed and managed adequately with plain x-ray.
- In case of severe injury with displacement of bone fractures, CT may be indicated prior to surgical intervention.
- If there is concern for delayed union or non-union of the bone, CT without contrast is indicated.
- MRI without contrast is indicated for the evaluation of a suspected physeal bar in a healing fracture or other complication of a fracture involving the growth plate, which may result in abnormal growth.
- Compressive injuries of the growth plate (Salter-Harris I) injuries may be difficult to identify on plain films, and MRI without contrast is indicated for confirmation.
PEDMS-2.4: Osteochondral or Chondral Fractures, Including Osteochondritis Dissecans

An Osteochondral fracture is a tear of the cartilage which covers the end of a bone, within a joint. It is also known as Osteochondritis Dissecans. In both disorders, loose bone fragments may form in a joint.

- If x-rays are negative and an osteochondral fracture is still suspected, or if x-ray or clinical exam suggests an unstable osteochondral injury, either MRI without contrast, MR arthrogram, or CT arthrogram of the involved joint is indicated.
- If plain x-rays show a non-displaced osteochondral fragment, follow up imaging should be with plain x-rays. Advanced imaging is not necessary.
- MRI without contrast or CT without contrast is indicated when healing cannot be adequately assessed on follow up plain x-rays.

PEDMS-2.5: Stress/Occult Fracture

- These fractures can usually be adequately evaluated by history, physical exam, plain x-ray and bone scan.
- Plain x-rays should be performed before advanced imaging. Plain x-rays are often negative initially but may become positive after 4 weeks in stress fractures or 14 days in occult fractures.
- Bone scan (CPT®78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT®78803) may be approved for evaluation of suspected stress or occult fracture when two x-rays are negative at least 10 days apart.
- If a stress or occult fracture is suspected involving the pelvis, sacrum, hip, femur, tibia, tarsal navicular, proximal 5th metatarsal, or scaphoid and the initial plain x-ray or bone scan fails to establish a definitive diagnosis, an MRI or CT without contrast is indicated without conservative care or follow-up plain x-rays.
- For all other suspected stress or occult fractures, MRI or CT without contrast is indicated if follow-up plain x-rays are negative after 2 weeks of conservative care when occult fracture is still suspected, or 4 weeks of conservative care when stress fracture is still suspected.
- Periodic follow-up plain x-rays will usually show progressive healing.
  - CT without contrast is indicated when there is clinical concern for non-union.

PEDMS-2.6: Compartment Syndrome

- Acute compartment syndrome is a clinical diagnosis made by direct measurement of compartment pressure and is a surgical emergency. Advanced imaging is not indicated.
- See MS-11.3: Chronic Exertional Compartment Syndrome for imaging guidelines.
PEDMS-2.7: Physical Child Abuse

See PEDMS-7: Suspected Physical Child Abuse for imaging guidelines

References


**PEDMS-3: Soft Tissue and Bone Masses**

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**PEDMS-3.1: Soft Tissue and Bone Masses – General Considerations**

- A recent (within 60 days) evaluation including a detailed history, physical examination, with detailed information on the mass (including location, size, duration, solid vs. cystic, fixed vs. not fixed to bone) should be performed prior to considering advanced imaging.

- Evaluation by a surgical specialist or oncologist is strongly recommended to help determine the most helpful advanced imaging studies for an individual patient.

- Plain x-rays should be performed as initial imaging. This is true even for soft tissue masses that are clearly not directly associated with osseous structures. Details such as soft tissue calcification, presence or absence of phleboliths, radiographic density, and any effect on adjacent bone are all potentially significant plain film findings that may help better identify the etiology of the mass and determine the optimal modality and contrast level when advanced imaging is indicated.

- If initial plain x-ray is negative, ultrasound (CPT® 76882) can be approved to evaluate:
  - Ill-defined masses or areas of swelling
  - Hematomas
  - Subcutaneous lipomas with inconclusive clinical examination
  - Lipomas in other locations
  - Masses that have been present and stable for ≥1 year
  - Vascular malformations (see PEDPVD-2: Vascular Anomalies for imaging guidelines)

- Advanced imaging is not indicated for the following entities:
  - Ganglion cysts
  - Sebaceous cysts
  - Hematomas
  - Subcutaneous lipomas
    - MRI without or without and with contrast can be performed if surgery is planned.

- Lipomas in other locations (not subcutaneous) may be evaluated by MRI without and with contrast, or by ultrasound (CPT® 76882).

**PEDMS-3.2: Soft Tissue Mass with Negative X-ray and Abnormal Ultrasound**

- MRI without and with contrast is indicated.
  - CT without or with contrast is indicated if MRI is contraindicated.

**PEDMS-3.3: Soft Tissue Mass with Calcification/Ossification on X-ray**

- MRI without and with contrast is indicated.
  - CT without or with contrast is indicated if MRI is contraindicated.
**PEDMS-3.4: Mass Involving Bone (Including Lytic and Blastic Metastatic Disease)**

- Many benign bone tumors have a characteristic appearance on plain x-ray and advanced imaging is not necessary unless one of the following applies:
  - Imaging requested for preoperative planning (MRI without and with contrast and/or CT without may be indicated).
  - MRI without and with contrast can be approved when the diagnosis is uncertain based on plain x-ray appearance.
    - CT without or with contrast can be approved if MRI is contraindicated.
- Known benign bone tumors, Osteogenic Sarcoma, and Ewing Sarcoma Family of Tumors should be imaged according to **PEDONC-9: Bone Tumors**.

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**PEDMS-4.1: General Evaluation of the Limping Child**

- This guideline primarily applies to children under the age of 6 years. It may also be applied to older children with pre-existing conditions who may not be able to communicate, such as a child with severe intellectual disability. Many of these cases will be urgent, because of the risk of adverse outcomes in delay of diagnosis.

- A recent (within 60 days) evaluation, including a detailed history and physical examination, should be performed, which will help determine any indication for advanced imaging. Based on this clinical evaluation, the most likely etiology should be determined, usually trauma, infection, or neither trauma nor infection.

**PEDMS-4.2: Limping Child with Suspected Trauma**

- Plain radiographs are indicated for detection of fractures, destructive lesions, and avascular necrosis. For children under age 4 this may require X-rays of the entire leg from hip to foot. If clinical suspicion is high for “toddler fracture” imaging may start with tibia/fibula radiographs, and if a fracture is demonstrated, additional imaging may not be required.

- If initial radiographs are negative, but limping symptoms or avoidance of weight-bearing persist, follow-up radiographs in 7 to 10 days are indicated. MRI without contrast of the affected body area is indicated if plain films are negative and suspicion remains high for stress fractures or soft tissue injury.

- CT use is limited in the evaluation of the limping child with suspected trauma. Requests should be for Medical Director Review.

- Radionuclide bone scan (CPT® 78300, CPT® 78305, or CPT® 78306) may be indicated in setting of a non-focal exam, especially in younger and non-verbal children. Due to relatively high radiation exposure, bone scan is reserved for high suspicion cases with negative radiographs. It is a preferred examination in a child with implanted hardware or devices precluding MRI.

**PEDMS-4.3: Limping Child with Suspected Infection**

- Pain localized to hip:
  - It is essential to exclude septic arthritis. Ultrasound of the hip (CPT® 76881) is used to exclude hip joint effusion.
    - If hip joint effusion is demonstrated, hip joint fluid aspiration should be performed to distinguish infection from non-infectious etiologies.
    - If no hip joint effusion is demonstrated, plain radiographs should be obtained.
    - If plain films are not diagnostic, MRI without or without and with contrast is indicated.
    - For unilateral hip use CPT® 73721 (without contrast) or CPT® 73723 (without and with contrast).
    - For bilateral hips use a single CPT® 73721 (without contrast) or CPT® 73723 (without and with contrast) and add modifier -50.
Pain localized distal to hip:
- Plain radiographs of the leg should be obtained. If these are not diagnostic, MRI without contrast or without and with contrast of the affected body part is indicated.

Nonlocalized pain:
- Plain radiographs of the spine, pelvis, and lower extremities may be necessary to localize the abnormality.
- If plain radiography is not diagnostic and suspicion for infection remains high, whole body bone scan (CPT® 78306) or MRI without contrast or without and with contrast of the affected body area is indicated.

**PEDMS-4.4: Limping Child with No Evidence of Trauma or Infection**

This differential diagnosis is quite broad.
- Transient (or toxic) synovitis of the hip:
  - Ultrasound of the hip (CPT® 76881) is the preferred initial exam.
    - If no hip effusion is demonstrated, plain radiographs should be obtained.
    - If a hip joint effusion is demonstrated, hip joint fluid aspiration is indicated. This is usually performed with US guidance, though fluoroscopic guidance or blind aspiration may be required.
- Avascular Necrosis: See **PEDMS-6: Avascular Necrosis (AVN)/ Legg-Calvé-Perthes Disease**
- Juvenile Idiopathic Arthritis: See **PEDMS-10.1: Juvenile Idiopathic Arthritis**
- Histiocytic Disorders: See **PEDONC-18: Histiocytic Disorders**
- Neoplasm: See **PEDONC-1: General Guidelines, PEDONC-3: Pediatric Leukemias, PEDONC-6: Neuroblastoma, PEDONC-8: Pediatric Soft Tissue Sarcomas, or PEDONC-9: Bone Tumors**
- Child Abuse: See **PEDMS-7: Suspected Physical Child Abuse**

**References**

PEDMS-5: Developmental Dysplasia of the Hip

Developmental dysplasia of the hip (DDH) was formerly known as congenital dislocation of the hip. DDH includes a spectrum of abnormalities including abnormal acetabular shape (dysplasia) and malposition of the femoral head ranging from mild subluxation, dislocatable hip to fixed dislocation. 60 to 80% of abnormalities are identified by physical exam, and more than 90% are identified by ultrasound. Treatment may involve placement in a Pavlik harness, casting, or surgery in extreme or refractory cases.

Screening studies

- The routine use of ultrasound in screening neonates and infants without risk factors for DDH is not recommended by the American Academy of Pediatrics and the American Academy of Orthopedic Surgeons. There are two sonographic methods of evaluating the hip: the dynamic stress (Harcke) technique and the static (Graf) technique
- Screening ultrasound (CPT® 76885 or CPT® 76886) is recommended for infants between 4 weeks of age and 4 months of age with one or more of the following risk factors:
  - Breech presentation
  - Family history of DDH
  - Abnormal hip exam (e.g. positive Ortolani or Barlow maneuvers, asymmetric thigh folds, shortening of the thigh observed on the dislocated side, limitation of hip abduction).
- For children between 4 and 6 months of age plain x-ray is the preferred imaging abnormality as femoral head ossification is often seen on xray in normal patients.
  - If x-ray is inconclusive, ultrasound (CPT® 76885 or CPT® 76886) may be indicated
- Indications for follow-up hip ultrasound (CPT® 76885 or CPT® 76886):
  - Type IIA hip was diagnosed on a previous hip ultrasound using the Graf method and follow-up hip ultrasound is requested to confirm normal development.
  - Graf type IIA hip has an alpha angle (bony angle) between 50 to 59 degrees in a child less than 3 months of age.
  - The overwhelming majority of these hips mature spontaneously, but follow-up may be required to ensure that maturation has occurred.
  - Subluxation or dislocation was diagnosed on previous hip ultrasound using the dynamic Harke imaging method.
  - Prior ultrasound demonstrates abnormal hip and treatment has been applied, such as a Pavlik harness or other device. Follow-up ultrasound is indicated to document effectiveness of treatment, to ensure the femoral head remains located in the acetabulum or to identify treatment failure. The usual interval for follow-up sonography is monthly, but earlier imaging is indicated for clinical suspicion of treatment failure, subluxation or dislocation of the hip.
MRI without contrast or CT without contrast is indicated to evaluate alignment following reduction. Children in casts or following surgery may require repeated advanced imaging to ensure the reduction remains satisfactory, or to assess incorporation of bone graft material.

- For unilateral Hip MRI use CPT® 73721
- For bilateral Hips MRI use a single CPT® 73721 and add modifier -50
- For unilateral Hip CT use CPT® 73700
- For bilateral Hips CT use a single CPT® 73700 and add modifier -50

Hip ultrasound is NOT indicated for the following:
- Infants less than 2 weeks of age, since hip laxity is normal after birth and usually resolves spontaneously.
- Infants older than 6 months of age as plain x-ray of the hips become more reliable due to femoral head ossification and should be used in infants over 6 months of age.
- Type I, IIB, IIC, IID, and III hips diagnosed on a previous hip ultrasound using the Graf method. Type I hip is normal, and Type IIB, IIC, IID, and III require referral for treatment rather than follow-up imaging.
- Plain x-ray of the hips should be performed rather than ultrasound if there is a clinical suspicion for teratogenic dysplasia.

References
### PEDMS-6: Avascular Necrosis (AVN) / Legg-Calvé-Perthes Disease / Idiopathic Osteonecrosis

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Legg-Calvé-Perthes Disease (LCP) is idiopathic osteonecrosis (AVN) of the femoral head. This may occur in children when the femoral head loses its blood supply. It most commonly affects children between the ages of 4 and 8 (occasionally younger or older). Clinically, LCP is quite different than adult AVN since there is good healing potential of the femoral head, especially in younger children. Treatment is observation in mild cases and containment of the head within the acetabulum by abduction bracing or occasionally surgery in more severe cases.

- A recent (within 60 days) evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

**PEDMS-6.1: Avascular Necrosis and Legg-Calvé-Perthes Disease**

- Plain x-ray is the initial imaging study and may be all that is necessary for follow-up.
- If the diagnosis is uncertain on plain x-ray, hip MRI either without contrast or without and with contrast is indicated.
  - For unilateral hip use CPT® 73721 (without contrast) or CPT® 73723 (without and with contrast).
  - For bilateral hips use a single CPT® 73721 (without contrast) or CPT® 73723 (without and with contrast) and add modifier -50
  - If MRI is contraindicated or unavailable, any one of the following studies may be approved in lieu of MRI:
    - CT scan without contrast, with contrast or without and with contrast
    - Nuclear bone scan (CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, or CPT® 78803)

**PEDMS-6.2: Osteonecrosis**

- Osteonecrosis can occur in a number of conditions, including during treatment for developmental dysplasia of the hip.
- Patients with acute lymphoblastic leukemia, lymphoblastic lymphoma, or other conditions with recurrent exposure to high dose corticosteroids and known or suspected osteonecrosis should be imaged according to guidelines in: **PEDONC-3.2: Acute Lymphoblastic Leukemia (ALL)**.
- Known or suspected osteonecrosis in long term cancer survivors should be imaged according to guidelines in: **PEDONC-19.4: Osteonecrosis in Long Term Cancer Survivors**.
- In other patients with concern for osteonecrosis and inconclusive recent x-ray, MRI either without contrast or without and with contrast can be approved if imaging results will change current patient management.
References
PEDMS-7: Suspected Physical Child Abuse

The suspicion of physical abuse of a child often requires imaging, both for clinical management and for forensic purposes. Every effort should be made to support reasonable requests for imaging in these children.

Child abuse injuries may affect any organ or system. Fractures are common, but injuries may also involve solid and hollow visceral organs, and/or superficial and deep soft tissue injuries. Some fracture patterns are highly correlated with non-accidental mechanisms, such as the “classic metaphyseal lesion,” also known as a corner fracture or bucket handle fracture, but fractures may occur in any bone. Unsuspected fractures, multiple fractures at various stages of healing, or fractures of a configuration or distribution inconsistent with the history provided, may raise the suspicion for physical abuse.

Skeletal Injury

- The radiographic skeletal survey is the primary imaging procedure for detecting fractures, especially in children age 24 months or younger. In older children, skeletal survey may be indicated, but more tailored radiographic evaluation based on history and physical examination may be preferable to skeletal survey.
- Bone scan (CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is complimentary to plain radiographs, and may be used when the skeletal survey is negative but clinical suspicion remains high.
- Suspected injury to the spine should usually first be evaluated with plain radiographs. CT without contrast and/or MRI without contrast or without and with contrast may be required for complete evaluation of osseous and soft tissue spine injuries. If requested for suspected or known physical abuse, both CT without contrast and/or MRI without contrast or without and with contrast of suspected sites should be approved.
- A repeat skeletal survey performed approximately 2 weeks after the initial examination can provide additional information on the presence and age of child abuse fractures and should be performed when abnormal or equivocal findings are found on the initial study and when abuse is suspected on clinical grounds.

Head Injury

- CT Head without contrast (CPT® 70450) is indicated when there is clinical evidence of head injury or when skull fracture of any age is detected on survey skull x-ray.
  - CT Head without contrast (CPT® 70450) is also indicated when known or suspected cervical trauma is present in a pediatric patient.
  - CT Cervical Spine without contrast (CPT® 72125) and/or MRI without contrast (CPT® 72141) or without and with contrast (CPT® 72156) may be approved when there is clinical evidence of head injury or when skull fracture of any age is detected on survey skull x-ray.
MRI Brain without contrast (CPT® 70551) or without and with contrast (CPT® 70553) is indicated to further evaluate brain parenchymal injury, or in a child where the clinical signs of brain injury are not sufficiently explained by CT findings.

Infants may require advanced imaging even if no neurologic symptoms are detected due to the great potential morbidity of abusive head trauma.

**Other Body Area Injuries**

CT should be performed with IV contrast unless an absolute contraindication exists.

Any of the following imaging studies are indicated for suspected injury to the abdomen or pelvis:
- Abdominal ultrasound (CPT® 76700)
- Pelvic ultrasound (CPT® 76856)
- CT Abdomen with contrast (CPT® 74160)
- CT Pelvis with contrast (CPT® 72193)
- CT Abdomen and Pelvis with contrast (CPT® 74177)

Any of the following imaging studies are indicated for suspected injury to the chest:
- CT Chest without contrast (CPT® 71250)
- CT Chest with contrast (CPT® 71260)

**Screening of other children**

A skeletal survey, or other imaging, may be requested for siblings of abused children, or for other household members under the age of two due to the high incidence of occult fractures in these children. All such requests should be approved.

**References**

PEDMS-8: Infection/Osteomyelitis

Infection and osteomyelitis imaging indications in pediatric patients are similar to those for adult patients other than the limping child.

- See MS-9: Infection/Osteomyelitis for imaging guidelines other than in the limping child.
- See PEDMS-4.3: Limping Child with Suspected Infection for imaging guidelines when limping is present.
- See PEDMS-10: Inflammatory Musculoskeletal Disease for imaging guidelines for chronic recurrent multifocal osteomyelitis (CRMO, which is an autoimmune disease).

Bone scan (CPT® 78315 or CPT® 78803 – Radiopharmaceutical Localization Of Inflammatory Process (SPECT) imaging) is indicated for evaluation of suspected bone infection if MRI cannot be done and when infection is multifocal, or when the infection is associated with orthopedic hardware or chronic bone alterations from trauma or surgery. Combining bone scintigraphy with a labeled leukocyte scan enhances sensitivity. A labeled leukocyte scan (radiopharmaceutical localization of tumor, inflammatory process, or distribution of radiopharmaceutical agent(s) imaging) - one of the following CPT® codes: CPT® 78800, CPT® 78801, or CPT® 78803 in concert with Tc-99m sulfur colloid marrow imaging (one of CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104) is particularly useful in cases with altered bone marrow distribution, such as joint prosthesis.

References

PEDMS-9: Foreign Body

- Foreign body imaging indications in pediatric patients are similar to those for adult patients. See MS-6.1: Foreign Body – General for imaging guidelines.

- The common soft tissue foreign bodies in children are wood, glass, and metal slivers. The latter two elements are radiopaque and visible to some degree on plain radiographs, whereas wood is usually radiolucent and nearly always imperceptible on radiographs. When a radiolucent foreign body is suspected, ultrasound (CPT®76882) can be used to identify the foreign body.

References
## PEDMS-10: Inflammatory Musculoskeletal Disease

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**PEDMS-10.0: Inflammatory Musculoskeletal Disease**

- A recent (within 60 days) evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging.
- Inflammatory arthritis imaging indications in pediatric patients are very similar to those for adult patients. See **MS-15: Rheumatoid Arthritis (RA) and Inflammatory Arthritis** for imaging guidelines. Specific pediatric considerations are included below.

**PEDMS-10.1: Juvenile Idiopathic Arthritis**

- Ultrasound (CPT® 76881) is indicted for assessment of: size and characteristics of joint effusions, extent of synovial hypertrophy, which is the hallmark of juvenile idiopathic arthritis, and involvement of tendinous structures.
- Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of facet arthropathy in patients with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis.
- MRI TMJ (CPT® 70336) is indicated annually for detecting silent TMJ arthritis in children with juvenile idiopathic arthritis (JIA).

**PEDMS-10.2: Chronic Recurrent Multifocal Osteomyelitis**

Chronic recurrent multifocal osteomyelitis (CRMO) is a rare autoimmune disease affecting multiple bones, arising most commonly during the second decade of life. Treatment consists of anti-inflammatory and immunomodulatory therapies, and is directed predominantly by status of clinical symptoms (most commonly pain).

- Patients with CRMO can have the following imaging approved for evaluation of new or worsening pain, or response to treatment in patients without complete clinical resolution of pain symptoms, when plain x-rays are non-diagnostic:
  - Bone scan (CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, CPT® 78315, or CPT® 78803 – radiopharmaceutical localization of tumor, inflammatory process, or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); tomographic (SPECT))
  - Nuclear Bone Marrow imaging (CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104), OR
  - Radiopharmaceutical localization of tumor, inflammatory process, or distribution of radiopharmaceutical agent imaging (CPT® codes: CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803)
  - MRI without contrast of specific painful body areas when plain x-ray and bone scan are insufficient to direct acute patient care decisions.
  - Literature suggests MRI may have greater sensitivity for clinically occult vertebral lesions than bone scan. Given possible complications of vertebral involvement, MRI spine without and with contrast (CPT® 72156, 72157, 72158) can be approved on an annual basis for screening of clinically occult radiographically active lesions of the vertebral bodies.
Whole body MRI is considered investigational for CRMO at this time due to lack of standardization in technique and lack of published evidence showing improvement in patient outcomes over monitoring with clinical symptoms, plain radiography, and bone scan. See Preface-5.2: Whole Body MR Imaging for additional details.

PEDMS-10.3: Inflammatory Muscle Diseases

- A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination, and plain radiography should be performed prior to considering advanced imaging.

Inflammatory Muscle Diseases:
These include dermatomyositis, polymyositis, and sporadic inclusion body myositis. MRI without contrast of a single site is indicated in these disorders for the following purposes:
- Selection of biopsy site
- Clinical concern for progression
- Treatment monitoring
- Detection of occult malignancy

Juvenile Dermatomyositis:
- MRI without contrast can frequently confirm the diagnosis and thus avoid a biopsy.
- CT without contrast (CPT® 73700) is indicated to follow progressive calcification in muscles, but MRI (CPT® 73718) is often used instead since it permits assessment of the primary muscle disease as well.
  - Both CT and MRI are rarely indicated concurrently, and these requests should be forwarded for medical director review.
- Contrary to adult dermatomyositis, juvenile dermatomyositis is very rarely paraneoplastic in nature, and routine screening for occult neoplasm is not indicated.
  - For patients with palpable lymphadenopathy or hepatosplenomegaly, CT Chest (CPT® 71260) and Abdomen and Pelvis (CPT® 74177) with contrast are indicated.
References


Muscle and tendon unit injury imaging indications in pediatric patients are identical to those for adult patients. See **MS-11: Muscle/Tendon Unit Injuries/Diseases** for imaging guidelines.
PEDMS-12: Osgood-Schlatter Disease

- Osgood-Schlatter Disease is defined as traction apophysitis of the tibial tubercle in skeletally immature individuals. Diagnosis is by clinical examination and x-ray, and treatment is conservative.

- Advanced imaging is not indicated in this disorder.

References
**PEDMS-13: Popliteal (Baker) Cyst**

Popliteal or Baker cyst in children is a different clinical entity than in adults and is almost never due to intra-articular pathology. These lesions are usually treated conservatively and rarely require surgery.

- Ultrasound (CPT® 76881) is the appropriate initial imaging study.
- MRI without contrast (CPT® 73721) is indicated for preoperative planning or if ultrasound is non-diagnostic.

**References**


**PEDMS-14: Slipped Capital Femoral Epiphysis (SCFE)**

Slipped capital femoral epiphysis (SCFE) should be considered in young adolescents or preadolescents with groin, anterior thigh, or atraumatic knee pain. Symptoms often include a history of intermittent limp and pain for several weeks or months that are often poorly localized to the thigh, groin, or knee. Any obese adolescent or preadolescent presenting with a history of a limp and thigh, knee, or groin pain for several weeks to one month should be presumed to have a slipped capital femoral epiphysis (SCFE).

**Imaging studies:**

- Anteroposterior and lateral x-rays (frog leg or cross table lateral) of both hips will confirm or exclude the diagnosis.
  - If clinical suspicion remains after negative plain films, MRI without contrast (CPT® 73721) or without and with contrast (CPT® 73723) is indicated to detect widening of the physis before the femoral head is displaced (pre-slip).
- Because a significant percentage of SCFE is bilateral at presentation, it is reasonable to evaluate the contralateral hip if requested, as some surgeons advocate surgical treatment of pre-slip. All bilateral hip requests should be forwarded for Medical Director Review.
  - For unilateral hip use CPT® 73721 (without contrast) or CPT® 73723 (without and with contrast).
  - For bilateral hips use a single CPT® 73721 (without contrast) or CPT® 73723 (without and with contrast) and add modifier -50.
- If MRI was not completed for diagnosis, MRI without contrast is indicated for preoperative planning.

**References**

PEDMS-15: Limb Length Discrepancy

- Limb length discrepancy imaging indications in pediatric patients are identical to those for adult patients. See MS-17.1: Limb Length Discrepancy for imaging guidelines.
## PEDMS-16: Congenital Anomalies of the Foot

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| PEDMS-16.3: Vertical Talus | 39 |
PEDMS-16.1: Tarsal Coalition (Calcaneonavicular Bar/Rigid Flat Foot)

- Plain x-rays should be performed initially since the calcaneonavicular bar is readily visible in older children and adults.
  - Talocalcaneal coalition is more difficult to evaluate on plain x-rays.
- If tarsal coalition is suspected (because of restricted hindfoot motion on physical exam), and plain x-rays are inconclusive, CT without contrast (CPT® 73700) or MRI without contrast (CPT® 73718) is indicated.

PEDMS-16.2: Club Foot

Club Foot is a congenital foot contracture with foot in equinus (plantar flexion) and heel and forefoot in varus/adduction (turned in). Immediate diagnosis and specialty evaluation in the first week of life provide the best chance for successful correction.

- Plain x-rays should be performed initially since the anomaly is readily visible in older children and adults.
- Ultrasound (CPT® 76881) can be used to characterize the cartilaginous tarsal bones and demonstrate tarsal bone alignment in infants with non-ossified tarsal bones.
- MRI is not currently used to image clubfoot, and limited experiences are published in the literature. MRI (CPT® 73718) or CT (CPT® 73700) can be approved to determine residual deficits following repair.

PEDMS-16.3: Vertical Talus

- Congenital vertical talus (also known as congenital rocker-bottom foot) is a fixed foot deformity characterized by irreducible talonavicular dislocation. The talus is plantar flexed and does not articulate with the navicular bone.
- Plain x-rays should be performed initially since the anomaly is readily visible in older children and adults.
- MRI (CPT® 73718) or CT (CPT® 73700) can be approved to determine residual deficits following repair.

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## PEDNECK-1: General Guidelines

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PEDNECK-1.1: Age Considerations

Many conditions affecting the neck in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are <18 years old should be imaged according to the Pediatric Neck Imaging Guidelines, and patients who are ≥18 years old should be imaged according to the Adult Neck Imaging Guidelines, except where directed otherwise by a specific guideline section.

PEDNECK-1.2: Appropriate Clinical Evaluation

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging (CT, MRI, Nuclear Medicine), unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the neck is not supported. Advanced imaging of the neck should only be approved in patients who have documented active clinical signs or symptoms of disease involving the neck.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the neck are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

PEDNECK-1.3: Modality General Considerations

- MRI

  - MRI Neck is generally performed without and with contrast (CPT® 70543) unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.

  - Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years) as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:

    - MRI procedures can be performed without and/or with contrast use as supported by these condition based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.

The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.

If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.

The presence of surgical hardware or implanted devices may preclude MRI.

The selection of best examination may require coordination between the provider and the imaging service.

**CT**

CT Neck typically extends from the base of the skull to the upper thorax.

- A separate CPT® code for head imaging in order to visualize the skull base is not necessary.
- In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.

CT Neck is generally performed with contrast (CPT® 70491) unless the patient has a documented contraindication to CT contrast or otherwise stated in a specific guideline section.

CT Neck may be indicated for further evaluation of abnormalities suggested on prior US or MRI Procedures.

In general, CT Neck is appropriate when evaluating trauma, malignancy, and for preoperative planning.

CTA Neck (CPT® 70498) is indicated for evaluation of the vessels of the neck, especially with concern for dissection.

CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.

The selection of best examination may require coordination between the provider and the imaging service.

**Ultrasound**

Ultrasound soft tissues of the neck (CPT® 76536) is indicated as an initial study for evaluating adenopathy, other palpable mass or swelling, thyroid, parathyroid, parotid and other salivary glands, and cysts.

For those patients who do require additional advanced imaging after ultrasound, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the patient.
Nuclear Medicine

Nuclear medicine studies of the neck in pediatric patients are most commonly used to evaluate neck masses, or thyroid and parathyroid disease following initial studies with anatomic imaging, such as ultrasound, CT, or MRI. See PEDNECK-2: Neck Masses (Pediatric) and PEDNECK-6: Thyroid and Parathyroid for imaging guidelines.

Salivary Gland Nuclear Imaging (one of CPT® 78230, CPT® 78231, or CPT® 78232) is indicated for the following:
- Evaluation of salivary gland function in patients with dry mouth (xerostomia) and one of the following:
  - Sjögren syndrome
  - Sialadenitis
  - History of head or neck radiation therapy

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References
PEDNECK-2: Neck Masses (Pediatric)

Evaluation of neck masses in pediatric patients involves careful consideration of clinical history and accurate physical examination. The patient's age and knowledge of the anatomy and common lesions of the neck are very important in narrowing the differential diagnosis.

- Ultrasound Neck (CPT® 76536) is indicated as the initial imaging study of choice. Ultrasound helps define the size and extent of localized superficial masses and helps confirm whether they are cystic or solid. Color Doppler ultrasound (CPT® 93880 bilateral study or carotid arteries or CPT® 93882 unilateral study) can evaluate the vasculature.

- MRI Neck without contrast (CPT® 70540) or without and with contrast (CPT® 70543), or CT Neck with contrast (CPT® 70491) can be approved if ultrasound is inconclusive or to further characterize abnormalities seen on ultrasound.

- Cervical lymphadenitis is common in children and follows most viral or bacterial infections of the ears, nose, and throat. No advanced imaging is necessary with uncomplicated lymph node enlargement. When lymphadenopathy persists for more than 4 weeks of treatment or there is suspicion of complications, such as abscess formation, ultrasound is indicated, See PEDNECK-3: Cervical Lymphadenopathy.

- Congenital cervical cysts frequently present in children and include thyroglossal duct cyst (55% of cases), cystic hygroma (25%), branchial cleft cysts (16%), bronchogenic cyst (0.91%), and thymic cyst (0.3%).
  - Barium swallow and MRI Neck without and with contrast (CPT® 70543) or CT Neck with contrast (CPT® 70491) are indicated for diagnosis of fourth branchial cleft cysts.
  - Ultrasound is indicated for initial evaluation of a suspected cystic neck mass.
  - MRI Neck without and with contrast (CPT® 70543) or CT Neck with contrast (CPT® 70491) may be indicated for preoperative planning.

- Salivary gland nuclear imaging (one of CPT® 78230, CPT® 78231, or CPT® 78232) is indicated for evaluation of parotid masses to allow preoperative diagnosis of Warthin’s tumor.

Practice Notes

- The most common malignant ENT tumors in children are lymphoma and rhabdomyosarcoma.
Differential Diagnosis of Neck Lesions by Anatomic Region:

- **Subcutaneous tissues:**
  - Teratoma (includes dermoid cysts)
    - Cervical teratomas are typically large bulky masses discovered at birth or in the first year of life.
    - Large lesions may cause stridor, dyspnea, or dysphagia.
    - Most teratomas arise in the anterior suprahyoid neck and may be midline or off midline in location and adjacent to or within a thyroid lobe.
  - Vascular malformations
  - Lipoma
  - Cellulitis
  - Plexiform neurofibromas
  - Keloid
  - Scar
  - Pilomatrixoma
  - Subcutaneous fat fibrosis (in neonates)

- **Retropharyngeal space:**
  - Abscess, cellulitis, adenitis
    - Usually involves children under age 6.
    - Patients have history of upper respiratory tract infection followed by high fever, dysphagia, and neck pain.
  - Lymphadenopathy
  - Extension of goiter
  - Extension of pharyngeal tumor

- **Retrovisceral space (posterior to the cervical esophagus):**
  - Gastrointestinal duplication cysts (usually are diagnosed in first year of life).

- **Pretracheal space (contains trachea, larynx, cervical esophagus, recurrent laryngeal nerves, and thyroid and parathyroid glands):**
  - Thyroglossal duct cyst
    - Thyroglossal duct cyst is most common before the age of 20, 75% present as a midline mass and 43% of patients present with an infected mass.
    - Usually presents as an enlarging, painless midline mass.
    - Thyroid carcinoma occurs in 1% of thyroglossal duct cysts.
  - Goiter
  - Laryngocele
  - Lymphadenopathy
  - Teratoma
  - Abscess
  - Extopic thymus or cervical extension of normal thymus

- **Danger space (closed space lying between the skull base and the posterior mediastinum and between the alar and prevertebral fasciae in a sagittal plane):**
  - Cellulitis
  - Abscess
▶ Prevertebral space:
  ◦ Neurenteric cyst
  ◦ Cellulitis
  ◦ Abscess
  ◦ Spondylodiskitis
  ◦ Lymphadenopathy
  ◦ Cellulitis
  ◦ Paraganglioma

▶ Carotid sheath space:
  ◦ Jugular vein thrombosis or phlebitis
  ◦ Lymphadenopathy
  ◦ Cellulitis
  ◦ Abscess
  ◦ Paraganglioma

▶ Parotid gland space:
  ◦ Parotid lymphadenopathy
  ◦ Retromandibular vein thrombosis
  ◦ Parotiditis
  ◦ Sialodochitis (inflammation of the salivary gland duct)
  ◦ Salivary duct stone

▶ Submandibular and sublingual spaces:
  ◦ Thyroglossal duct cyst
  ◦ Branchial cleft cyst
    ▪ 90% of branchial abnormalities arise from the second branchial apparatus.
    ▪ Second branchial cleft cysts are the most common branchial cleft cyst and usually present in patients between 10 and 40 years as painless fluctuant masses.
    ▪ They typically present as slowly growing, nontender masses in the upper neck
    ▪ Most second branchial cleft cysts are located in the submandibular space, at the anteromedial border of the sternocleidomastoid muscle, lateral to the carotid space, or posterior to the submandibular gland.
    ▪ Ranula – typically cystic masses in the floor of the mouth.

▶ Masticator space (includes masseter and pterygoid muscles):
  ◦ Venous or lymphatic malformation
  ◦ Cellulitis
  ◦ Abscess
  ◦ Rhabdomyosarcoma

▶ Parapharyngeal space:
  ◦ Cellulitis
  ◦ Abscess
  ◦ Rhabdomyosarcoma
  ◦ Extension of lymphoma
Paravertebral space:
- Cervical dermal sinus (epithelium-lines dural tubes that connect the skin with the central nervous system or its covering)
- Meningocele
- Rhabdomyosarcoma
- Lymphoma
- Neuroblastoma
- Neurofibroma

Posterior cervical space:
- Lymphadenopathy
- Lymphatic malformation

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**PEDNECK-3.1: Imaging**

- Painful acute lymphadenopathy and other painful neck masses (including neck "swelling") should be treated with a trial of conservative therapy for at least 4 weeks, including antibiotics if appropriate.
  - If there is improvement with conservative treatment, advanced imaging is not indicated.
  - If there is unexplained fever with a temperature ≥100.4°F and there is clinical concern for suppurative lymphadenopathy or a neck abscess, ultrasound (CPT® 76536) is indicated without 4 weeks of treatment and observation.

- Ultrasound Neck (CPT® 76536) is indicated as an initial evaluation if lymphadenopathy persists following 4 weeks of treatment and/or observation.

- MRI Neck without contrast (CPT® 70540) or without and with contrast (CPT® 70543) or CT Neck with contrast (CPT® 70491) can be approved if ultrasound is inconclusive or to further characterize abnormalities seen on ultrasound. Both are superior to ultrasound for defining the relationship of an abscess to adjacent structures, particularly the airway; and detecting posterior cervical, mediastinal and intracranial extension.

- If systemic symptoms or other clinical findings suggest malignancy, See **PEDONC-5: Pediatric Lymphomas** in the Pediatric Oncology Imaging Guidelines.

**Practice Notes**

Inflammatory lymph nodes from acute lymphadenitis are usually painful, tender and mobile, frequently associated with upper respiratory infection, pharyngitis or dental infection.

Occasionally, sarcoidosis or toxoplasmosis and Human immunodeficiency virus (HIV) can cause inflammatory lymphadenopathy as well.

**References**

PEDNECK-4: Dystonia/Torticollis

Infants under 12 Months of Age (Congenital Muscular Torticollis)

- Ultrasound Neck (CPT® 76536) is indicated as the initial study to evaluate suspected congenital muscular torticollis, also called fibromatosis coli.
  - Patients usually present by 2 weeks of life with an anterior neck mass, which is commonly right sided (75% of cases). A history of a traumatic breech or forceps delivery is common.
  - If Ultrasound is Positive → No further imaging is needed since diagnosis is defined.
  - If Ultrasound is Negative → CT Neck with contrast (CPT® 70491) or MRI Neck without contrast (CPT® 70540) or without and with contrast (CPT® 70543) can be approved to evaluate for other structural causes.

Children and Adults (Acquired Torticollis)

- Injury or inflammation involving the sternocleidomastoid or trapezius muscles is the most common cause of acquired torticollis in children.

- If there has been recent trauma, plain radiographs of the cervical spine should be obtained as an initial evaluation when the suspicion of injury is low. CT Neck with contrast (CPT® 70491) and/or CT Cervical Spine without contrast (CPT® 72125) is indicated as the initial study to identify fracture or malalignment if plain radiographs are inconclusive or in patients with a high risk mechanism of cervical spine injury within the last 3 months (See below**). MRI Cervical Spine without contrast (CPT® 72141) is also appropriate in the clinical setting of cervical spine trauma with an associated neurologic deficit.

- In the absence of trauma, CT Neck with contrast (CPT® 70491), CT Cervical Spine without contrast (CPT® 72125), MRI Cervical Spine without contrast (CPT® 72141), MRI Neck without and with contrast (CPT® 70543), or MRA Neck without and with contrast (CPT® 70549) can be approved to identify underlying abscess, bony, muscular, vascular, or neurologic causes.
  - Positive → Further advanced imaging is not required if a local cause has been identified.
  - Negative → MRI Brain without and with contrast (CPT® 70553) to exclude CNS cause.

**High risk mechanisms of cervical spine injury may include:
- Head trauma and/or maxillofacial trauma
- Pedestrian in a motor vehicle accident
- Fall from above standing height
- Diving accident
- Head-on motor vehicle collision without/with airbag deployment
- Rollover motor vehicle collision
- Ejection from the vehicle in a motor vehicle collision
- High speed of the vehicle at the time of collision
Not wearing a seatbelt/shoulder harness in a motor vehicle collision

Patients with ankylosing spondylitis are at high risk of cervical spine fractures even with minor direct/indirect trauma to the cervical spine which can result in quadriparesis/quadriplegia

**Practice Note**

Torticollis or cervical dystonia is an abnormal twisting of the neck in which the head is rotated or twisted. Acute causes are most common. Other causes are variable and may be congenital, acquired (caused by trauma, juvenile idiopathic arthritis, or neoplasm), or idiopathic. Imaging approach is same as that for acute torticollis in children.

**References**

PEDNECK-5: Dysphagia

Dysphagia imaging indications in pediatric patients are very similar to those for adult patients. See **Neck-3: Dysphagia and Esophageal Disorders** in the Neck Imaging Guidelines.

Pediatric-specific imaging considerations include the following:
- X-rays neck and chest may be appropriate as the initial imaging study when concerned for foreign body ingestion as cause of dysphagia.
- Esophageal motility study (CPT® 78258) is indicated for ANY of the following:
  - Dysphagia associated with chest pain and difficulty swallowing both solids and liquids.
  - Gastroesophageal reflux.
- CTA Chest (CPT® 71275) or MRA Chest (CPT® 71555) is indicated for a suspected vascular ring, which can be associated with dysphagia:
  - A right aortic arch or double arch noted on chest radiography is an indication for CTA or MRA.

References
### PEDNECK-6: Thyroid and Parathyroid

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PEDNECK-6.1: Thyroid Masses or Nodules

➤ Ultrasound Neck (CPT® 76536) is the recommended initial study for evaluation of thyroid masses or nodules in pediatric patients.
  ◆ If TSH normal or elevated, fine needle aspiration (FNA) under ultrasound guidance (CPT® 76942) is indicated.
  ◆ If TSH is low, nuclear thyroid scintigraphy (either CPT® 78013 or CPT® 78014), is indicated.
    ▪ Hyperfunctioning nodules should be resected surgically.
    ▪ Hypofunctioning nodules should undergo FNA under ultrasound guidance (CPT® 76942).

➤ CT Neck without contrast (CPT® 70490) or with contrast (CPT® 70491), or MRI Neck without contrast (CPT® 70540) or without and with contrast (CPT® 70543) is indicated for preoperative planning in patients with large or fixed masses, vocal cord paralysis, or bulky cervical or supraclavicular adenopathy.
  ◆ CT Chest without contrast (CPT® 71250) or with contrast (CPT® 71260) is also indicated for patients with substernal extension of the thyroid, pulmonary symptoms, or abnormalities on recent chest x-ray.

➤ If any biopsy reveals thyroid carcinoma, See ONC-6: Thyroid Cancer in the Oncology Imaging Guidelines.

➤ If the biopsy shows indeterminate findings, repeat ultrasound (CPT® 76536) and/or FNA (CPT® 76942) is indicated 3 months following initial biopsy.
  ◆ If the nodule is stable and/or FNA is benign, repeat ultrasound (CPT® 76536) is indicated in 6 months.
  ◆ If the nodule is growing or the FNA is not benign, the nodule should be resected surgically.

➤ If the initial biopsy shows benign findings, repeat ultrasound (CPT® 76536) is indicated 6 months following initial biopsy.
  ◆ If the nodule is stable, repeat ultrasound (CPT® 76536) is indicated annually.
  ◆ If the nodule is growing or concerning new findings are present, the nodule should undergo repeat FNA (CPT® 76942) or be resected surgically.
  ◆ Benign nodules that have been surgically resected do not require routine imaging follow up in the absence of clinical or laboratory changes suggesting recurrence.

PEDNECK-6.2: Hyperthyroidism

➤ Ultrasound Neck (CPT® 76536) is the recommended initial study for evaluation of hyperthyroidism. Common causes are Graves’ disease and autoimmune disorders (lupus, rheumatoid arthritis and Sjogren syndrome).
  ◆ If a nodule or mass is discovered on ultrasound, the patient should be imaged according to PEDNECK-6.1: Thyroid Masses or Nodules.

➤ For all other patients with documented hyperthyroidism, thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is indicated.
**PEDNECK-6.3: Hypothyroidism**

- Causes include thyroid congenital dysgenesis, dyshormonogenesis autoimmune thyroiditis, Hashimoto thyroiditis, subacute thyroiditis, and abnormality in the pituitary gland or hypothalamus. Congenital hypothyroidism is usually diagnosed in the neonate on a routine perinatal screening examination.

- Ultrasound (CPT® 76536) is the recommended initial study for evaluation of hypothyroidism.
  - If a nodule or mass is discovered on ultrasound, the patient should be imaged according to **PEDNECK-6.1: Thyroid Masses or Nodules**.

- For patients with documented congenital hypothyroidism, thyroid uptake nuclear imaging (either CPT® 78012 or CPT® 78014) is indicated.

**PEDNECK-6.4: Parathyroid Imaging**

- Either ultrasound (CPT® 76536) or sestamibi parathyroid nuclear imaging (one of CPT® 78070, CPT® 78071, or CPT® 78072) is indicated for initial evaluation of primary or recurrent hyperparathyroidism, generally indicated by one of the following:
  - Serum calcium (>1 mg/dL over upper limit of normal).
  - Elevated serum calcium and elevated serum parathyroid hormone (PTH).

- CT Neck without and with contrast (CPT® 70492) or MRI Neck without contrast (CPT® 70540) or without and with contrast (CPT® 70543) is indicated for any of the following:
  - Preoperative planning for localization.
  - Serum calcium (>1 mg/dL over upper limit of normal).
  - Recurrent or persistent hyperparathyroidism following neck exploration (MRI preferred unless contraindicated).
References


Esophagus imaging indications in pediatric patients are very similar to those for adult patients. See Neck-3: Dysphagia and Esophageal Disorders in the Neck Imaging Guidelines.

Pediatric-specific imaging considerations include the following:

- Esophagram is the study of choice for evaluating congenital atresia with associated tracheoesophageal fistula.
- Plain radiographs alone usually suffice for the diagnosis of other types of esophageal atresia and a contrast examination of the esophagus is not warranted but may be indicated for post-operative evaluation.
- CT Neck with contrast (CPT® 70491) and CT Chest with contrast (CPT® 71260) are indicated for evaluation of suspected congenital malformations if x-rays or esophagram are inconclusive.
  - 3D rendering may be approvable for preoperative planning in complex cases.

References
Trachea imaging indications in pediatric patients are very similar to those for adult patients. See **Neck-9: Trachea and Bronchus** in the Neck Imaging Guidelines.

Pediatric-specific imaging considerations include the following:

- CT Neck with contrast (CPT® 70491) and CT Chest with contrast (CPT® 71260) are indicated for evaluation of suspected congenital malformations if x-rays are inconclusive.
  - 3D rendering may be approvable for preoperative planning in complex cases.
- CT is not routinely performed to evaluate foreign body aspiration, but it may be considered in complicated cases.

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## Abbreviations for Pediatric Oncology Imaging Guidelines

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<th>Description</th>
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<tr>
<td>AFP</td>
<td>Alpha-fetoprotein (tumor marker)</td>
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<tr>
<td>ALCL</td>
<td>Anaplastic large cell lymphoma</td>
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<tr>
<td>ALL</td>
<td>Acute lymphoblastic leukemia</td>
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<tr>
<td>AML</td>
<td>Acute myelogenous leukemia</td>
</tr>
<tr>
<td>β-hCG</td>
<td>Human chorionic gonadotropin beta-subunit (tumor marker)</td>
</tr>
<tr>
<td>BKL</td>
<td>Burkitt's lymphoma</td>
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<tr>
<td>BWT</td>
<td>Bilateral Wilms tumor</td>
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<tr>
<td>CCSK</td>
<td>Clear cell sarcoma of the kidney</td>
</tr>
<tr>
<td>CNS</td>
<td>Central nervous system</td>
</tr>
<tr>
<td>COG</td>
<td>Children's Oncology group</td>
</tr>
<tr>
<td>CPT®</td>
<td>Current procedural terminology; trademark of the American Medical Association</td>
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<tr>
<td>CSF</td>
<td>Cerebrospinal fluid</td>
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<tr>
<td>CT</td>
<td>Computed tomography</td>
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<tr>
<td>CXR</td>
<td>Chest x-ray</td>
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<tr>
<td>DAWT</td>
<td>Diffuse anaplasia Wilms tumor</td>
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<tr>
<td>ESFT</td>
<td>Ewing sarcoma family of tumors</td>
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<tr>
<td>FAWT</td>
<td>Focal anaplasia Wilms tumor</td>
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<tr>
<td>FHWWT</td>
<td>Favorable histology Wilms tumor</td>
</tr>
<tr>
<td>HL</td>
<td>Hodgkin lymphoma</td>
</tr>
<tr>
<td>HSCT</td>
<td>Hematopoietic stem cell transplant (bone marrow or peripheral blood)</td>
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<tr>
<td>HVA</td>
<td>Homovanillic acid</td>
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<tr>
<td>LL</td>
<td>Lymphoblastic lymphoma</td>
</tr>
<tr>
<td>MIBG</td>
<td>Metaiodobenzylguanidine (nuclear scan using $^{123}$I or $^{131}$I)</td>
</tr>
<tr>
<td>MPNST</td>
<td>Malignant peripheral nerve sheath tumor</td>
</tr>
<tr>
<td>MRI</td>
<td>Magnetic resonance imaging</td>
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<tr>
<td>NBL</td>
<td>Neuroblastoma</td>
</tr>
<tr>
<td>NED</td>
<td>No evidence of disease</td>
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<tr>
<td>NHL</td>
<td>Non-hodgkin lymphoma</td>
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<td>NPC</td>
<td>Nasopharyngeal carcinoma</td>
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<tr>
<td>NRSTS</td>
<td>Nonrhabdomyosarcomatous soft tissue sarcomas</td>
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<td>OS</td>
<td>Osteosarcoma</td>
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<td>PET</td>
<td>Positron emission tomography</td>
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<td>PMBCL</td>
<td>Primary mediastinal b-cell lymphoma</td>
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**PEDONC-1: General Guidelines**

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PEDONC-1.1: Age Considerations

The majority of malignancies occurring in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management between pediatric and adult medical oncologists due to patient age, comorbidities, and differences in disease natural history between children and adults.

▸ Patients who are < 18 years old at initial diagnosis should be imaged according to the Pediatric Oncology Imaging Guidelines, and patients who are ≥ 18 years at initial diagnosis should be imaged according to the adult Oncology Imaging Guidelines, except where directed otherwise by a specific guideline section.

▸ Patients who are 15 to 39 years old at initial diagnosis are defined as Adolescent and Young Adult (AYA) Oncology patients. There is significantly more overlap between cancer types in this age group.
  ◆ When unique guidelines for a specific cancer type exist only in either Oncology or Pediatric Oncology, AYA patients should be imaged according to the guideline section for their specific cancer type, regardless of the patient’s age.
PEDONC-1.2: Appropriate Clinical Evaluations

- In general, a recent (within 60 days) detailed history and physical examination and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled off-therapy surveillance evaluation.
  - Because of the relatively small number of childhood cancer treatment centers, it is common to combine off-therapy visits with imaging and other subspecialist visits to accommodate families traveling long distances for their child’s care.

- The majority of pediatric oncology imaging indications are listed in the diagnosis-specific guideline sections, but for rare malignancies and other circumstances not specifically addressed elsewhere in the pediatric oncology guidelines, the following general principles apply:
  - Routine imaging of brain, spine, neck, chest, abdomen, pelvis, bones, or other body areas is not indicated in the absence of localizing symptoms or abnormalities on plain radiography or ultrasound.

- The overwhelming majority of pediatric oncology patients treated in the United States will be enrolled on or treated according to recent Children’s Oncology Group (COG) protocols. These imaging guidelines are consistent with evaluations recommended by COG protocols commonly used for direct patient care (whether formally enrolled on study or not).

- For patients enrolled on a COG study, imaging recommended by COG protocols should generally be approved unless the imaging is being performed solely to address a study objective and would not be indicated in usual clinical care.
Phases of Pediatric Oncology Imaging:

- **Screening:**
  - All imaging studies requested for patients at increased risk for a particular cancer in the absence of any clinical signs or symptoms.
  - Screening using advanced imaging is only supported for conditions listed in PEDONC-2: Screening Imaging In Cancer Predisposition Syndromes.

- **Initial staging:**
  - All imaging studies requested from the time cancer is first clinically suspected until the initiation of specific treatment (which may be surgical resection alone).
  - Pediatric malignancies in general behave more aggressively than adult cancers, and the time from initial suspicion of cancer to specific therapy initiation can be measured in hours to days for most pediatric cancers.
    - It is recommended that children with pediatric solid tumors undergo CT evaluation of the Chest prior to general anesthesia for biopsy or resection due to the risk of post-operative atelectasis mimicking pulmonary metastasis resulting in inaccurate staging and/or delay in therapy initiation.
    - If CTs of other body areas are indicated, (Neck, Abdomen, Pelvis), they should be performed concurrently with Chest CT to avoid overlapping fields and the resulting increase in radiation exposure.
    - Metastatic CNS imaging and nuclear medicine imaging are generally deferred until after a histologic diagnosis is made, with the exception of aggressive non-Hodgkin Lymphomas.

- **Treatment response:**
  - All imaging studies completed during any type of active treatment (chemotherapy or other medications, radiation therapy, or surgery), including evaluation at the end of planned active treatment.
  - Unless otherwise stated in the diagnosis-specific guidelines, imaging for treatment response can be approved after every 2 cycles, which is usually ~6 weeks of therapy for solid tumors and usually ~8 to 12 weeks for CNS tumors.

- **Surveillance:**
  - All routine imaging studies requested for a patient who is not receiving any active treatment, even if residual imaging abnormalities are present.
  - Unlike adult cancers, in most pediatric cancers surveillance does not begin until all planned multimodal therapy is completed. Pediatric cancers where surgical resection is considered curative are listed in the diagnosis-specific guideline sections.
  - The recommended timing for surveillance imaging studies in these guidelines refers to patients who are asymptomatic or have stable chronic symptoms.
  - Certain tumor types do not require surveillance with advanced imaging as patient outcomes following relapse are not improved by surveillance imaging. See diagnosis-specific guideline sections for details.
  - PET imaging is not supported for surveillance imaging unless specifically stated in elsewhere in the diagnosis-specific guideline sections.
Patients with new or changing clinical signs or symptoms suggesting recurrent disease should have symptom-appropriate imaging requests approved even when surveillance timing recommendations are not met.

Recurrence:
- All imaging studies completed at the time a recurrence or progression of a known cancer is documented or is strongly suspected based on clinical signs or symptoms, laboratory findings, or results of basic imaging studies such as plain radiography or ultrasound.
- Following documented recurrence of childhood cancer, any studies recommended for initial staging of that cancer type in the diagnosis-specific imaging guideline section should be approved.
- During active treatment for recurrent pediatric cancer, conventional imaging evaluation (CT or MRI, should use the same modality for ongoing monitoring as much as possible) of previously involved areas should be approved according to the treatment response imaging in the diagnosis-specific guideline section:
  - Imaging may be indicated more frequently than recommended by guidelines with clinical documentation that the imaging results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance.
- Unless otherwise specified for a specific cancer type, PET is generally not indicated for routine treatment response evaluation during active treatment for recurrent pediatric cancer.
  - In rare circumstances, PET may be appropriate when results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance.
  - These requests will be forwarded for Medical Director review.
- If a patient with recurrent pediatric cancer completes active treatment with no evidence of disease (NED), s/he should be imaged according to the diagnosis-specific surveillance guideline sections.

Radiation Treatment Planning In Pediatric Oncology:
- Imaging performed in support of radiation therapy treatment planning should follow guidelines outlined in ONC-1.5: Unlisted Procedure Codes in Oncology.
Cardiac Function Assessment in Pediatric Oncology During Active Treatment:

- Echocardiography (CPT® 93306, CPT® 93307, or CPT® 93308) is preferred for evaluation of cardiac function prior to cardiotoxic chemotherapy and can be performed as often as each chemotherapy cycle at the discretion of the treating pediatric oncologist based on:
  - Cumulative cardiotoxic therapy received to date
  - Patient’s age and gender
  - Most recent echocardiogram results
  - New or worsening cardiac symptoms

- Multigated acquisition (MUGA, CPT® 78472) blood pool nuclear medicine scanning should not be approved for cardiac function monitoring in pediatric oncology patients unless one of the following applies:
  - Echocardiography yielded a borderline shortening fraction (< 30%) and additional left ventricular function data are necessary to make a chemotherapy decision
  - Echocardiography windowing is suboptimal due to body habitus or tumor location

Immunosuppression during Pediatric Cancer therapy and imaging ramifications:

- Patients may be severely immunocompromised during active chemotherapy treatment and any conventional imaging request to evaluate for infectious complications during this time frame should be approved immediately

- Imaging requests for infectious disease concerns for all patients with absolute neutrophil count (ANC) < 500 or inconclusive findings on Chest x-ray or US at any ANC during active treatment should be approved as requested

- Additionally, patients may have therapy-induced hypogammaglobulinemia which requires supplemental intravenous immune globulin (IVIG) during maintenance therapy. Patients receiving supplemental IVIG should be treated similarly to patients with ANC < 500 with regards to imaging for infectious disease.

- Some patients are treated with very intensive chemotherapy regimens (including autologous stem cell transplantation - See ONC-29: Hematopoietic Stem Cell Transplantation and spend the majority of their chemotherapy treatment phase in the hospital. Due to the high risk of invasive infections, frequent CT may be indicated to evaluate known sites of invasive fungal infection, and in general these should be approved as requested.
  - Surveillance imaging of asymptomatic patients to detect invasive fungal infection has not been shown to impact patient outcomes. Imaging requests in these circumstances should only be approved when acute clinical decisions will be made based on the imaging.
Hematopoietic Stem Cell Transplant (HSCT) in Pediatric Oncology:

- Transplantation of hematopoietic stem cells from bone marrow, peripheral blood, or cord blood is commonly used in the following clinical situations in pediatric hematology and oncology patients:
  - High risk or recurrent leukemia (allogeneic)
  - Recurrent lymphoma (allogeneic or autologous)
  - Hemophagocytic lymphohistiocytosis (allogeneic)
  - High risk sickle cell disease (allogeneic)
  - High risk neuroblastoma (autologous)
  - High risk CNS tumors (autologous)
  - Recurrent Ewing sarcoma family of tumors (autologous, rarely allogeneic)

- Imaging considerations for HSCT should follow guidelines in:
  
  **ONC-29: Hematopoietic Stem Cell Transplantation.**
PEDONC-1.3: Modality General Considerations

- Plain radiography
  - Chest x-ray (CXR) can provide a prompt means to evaluate primary intrathoracic tumors and continues to be the initial imaging study recommended to detect complications, such as suspected infection, in symptomatic patients undergoing treatment.
  - CXR continues to be the initial imaging study recommended for pulmonary surveillance for some pediatric cancers. See diagnosis-specific guideline sections for details.
  - Plain radiography continues to be the initial imaging study recommended for evaluation of lesions involving the appendicular skeleton, both during and after completion of treatment. See diagnosis-specific guideline sections for details.
  - Plain abdominal radiographs have been replaced by ultrasound, CT, or MRI

- Ultrasound
  - Ultrasound is not widely used in pediatric oncology for staging, but is frequently used for surveillance in patients who have successfully treated (primarily abdominal or pelvic) tumors with little or no residual disease. See diagnosis-specific guideline sections for details.

- CT
  - CT with contrast is the imaging study of choice in pediatric patients with lymphomas or solid tumors of the neck, thorax, abdomen, and/or pelvis
    - If CT contrast use is contraindicated due to allergy or impaired renal function, either CT without contrast or MRI without and with contrast may be substituted at the discretion of the ordering physician

- MRI
  - MRI without and with contrast is the study of choice for CNS and musculoskeletal tumors
    - If MRI contrast use is contraindicated due to allergy or impaired renal function, MRI without contrast may be substituted at the discretion of the ordering physician
  - Due to the length of time for image acquisition and the need for stillness, anesthesia is required for almost all infants and young children (age < 7 years), as well as older children with delays in development or maturity. In this patient population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:
    - MRI should always be performed without and with contrast unless there is a specific contraindication to gadolinium use, since the patient already has intravenous access for anesthesia.
      - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
The U.S. food and drug administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAS) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAS should be assessed.

If requesting clinicians indicate that a non-contrast study is being requested due to concerns regarding the use of gadolinium, the exam can be approved.

If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.

Nuclear medicine

General PET imaging consideration can be found in PEDONC-1.4: PET Imaging in Pediatric Oncology.

Bone scan is frequently used for evaluation of bone metastases during initial treatment, treatment response, and surveillance in pediatric oncology.

For the purposes of these guidelines, any of the following codes can be approved where “bone scan” is indicated:

- CPT® 78300
- CPT® 78305
- CPT® 78306
- CPT® 78803 or hybrid SPECT/CT (CPT® 78830 or 78832)
- SPECT CPT® 78305 and CPT® 78803 or hybrid SPECT/CT (CPT® 78830 or 78832)
- CPT® 78306 and CPT® 78803 or hybrid SPECT/CT (CPT® 78830 or 78832)
- If CPT® 78300 and CPT® 78803 are requested together, only CPT® 78803 should be approved
- CPT® 78315 has no specific indications for evaluation of malignant disease

123I-metaiodobenzylguanidine (MIBG) scintigraphy is the preferred metabolic imaging for neuroblastoma and is positive in 90 to 95% of neuroblastomas, and is also used for evaluation of pheochromocytomas, paragangliomas, ganglioneuromas, and ganglioneuroblatomas.

For the purposes of these guidelines, any of the following codes can be approved where “MIBG” is indicated:

- CPT® 78800
- CPT® 78801
- CPT® 78802
- CPT® 78803 or hybrid SPECT/CT (CPT® 78830 or 78832)
- CPT® 78804

Octreotide and gallium scans use the same CPT codes as MIBG.
**PEDONC-1.4: PET Imaging in Pediatric Oncology**

Throughout these guidelines, the term “PET” refers specifically to $^{18}$F-FDG-PET imaging and also applies to PET/CT fusion studies.

- PET imaging in pediatric Oncology should use PET/CT fusion imaging (CPT® 78815 or CPT® 78816) unless there is clear documentation that the treating facility does not have fusion capacity, in which case PET alone (CPT® 78812 or CPT® 78813) can be approved along with the appropriate CT studies. Unbundling PET/CT imaging into separate PET and diagnostic CT codes is otherwise not supported.

- The decision whether to use skull base to mid-femur (“eyes to thighs”) procedure code for PET (CPT® 78812 or CPT® 78815) or whole body PET (CPT® 78813 or CPT® 78816) is addressed in the diagnosis-specific guideline sections.

- PET imaging is not reliable for the detection of anatomic lesions smaller than 8 mm in size.

- PET imaging using isotopes other than $^{18}$F-FDG and $^{68}$Ga-DOTATATE is considered investigational at this time.

- PET has not been shown to be diagnostically useful in all forms of childhood cancer. PET is supported for pediatric malignancies with significant published evidence regarding its diagnostic accuracy and importance in accurately directing patient care decisions. See diagnosis-specific guideline sections for details.

- PET imaging is not specific to cancer, and has a high rate of false positivity. Inflammation, infection (especially granulomatous), trauma, and post-operative healing may show high levels of FDG uptake and be false-positive for malignant lesions.

- PET for rare malignancies not specifically addressed by eviCore guidelines is generally not indicated, due to lack of available evidence regarding diagnostic accuracy of PET in the majority of rare cancers. Conventional imaging studies should be used for initial staging and treatment response for these diagnoses. PET can be approved if all of the following apply:
  - Conventional imaging (CT, MRI, US, plain film) reveals findings that are equivocal or suspicious
  - No other specific metabolic imaging (MIBG, octreotide, technetium, etc.) is appropriate for the cancer type
  - The submitted clinical information describes a specific decision regarding the patient’s care that will be made based on the PET results
  - These requests will be forwarded for Medical Director review

- PET imaging is not supported for surveillance imaging unless specifically stated elsewhere in the diagnosis-specific guideline sections

- Unless otherwise specified for a specific cancer type, once PET has been documented to be negative for a given patient’s cancer or all PET-avid disease has been surgically resected, PET should not be used for continued disease monitoring or surveillance unless one of the following applies:
Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive or suspicious for recurrence
- Residual mass that has not changed in size since the last conventional imaging does **not** justify PET imaging
- PET avidity in a residual mass at the end of planned therapy is **not** an indication for PET imaging during surveillance.

Very rare circumstances where tumor markers or obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities

The patient is undergoing salvage treatment for a recurrent solid tumor with residual measurable disease on conventional imaging and confirmed repeat negative PET imaging will allow the patient to transition from active treatment to surveillance.

These requests will be forwarded for Medical Director review.
PEDONC-1.5: Diagnostic Radiation Exposure in Pediatric Oncology

Young children are presumed to be at increased risk for malignancy from diagnostic radiation exposure, most commonly from CT and nuclear medicine imaging. They are more sensitive to radiation than adults and generally live longer after receiving radiation doses from medical procedures, resulting in a larger number of years during which to manifest a cancer.

- Because of this presumed increased risk in young children, requests to substitute MRI without and with contrast for CT with contrast to avoid radiation exposure can be approved if all of the following criteria apply:
  - The patient is presently a young child and the ordering physician has documented the reason for MRI, rather than CT, is to avoid radiation exposure.
  - The disease-specific guidelines do not list CT as superior to MRI for the current disease and time point, meaning the MRI will provide equivalent or superior information relative to CT.
  - The request is for a body area other than Chest as MRI is substantially inferior to CT for detection of small pulmonary metastases.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.
References- PEDONC-1


24. Bhatia S, Pappo AS, Acquazzino M, et al. National Comprehensive Cancer Network (NCCN) Guidelines Version 1.2020—July 11, 2019, Adolescent and Young Adult (AYA) Oncology, available at: [https://www.nccn.org/professionals/physician_gls/pdf/aya.pdf](https://www.nccn.org/professionals/physician_gls/pdf/aya.pdf), referenced with permission from the NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines™) for Adolescent and Young Adult (AYA) Oncology V1.2020 7/11/19. ©2019 National Comprehensive Cancer Network, Inc. All rights reserved. The NCCN Guidelines™ and illustrations herein may not be reproduced in any form for any purpose without the express written permission of the NCCN. To view the most recent and complete version of the NCCN Guidelines™, go online to NCCN.org.
PEDONC-2: Screening Imaging in Cancer Predisposition Syndromes

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PEDONC-2.1: Screening Imaging in Cancer Predisposition Syndromes – General Considerations

This section is intended to give guidance for screening imaging prior to diagnosis with a specific malignancy. Once a patient with a cancer predisposition syndrome has been diagnosed with a malignant disease, future imaging decisions should be guided by the appropriate disease-specific guidelines except as explicitly stated elsewhere in this section.

This section’s guidelines are limited to cancer predisposition syndromes with screening imaging considerations. Syndromes requiring only clinical or laboratory screening are not discussed here.

- In general, a recent (within 60 days) detailed history and physical examination and appropriate laboratory studies should be performed prior to considering advanced imaging, unless the patient is undergoing guideline-supported scheduled screening evaluation identified in this section.

- Many of these cancer predisposition syndromes also affect adults as survival continues to improve for these patients. Adults with syndromes covered in this section may follow these imaging guidelines except where contradicted by specific statements in the adult imaging guidelines.

Documentation of genetic or molecular confirmation of the appropriate syndrome with increased cancer risk is preferred for any patient to qualify for screening imaging. There are a number of complex ethical, social, and financial issues involved in the decision to complete genetic testing in a pediatric patient:

- From the 2013 AAP Policy Statement, “Predictive genetic testing for adult-onset conditions generally should be deferred unless an intervention initiated in childhood may reduce morbidity or mortality.” Imaging surveillance is one such intervention and should not be performed without justifiable cause.

- Genetic testing should be performed in conjunction with genetic counseling for appropriate communication of risks identified by testing.

- When genetic testing is not possible or not supported by health plan coverage policies, formal diagnosis after evaluation by a physician with significant training and/or experience in cancer predisposition syndromes (most commonly a geneticist or oncologist) is generally sufficient to confirm eligibility for screening imaging.

- Due to the length of time for image acquisition and the need for stillness, anesthesia is required for almost all infants and young children (age < 7 years), as well as older children with delays in development or maturity. In this patient population, MRI imaging sessions should be planned with a goal of avoiding a short-interval repeat anesthesia exposure due to insufficient information using the following considerations:
  - MRI should always be performed without and with contrast unless there is a specific contraindication to gadolinium use, since the patient already has intravenous access for anesthesia.
    - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
The U.S. food and drug administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAS) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAS should be assessed.

If requesting clinicians indicate that a non-contrast study is being requested due to concerns regarding the use of gadolinium, the exam can be approved. If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
**PEDONC-2.2: Li-Fraumeni Syndrome (LFS)**

Syndrome inherited in an autosomal dominant manner (50% risk to offspring) associated with germline mutations in *TP53* resulted in an increased susceptibility to a variety of cancers.

- Eighty percent of individuals will have germline *TP53* mutation:
  - Tumor-specific *TP53* mutations are much more common than germline *TP53* mutations and are not associated with an increased risk for subsequent cancers
  - If *TP53*-negative, formal diagnosis of LFS should be assigned by a physician with significant training and/or experience in LFS (most commonly a geneticist or oncologist) based on specified clinical criteria prior to beginning a screening imaging program
  - *TP53* mutations may be present in 50 to 80% of pediatric adrenocortical carcinoma, 10% of pediatric rhabdomyosarcoma, and 10% of pediatric osteosarcoma patients

- Patients with LFS have an increased sensitivity to ionizing radiation, so screening strategies resulting in significant radiation exposure are not appropriate (CT and nuclear medicine).

The following imaging studies should be considered appropriate in patients with LFS:

- Annual complete detailed physical examinations, complete blood counts, and urinalyses form the backbone of LFS cancer screening.
- Annual MRI Brain without and with contrast (CPT® 70553) for all patients
  - Annual whole-body MRI (WBMRI, CPT® 76498) for all patients
  - Substantial variation continues to exist in WBMRI techniques, and a specific CPT code for WBMRI has not yet been assigned. As a result, CPT® 76498 is the only approvable code for a WBMRI study at this time.
  - Abdominal (CPT® 76700) and Pelvic (CPT® 76856) ultrasound every 3 months from birth to age 18 (for adrenocortical carcinoma screening)
  - Annual Breast MRI (CPT® 77049) alternating every 6 months with breast ultrasound for breast cancer screening is appropriate for LFS patients beginning at age 20 (See BR-6: Breast MRI Indications)
  - Targeted MRI imaging without and with contrast of any body area(s) with documented signs or symptoms suggestive of possible malignancy
  - When a specific malignancy is suspected, the patient should be imaged according to the eviCore imaging guideline specific to the suspected cancer type
  - Studies ordered as part of a screening imaging program based on specific family cancer history that has been developed for an individual patient in conjunction with a multidisciplinary team including at least genetics and Oncology
  - Specifics of the program should be obtained and available for the Medical Director reviewing the case

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End of PEDONC-2.2
**PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2)**

**NF1:**
Common syndrome inherited in an autosomal dominant manner (50% risk to offspring) affecting 1 in 2500 people. The diagnosis is commonly made based on established clinical criteria including café-au-lait spots, lisch nodules of the iris, axillary freckling, family history, and the presence of NF-associated tumors.

Genetic testing is encouraged for children with possible NF1 and no family history prior to assigning a diagnosis, but will not identify a mutation for all patients with NF1. The majority of tumors are benign in nature, but malignant degeneration can occur. The most frequent neoplasms associated with NF1 in children are malignant peripheral nerve sheath tumor (MPNST), glioma, pheochromocytoma, and leukemia.

NF1-affected persons have increased sensitivity to ionizing radiation, so CT and nuclear medicine imaging are not appropriate screening or surveillance studies for these patients. CT and/or nuclear medicine studies may be indicated for acute clinical situations and should be judged on a case-by-case basis. These requests will be forwarded for Medical Director review.

Annual ophthalmology evaluation is strongly recommended beginning at the time of diagnosis of NF1 to evaluate for optic pathway abnormalities:

- Screening MRIs of the Brain (CPT® 70553) and Orbits (CPT® 70543) for asymptomatic individuals are not generally recommended due to the ~60% rate of unidentified bright objects (UBOs, T2-weighted signal abnormalities) which mostly disappear by age 30
  - A one-time MRI Brain (CPT® 70553) and Orbits (CPT® 70543) without and with contrast can be approved to clarify the diagnosis of NF1 if evaluation by a physician with significant training and/or experience in neurofibromatosis is inconclusive (most commonly a neurologist, geneticist, ophthalmologist, or oncologist)
  - MRI Brain (CPT® 70553) and Orbits (CPT® 70543) without and with contrast can be approved for any new or worsening symptoms
  - Routine follow up imaging of UBOs is not warranted in the absence of acute symptoms suggesting new or worsening intracranial disease
  - Children with negative brain and orbital screening at age 15 months generally do not develop optic pathway gliomas

- Patients with NF1 and documented optic pathway gliomas should be imaged according to **PEDONC-4.2: Intracranial Low Grade Gliomas (LGG)**.
NF1 patients are at increased risk for plexiform neurofibromas (PN) and malignant peripheral nerve sheath tumors (MPNST—a high grade sarcoma).

- Screening imaging of asymptomatic patients for these tumors is not supported by evidence. PET imaging is not supported for PN surveillance in asymptomatic patients at this time as the positive predictive value is only 60 to 65% even in symptomatic patients.
- MRI imaging without and with contrast is appropriate for any clinical symptoms suggestive of change in a known PN in a patient with NF1 (examples include pain, rapid growth, and neurologic dysfunction).
- Although PET imaging has a positive predictive value of only 61 to 63% in NF1 patients with suspected transformation to MPNST, the negative predictive value is high (96 to 99%)
  - PET imaging is indicated for evaluating NF1 patients with clinical symptoms concerning for malignant transformation of a known PN when all of the following conditions exist:
    - Recent MRI is inconclusive regarding transformation or progression
    - Negative PET will result in a decision to avoid biopsy in a difficult or morbid location
  - Inconclusive PET findings should lead to biopsy of the concerning lesion
  - Repeat PET studies are not indicated due to the poor positive predictive value in this setting

- Patients with NF1 and known plexiform neurofibromas should be imaged according to guidelines in PEDPN-2.1: Neurofibromatosis 1.
- Patients with NF1 and new soft tissue masses should be imaged according to ONC-12: Sarcoma or PEDONC-8.3: Non-Rhabdomyosarcoma Soft Tissue Sarcomas, depending on the patient’s age at the time the mass is discovered.
- Patients with NF1 and new bone masses should be imaged according to PEDONC-9: Bone Tumors.

NF2:
NF2 is substantially less common than NF1. It is inherited in an autosomal dominant manner (50% risk to offspring) affecting ~1 in 25000 people. NF2 is associated with increased risk for meningiomas (50% of affected individuals), vestibular schwannomas, and spinal tumors (75% of affected individuals).

- Patients with NF2 and known vestibular schwannomas should be imaged according to guidelines in PEDPN-2.2: Neurofibromatosis 2.
- Patients with NF2 and known meningioma should be imaged according to guidelines in ONC-2.8: Meningiomas.
- Patients with NF2 and known ependymoma should be imaged according to guidelines in PEDONC-4: Ependymoma.
**Recommended cancer screening imaging includes:**

- Annual MRI Brain without and with contrast (CPT® 70553) beginning at age 10 years
- MRI spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved every 3 years beginning at age 10 years for patients without spinal tumors
  - Annual MRI spine can be approved for all patients with NF2 and a history of spinal tumors

**Additional appropriate imaging requests include:**

- MRI Brain without and with contrast (CPT® 70553) should be approved for any patient with NF2 and clinical symptoms of intracranial mass or vestibular disease
- MRI spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) should be approved for any patient with NF2 and:
  - Clinical symptoms suggestive of new or progressive spinal or paraspinal tumors, including uncomplicated back pain or radiculopathy
  - Recent diagnosis with a meningioma or vestibular schwannoma
PEDONC-2.4: Beckwith-Wiedemann Syndrome (BWS)

Inherited syndrome characterized by macroglossia, hemihypertrophy, macrosomia, organomegaly, and neonatal hypoglycemia. Patients with isolated hemihypertrophy are also imaged according to this guideline.

Caused by mutation at chromosome 11p15, affected children are predisposed to Wilms tumor, hepatoblastoma, rhabdomyosarcoma, and adrenal tumors.

Recommended cancer screening imaging includes:

- Abdominal ultrasound (CPT® 76700) every 3 months from birth to the 8th birthday
  - Patients found to have adrenal masses on screening ultrasound should receive additional imaging as follows:
    - Purely cystic mass:
      - Continue screening ultrasound every 3 months without additional imaging
    - Solid or mixed mass in patients age 0 to 5 months:
      - If mass 0 to 3 cm in diameter → MIBG imaging and either CT or MRI Abdomen (contrast as requested)
        - If no evidence of malignancy based on MIBG, CT or MRI, Urine HVA/VMA, and serum ACTH, then repeat abdominal ultrasound every 6 weeks for 2 years
      - If mass > 3 cm in diameter → MIBG imaging and MRI Abdomen (contrast as requested)
    - Solid or mixed mass in patients age 6 months or greater:
      - MIBG imaging prior to biopsy or resection
      - If no evidence of malignancy on biopsy or resection, resume screening abdominal ultrasound every 3 months

- Patients with BWS and known renal tumors should be imaged according to guidelines in PEDONC-7: Pediatric Renal Tumors.

- Patients with BWS and known hepatoblastoma should be imaged according to guidelines in PEDONC-11.2: Hepatoblastoma.

- Patients with BWS and known neuroblastoma should be imaged according to guidelines in PEDONC-6: Neuroblastoma.

- Patients with BWS and known adenocortical carcinoma should be imaged according to guidelines in PEDONC-14: Pediatric Adrenocortical Carcinoma.

- Patients with BWS and known pheochromocytoma should be imaged according to guidelines in ONC-15: Neuroendocrine Cancers and Adrenal Tumors.
**PEDONC-2.5: Denys-Drash Syndrome (DDS)**

Characterized by pseudohermaphroditism, early renal failure, and > 90% risk of Wilms tumor development in each kidney. Associated with mutations at 11p13, risk of renal failure after detection of symptomatic Wilms tumor is 62%, so early detection may allow for renal-sparing surgical approaches.

**Recommended cancer screening imaging includes:**

- Abdominal ultrasound (CPT® 76700) every 3 months from birth to the 8th birthday
- Patients with DDS and known renal tumors should be imaged according to guidelines in **PEDONC-7: Pediatric Renal Tumors**.

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**PEDONC-2.6: Wilms Tumor-Aniridia-Growth Retardation (WAGR)**

Named for the components of the disorder, it is associated with mutations at 11p13. As the name suggests, patients are predisposed to Wilms tumor, with 57% of patients in one cohort developing Wilms tumor. Risk of renal failure after detection of symptomatic Wilms tumor is 38%, so early detection may allow for renal-sparing surgical approaches.

**Recommended cancer screening imaging includes:**

- Abdominal US (CPT® 76700) every 3 months from birth to the 8th birthday
- Patients with WAGR and known renal tumors should be imaged according to guidelines in **PEDONC-7: Pediatric Renal Tumors**.
**PEDONC-2.7: Familial Adenomatous Polyposis (FAP) and Related Conditions**

Inherited in an autosomal dominant manner (50% risk to offspring), it is also known as Adenomatous Polyposis Coli (APC). It is associated with the development of thousands of colonic polyps by age 20 and > 90% risk of colorectal carcinoma. Prophylactic total colectomy is recommended by age 20 for most patients. FAP is also associated with hepatoblastoma, tumors of the pancreas and small bowel, medulloblastoma, and thyroid cancer.

Patients with Lynch, Gardner, and Turcot syndromes should also be imaged according to these guidelines.

**Recommended cancer screening imaging includes:**

- Abdominal US (CPT® 76700) every 3 months from birth to the 6th birthday
  - Annual Abdominal US for life after age 6 with family history of desmoid tumors
- Serum AFP every 3 months to the 6th birthday
- Annual colonoscopy beginning at age 10
- Annual esophagogastroduodenoscopy beginning at age 10
- Annual thyroid ultrasound (CPT® 76536) beginning at age 12
- Annual pelvic ultrasound (CPT® 76856) beginning at age 30
- Patients with FAP and known colorectal tumors should be imaged according to guidelines in **ONC-16: Colorectal Cancer**.
- Patients with FAP and known desmoid tumors should be imaged according to guidelines in **PEDONC-8.3: Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS)**.
**PEDONC-2.8: Multiple Endocrine Neoplasias (MEN)**

Inherited in an autosomal dominant manner (50% risk to offspring)

MEN1 is characterized by parathyroid, pancreatic islet cell, and pituitary gland tumors (3 P’s), as well as carcinoid tumors in the chest and abdomen, and 28% of patients will develop at least one tumor by age 15.

MEN2a is characterized by medullary thyroid carcinoma, parathyroid adenomas, and pheochromocytomas.

MEN2b is characterized by ganglioneuromas of the GI tract and skeletal abnormalities presenting in infancy.

**Recommended cancer screening imaging includes:**

- **MEN1**
  - Annual MRI Brain without and with contrast (CPT® 70553) can be approved beginning at age 5
  - Annual MRI Abdomen without and with contrast (CPT® 74183), CT Abdomen with contrast (CPT® 74160), or ultrasound (CPT® 76700) can be approved beginning at age 5
  - Annual MRI Chest without and with contrast (CPT® 71552) or CT Chest with contrast (CPT® 71260) can be approved beginning at age 15
  - Annual Octreotide study (CPT® 78800, CPT® 78801, CPT® 78802, SPECT CPT® 78803, 78831, hybrid SPECT/CT CPT® 78830, 78832, or CPT® 78804) can be approved beginning at age 5

- Patients with MEN1 and known thyroid cancer should be imaged according to guidelines in **ONC-6: Thyroid Cancer**

- Patients with MEN1 and known pheochromocytoma should be imaged according to guidelines in **ONC-15: Neuroendocrine Cancers and Adrenal Tumors**

- **MEN2a and MEN2b**
  - Annual measurement of catecholamines for pheochromocytoma screening
  - MRI Abdomen without and with contrast (CPT® 74183) can be approved every 3 years beginning at age 5
  - Octreotide study (CPT® 78800, CPT® 78801, CPT® 78802, SPECT CPT® 78803, 78831, hybrid SPECT/CT CPT® 78830, 78832, or CPT® 78804) or Adrenal Nuclear Imaging (CPT® 78075) can be approved for elevated catecholamines or inconclusive adrenal mass on MRI

- Patients with MEN2a or MEN2b and known pheochromocytoma should be imaged according to guidelines in **ONC-15: Neuroendocrine Cancers and Adrenal Tumors**
**PEDONC-2.9: Tuberous Sclerosis Complex (TSC)**

Inherited in an autosomal dominant manner (50% risk to offspring), affecting ~1 in 6000 individuals, it is associated with benign tumors, hypopigmented skin macules (ash leaf spots), pulmonary lymphangioleiomyomatosis, developmental delay, and epilepsy.

**Malignancies associated with this syndrome include:**

- Subependymal giant cell astrocytomas (SEGA tumors)
  - Historically, early surgery was important to reduce morbidity related to these tumors
  - More recently, everolimus has been successfully used to treat these tumors without surgery, and early detection remains an important feature for success
- Renal cell carcinoma
- Cardiac rhabdomyosarcoma
- Pulmonary lymphangioleiomyomatosis

**Recommended cancer screening imaging includes:**

- Annual ophthalmologic and dermatologic evaluation
- Annual Brain MRI without and with contrast (CPT® 70553) beginning at age 3 until age 25
- Annual Renal US (CPT® 76770) beginning at age 3
  - Annual MRI Abdomen without and with contrast (CPT® 74183) can be substituted for Renal US in patients with documented renal lesions
- Annual Echocardiography
- CT Chest without contrast (CPT® 71250) every 5 years beginning at age 18 years
  - Additional CTs may be approved every 1 year for patients with documented abnormalities
  - CT Chest without contrast should be approved for evaluation of any new pulmonary symptoms or worsening pulmonary function testing

Patients with TSC and known SEGA tumors should be imaged according to **PEDONC-4.2: Intracranial Low Grade Gliomas (LGG)**

Patients with TSC and known renal cell carcinoma should be imaged according to **PEDONC-7.4: Pediatric Renal Cell Carcinoma (RCC)**
PEDONC-2.10: Von Hippel-Lindau Syndrome (VHL)
Inherited in an autosomal dominant manner (50% risk to offspring), it is associated with CNS hemangioblastomas, retinal angiomas, endolymphatic sac tumors (ELST), gastrointestinal stromal tumor (GIST), renal cell carcinoma (RCC), and pheochromocytomas and other neuroendocrine tumors (NETs). Pediatric patients are at risk of developing hemangioblastomas and pheochromocytomas that can remain clinically occult until symptoms become severe. Historically, substantial mortality was attributable to RCC, pancreatic NET, and CNS hemangioblastoma.

Recommended cancer screening imaging includes:

- Annual ophthalmologic evaluation beginning at birth
- Annual measurement of catecholamines beginning at age 2
  - Octreotide study (CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804) or Adrenal Nuclear imaging (CPT® 78075) can be approved for elevated catecholamines or inconclusive adrenal mass on MRI
- Audiology assessment every 2 years beginning at age 5
  - If frequent ear infections are present, MRI Brain without and with contrast (CPT® 70553) with attention to internal auditory canals can be approved
- MRI Brain without and with contrast (CPT® 70553) every 2 years beginning at age 8
  - Patients with known hemangioblastoma that has not been resected can have MRI Brain every 1 year or for any new or worsening symptoms
- MRI Spine without and with contrast (Cervical-CPT® 72156), Thoracic-CPT® 72157, and Lumbar-CPT® 72158) every 2 years beginning at age 8
  - Patients with known hemangioblastoma that has not been resected can have MRI Spine every 1 year or for any new or worsening symptoms
- Annual Abdominal US (CPT® 76700) beginning at age 5
- MRI Abdomen without and with contrast (CPT® 74183) every 2 years beginning at age 10
- Patients with VHL and known CNS Hemangioblastoma should be imaged according to PEDONC-4.2: Intracranial Low Grade Gliomas (LGG)
- Patients with VHL and known renal cell carcinoma should be imaged according to PEDONC-7.4: Pediatric Renal Cell Carcinoma (RCC)
- Patients with VHL and known pheochromocytoma or other neuroendocrine tumors should be imaged according to guidelines in ONC-15: Neuroendocrine Cancers And Adrenal Tumors

End of PEDONC-2.10
**PEDONC-2.11: Rhabdoid Tumor Predisposition Syndrome**

Inherited in an autosomal dominant manner (50% risk to offspring), it is associated with malignant rhabdoid tumors of the kidney and extrarenal locations, and atypical teratoid/rhabdoid tumors (ATRT) of the CNS. It is caused by a germline mutation in *INI1* or *SMARCB1*, and is associated with a more variable prognosis than de novo rhabdoid tumors.

- Targeted advanced imaging should be approved for any patient with this syndrome and any clinical symptoms to suggest malignancy
- Ultrasound of the head (CPT® 76506), abdomen (CPT® 76700), and pelvis (CPT® 76856) monthly from birth to 12 months of age
- MRI can be approved for clarification of inconclusive findings on ultrasound, and should be used in place of ultrasound for remainder of planned screening
- MRI Brain (CPT® 70553) and Spine (CPT® 72156, 72157, & 72158) without and with contrast every 3 months from age 1 to 5 years
- MRI (CPT® 74183 & 72197) or Ultrasound Abdomen and Pelvis (CPT® 76700 & 76856) every 3 months from age 1 to 5 years
  - Whole-body MRI resolution may not be sufficient to detect small rhabdoid tumors, so is not recommended in lieu of conventional MRI studies
**PEDONC-2.12: Familial Retinoblastoma Syndrome**

This syndrome is inherited in an autosomal dominant manner (50% risk to offspring). As the name suggests, it is associated with retinoblastoma, as well as osteosarcoma, pediatric melanoma, and a significantly increased risk for radiation-related malignancies.

Regular physical and ophthalmologic evaluations under anesthesia (EUA) are the hallmark of surveillance strategies for these patients, and asymptomatic screening imaging does not have a defined role at this time.

- Patients with retinomas (premalignant retinal lesions) can have annual MRI Orbits (CPT® 70543)

When advanced imaging is necessary for evaluation of inconclusive EUA findings or new symptoms, ultrasound or MRI should be used if at all possible in lieu of CT or nuclear imaging if at all possible to avoid radiation exposure in these patients.
PEDONC-2.13: Hereditary Paraganglioma-Pheochromocytoma (HPP) Syndromes

Caused by mutations in SDHx genes, this syndrome is inherited in an autosomal dominant manner (50% risk to offspring), and is associated with pheochromocytomas and paragangliomas.

Patients with multiple endocrine neoplasias should not use this guideline and should be imaged according to PEDONC-2.8: Multiple Endocrine Neoplasias (MEN).

Cancer screening should begin at age 6. The following recommended imaging can be approved:

- All patients with SDHx mutations:
  - Annual measurement of catecholamines
  - One of the following every 2 years:
    - Whole body MRI (CPT® 76498)
    - MRI Neck (CPT® 70543), Chest (CPT® 71552), Abdomen (CPT® 74183), Pelvis (CPT® 72197) without and with contrast
    - CT Neck (CPT® 70491), Chest (CPT® 71260), and Abdomen/Pelvis (CPT® 74177) with contrast
    - MRI is preferred to CT to minimize radiation exposure given these patients' lifelong need for screening

- Patients with HPP and known pheochromocytoma or other neuroendocrine tumors should be imaged according to guidelines in ONC-15: Neuroendocrine Cancers and Adrenal Tumors

End of PEDONC-2.13
**PEDONC-2.14: Costello Syndrome**

Caused by mutations in *HRAS* genes, this syndrome is inherited in an autosomal dominant manner (50% risk to offspring), and is associated with rhabdomyosarcoma and neuroblastoma in early childhood, and transitional cell cancer of the bladder in older children and adults.

**Recommended Screening Imaging Includes:**

- Following initial diagnosis, any or all of the following are indicated:
  - Echocardiogram (CPT® 93306)
  - MRI Brain (CPT® 70553) without and with contrast
  - MRI Cervical (CPT® 72156) and Thoracic Spine (CPT® 72157) without and with contrast
- Ultrasound of the Abdomen (CPT® 76700) and Pelvis (CPT® 76856) every 3 months from birth to 10th birthday
- Echocardiogram (CPT® 93306) as requested for patients with Costello syndrome and known cardiac disease
- Patients with Costello syndrome and known rhabdomyosarcoma should be imaged according to guidelines in **PEDONC-8.2: Rhabdomyosarcoma (RMS)**
- Patients with Costello syndrome and known neuroblastoma should be imaged according to guidelines in **PEDONC-6: Neuroblastoma**
PEDONC-2.15: Constitutional Mismatch Repair Deficiency (CMMRD or Turcot Syndrome)

A highly penetrant and aggressive cancer predisposing syndrome resulting from autosomal recessive inheritance of biallelic mutations in mismatch repair genes, CMMRD syndrome leads to substantial risk for several commonly fatal childhood malignancies - high-grade CNS tumors (glioma, PNET, medulloblastoma) and hematologic malignancies (non-Hodgkin lymphoma, acute lymphoblastic leukemia). CMMRD patients are also at increased risk for gastrointestinal tumors.

Recommended Screening Imaging Includes:

- MRI Brain without and with contrast (CPT® 70553) every 6 months after CMMRD diagnosis is confirmed
- Annual whole body MRI (CPT® 76498) beginning at age 6 years
- Annual esophagastroduodenoscopy and colonoscopy beginning at age 4 years
References – PEDONC-2


## PEDONC-3: Pediatric Leukemias

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PEDONC-3.1: Pediatric Leukemia General Considerations

The overwhelming majority of leukemias occurring in children are acute. Chronic myelogenous leukemia (CML) is rare in children, and the occurrence of chronic lymphocytic leukemia (CLL) appears to have only been reported once in pediatric patients to date.

- MRI Brain without and with contrast (CPT® 70553) can be performed in patients exhibiting CNS symptoms and in patients found to have high tumor burden on CSF cytology.

- Routine advanced imaging is not indicated in the evaluation and management of chronic myeloid leukemia in the absence of specific localizing clinical symptoms or clearance for hematopoietic stem cell transplantation. See ONC-29: Hematopoietic Stem Cell Transplantation for imaging guidelines related to transplant.
PEDONC-3.2: Acute Lymphoblastic Leukemia (ALL)

- The majority of ALL patients have B-precursor ALL and routine advanced imaging is not necessary.
- Patients with B-precursor or T-cell lymphoblastic lymphoma without bone marrow involvement are treated similarly to leukemia patients of the same cell type and should be imaged according to this guideline section.
- This section does not apply to patients with mature B-cell histology (primarily Burkitt’s in children). Please refer to PEDONC-5.3: Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL) for guidelines for these patients.
- CXR should be performed to evaluate for mediastinal mass in suspected cases or upon initial diagnosis.
  - If mediastinal widening is seen on CXR, CT Chest with contrast (CPT® 71260) is indicated immediately to evaluate for airway compression and anesthesia safety prior to attempting histologic diagnosis.
  - Patients with known or strongly suspected T-cell histology or other suspected lymphoblastic lymphoma involvement can have either of the following approved for initial staging purposes:
    - CT Neck (CPT® 70491), CT Chest (CPT® 71260) and CT Abdomen/Pelvis (CPT® 74177) with contrast OR
    - PET/CT (CPT® 78815 or 78816)
- MRI Brain without and with contrast (CPT® 70553) can be performed in patients exhibiting CNS symptoms and in patients found to have high tumor burden on CSF cytology.

Additional imaging in lymphoblastic lymphoma:

- Follow up CT to assess response to therapy is indicated only for patients with known bulky nodal disease (usually with T-cell histology) at the end of induction (~4 to 6 weeks). Patients with residual masses can be evaluated with every new therapy phase (Consolidation, Interim maintenance, etc., generally every 8 to 12 weeks) until disease resolution is seen.
  - PET/CT (CPT® 78815) can be approved when residual mass ≥ 8 mm in diameter is present on recent CT imaging and there is documentation of how PET findings will affect immediate treatment decision making. These requests should be forwarded for Medical Director review.
- Once CT imaging shows no evidence of disease, further surveillance should use CXR or Abdominal Ultrasound (CPT® 76700) only, as indicated by site(s) of bulky disease present at diagnosis.
  - Patients with persistent residual masses can have CT of all involved bulky nodal areas performed as part of an end of therapy evaluation.
**Immunosuppression during ALL therapy and imaging ramifications:**

- ALL patients are severely immunocompromised during the first 4 to 6 weeks of treatment (induction) and any conventional imaging request to evaluate for infectious complications during this time frame should be approved immediately.

- CT or MRI imaging requests for infectious disease concerns for ALL patients with absolute neutrophil count (ANC) < 500 or inconclusive findings on chest x-ray or US at any ANC during active treatment should be approved as requested.

- Additionally, patients may have therapy-induced hypogammaglobulinemia which requires supplemental intravenous immune globulin (IVIG) during maintenance therapy. Patients receiving supplemental IVIG should be treated similarly to patients with ANC < 500 with regards to imaging for infectious disease.

- Intracranial hemorrhage in patients treated with asparaginase
  - MRA/MRV of the head (CPT® 70544, 70545, or 70546) to rule out bleeding associated with sinus venous thrombosis

**Imaging during therapy for relapsed ALL:**

- Relapsed ALL patients are treated with very intensive chemotherapy regimens and most patients spend the majority of their chemotherapy treatment phase in the hospital. Due to the high risk of invasive infections, frequent CT or MRI imaging may be indicated to evaluate known or suspected new sites of invasive fungal or other aggressive infections, and in general these should be approved as requested.

- Surveillance imaging of asymptomatic patients to detect invasive fungal infection has not been shown to impact patient outcomes. Imaging requests in these circumstances should only be approved when acute clinical decisions will be made based on the imaging.
Imaging of known or suspected osteonecrosis in ALL:

- Osteonecrosis (ON) in ALL patients is a relatively common complication of ALL and its treatment, primary corticosteroids. Approximately 3% of younger children and 12 to 15% of adolescents are affected by ON at some point during therapy. The peak incidence occurs approximately one year from the time of diagnosis.
  - For patients with symptoms suggesting osteonecrosis, MRI without contrast or without and with contrast of the affected joint(s) can be approved.
    - CT without contrast can be approved when MRI is contraindicated or unavailable, or for diagnosis of suspected subchondral fracture
  - Screening MRI of asymptomatic patients age ≤ 10 years to detect osteonecrosis has not been shown to impact patient outcomes, and it is not standard to alter treatment based on imaging findings alone without symptoms
    - A single screening MRI Bilateral Hips (CPT® 73721 or CPT® 73723 with modifier -50) can be approved 6 to 9 months after diagnosis for patients age ≥11 years
  - If osteonecrosis is detected on initial MRI, corticosteroids are often withheld during maintenance chemotherapy (but continued in earlier phases of therapy).
  - In patients whose symptoms have resolved and are still receiving active treatment, repeat MRI without contrast of the affected joint(s) can be approved every 2 cycles of maintenance (~every 6 months) if reintroduction of corticosteroids is being considered.
  - MRI without contrast of the affected joint(s) can be approved if requested for preoperative planning in patients undergoing core decompression
  - See PEDONC-19.4: Osteonecrosis In Long Term Cancer Survivors for information on osteonecrosis in ALL patients who have completed therapy
PEDONC-3.3: Acute Myeloid Leukemia (AML)

The majority of AML patients do not have any bulky disease and routine advanced imaging is not necessary.

Advanced imaging may be indicated for rare patients with bulky tumor masses (commonly referred to as chloromas, leukemic sarcomas, or myeloid sarcomas) noted on physical examination or other imaging such as plain film or ultrasound.

- AML patients are treated with very intensive chemotherapy regimens and spend the majority of their chemotherapy treatment phase in the hospital. Due to the high risk of invasive infections, frequent CT or MRI imaging may be indicated to evaluate known sites of invasive fungal infection, and in general these should be approved as requested.
  - Surveillance imaging of asymptomatic patients to detect invasive fungal infection has not been shown to impact patient outcomes. Imaging requests in these circumstances should only be approved when acute clinical decisions will be made based on the imaging.
References – PEDONC-3


## PEDONC-4: Pediatric CNS Tumors

| PEDONC-4.1: Pediatric CNS Tumors General Considerations |
| PEDONC-4.2: Intracranial Low Grade Gliomas (LGG) |
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| PEDONC-4.10: Craniopharyngioma and Other Hypothalamic/Pituitary Region Tumors |
| PEDONC-4.11: Primary CNS Lymphoma |
| PEDONC-4.12: Meningiomas |
| PEDONC-4.13: Choroid Plexus Tumors |
PEDONC-4.1: Pediatric CNS Tumors General Considerations

Central nervous system tumors are the second most common form of childhood cancer, accounting for ~20% of all pediatric malignancies.

<table>
<thead>
<tr>
<th>Red flag symptoms raising suspicion for CNS tumors include:</th>
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<td>Any headache complaint from a child age ≤ 5 years</td>
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<td>Headaches awakening from sleep</td>
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<tr>
<td>Focal findings on neurologic exam</td>
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<td>Clumsiness (common description of gait or coordination problems in young children)</td>
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<tr>
<td>Headaches associated with morning nausea/vomiting</td>
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<tr>
<td>New onset of seizure activity with focal features</td>
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<td>Papilledema on physical exam</td>
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- MRI is the preferred imaging modality for all pediatric CNS tumors. The primary imaging study for pediatric brain tumors is MRI Brain without and with contrast (CPT® 70553).
  - For children able to undergo MRI without sedation, MRI Brain without contrast (CPT® 70551) can be approved if requested for initial evaluation of suspected CNS tumor.
  - Younger patients requiring sedation for MRI should have their initial MRI performed without and with contrast in order to avoid a second anesthesia exposure.

- CT can be approved for evaluation of ventriculomegaly or other operative considerations, or for children who cannot undergo MRI safely.
  - Because of the significant percentage of pediatric CNS tumors occurring in the posterior fossa, CT is not a recommended study for evaluation of pediatric headache when brain tumor is clinically suspected because of its limited diagnostic accuracy in this area. MRI should be used as first line imaging in these cases.
  - CT should not be used in place of MRI to avoid sedation in young children when red flag symptoms for CNS tumors are present.
  - CT can also be approved for evaluation of headaches related to head trauma or evaluation of skull or facial bone abnormalities.

- MRA or CTA are not routinely indicated in pediatric CNS tumors but can be approved for preoperative planning or to clarify inconclusive findings on MRI or CT.

- Definitive imaging should be completed prior to considering biopsy given the high degree of morbidity associated with operating on the CNS.
  - Occasionally biopsy is not necessary because the imaging findings provide a definitive diagnosis. Examples include diffuse intrinsic pontine glioma and optic pathway gliomas in a patient with known neurofibromatosis.
Perioperative imaging frequency

- Children may undergo very frequent imaging in the immediate perioperative period around resection or debulking of a CNS tumor due to the small anatomic spaces involved. Requests for imaging during this time period to specifically evaluate postoperative course or ventriculoperitoneal shunt functioning should, in general, be approved as requested.
- A one-time MRI Brain without and with contrast (CPT® 70553) can be approved in the immediate preoperative period (even if another study has already been completed) to gain additional information which can be important in optimizing patient outcomes, such as:
  - Completion of additional specialized MRI sequences such as diffusion-tensor imaging, perfusion imaging, tractography, or other sequences not reported under a separate CPT® code but not part of a routine MRI Brain series
  - Repeat MRI Brain that is being requested solely for loading into operative navigation software should not be requested as a diagnostic code, but can be approved under a treatment planning code (CPT® 76498). These requests should be forwarded for Medical Director review.

**MR Spectroscopy (MRS, CPT® 76390):**

- MRS is only supported for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature
  - See diagnosis-specific guidelines for MRS indications
- MRS is considered investigational/experimental for all other histologies and indications not listed in a diagnosis-specific guideline section
- MR spectroscopy is not indicated for routine surveillance
- Requests for MRS should be forwarded for Medical Director review
PET Brain Imaging (CPT® 78608 and CPT® 78609):

- PET Brain Metabolic imaging (CPT® 78608) is only supported for use in brain tumors of specified histologies where diagnostic accuracy has been established in peer-reviewed literature
  - See diagnosis-specific guidelines for PET indications
- PET Brain Metabolic imaging is considered investigational/experimental for all other histologies and indications not listed in a diagnosis-specific guideline section
- PET Brain Perfusion imaging (CPT® 78609) is not indicated in the evaluation or management of primary CNS tumors
- Fusion PET/CT studies (CPT® 78814, CPT® 78815, or CPT® 78816) are not indicated in the evaluation or management of primary CNS tumors
- PET Brain Metabolic is not indicated for routine surveillance
- Requests for PET Brain Metabolic should be forwarded for Medical Director review
**PEDONC-4.2: Intracranial Low Grade Gliomas (LGG)**

Account for 40 to 60% of pediatric CNS tumors. These tumors are defined as having a WHO histologic grade of I or II (out of IV), can occur anywhere in the CNS, and includes the following tumors:

- Pilocytic Astrocytoma
- Fibrillary (or Diffuse) Astrocytoma
- Optic Pathway Gliomas
- Pilomyxoid Astrocytoma
- Oligodendroglioma
- Oligoastrocytoma
- Oligodendrocytoma
- Subependymal Giant Cell Astrocytoma (SEGA)
- Ganglioglioma
- Gangliocytoma
- Dysembryoplastic Infantile Astrocytoma (DIA)
- Dysembryoplastic Infantile Ganglioglioma (DIG)
- Dysembryoplastic Neuroepithelial Tumor (DNT)
- Tectal Plate Gliomas
- Cervicomedullary Gliomas
- Pleomorphic Xanthoastrocytoma (PXA)
- Any other glial tumor with a WHO grade of I or II

**PET Brain Metabolic imaging (CPT® 78608) can be approved in the following circumstances:**

- To determine need for biopsy when transformation to high grade glioma is suspected based on clinical symptoms or recent MRI findings
- To evaluate a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed

**MR spectroscopy (MRS, CPT® 76390) can be approved in the following circumstances:**

- To distinguish low grade from high grade gliomas
- To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed
- To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy.
Low Grade Gliomas Initial Staging:

- MRI Brain without and with contrast (CPT® 70553) is indicated for all LGG.
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved for all LGG patients if requested, and spinal imaging is particularly recommended for patients with:
  - Multicentric tumors
  - Intracranial leptomeningeal disease
  - Clinical signs or symptoms suggesting spinal cord involvement
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.

- Patients with neurofibromatosis and small optic pathway tumors may not undergo biopsy or resection and will proceed directly to treatment or surveillance.

Low Grade Gliomas Treatment Response:

- Children who have resection of the tumor can have a single MRI Brain without and with contrast (CPT® 70553) approved following resection to establish baseline imaging and those with a complete resection should then be imaged according to surveillance guidelines.
- Children with neurofibromatosis and small optic pathway gliomas may be observed without specific treatment and should be imaged according to surveillance guidelines for LGG.
- Patients age > 10 years with incompletely resected tumors usually receive adjuvant radiation therapy and can have a single MRI Brain without and with contrast (CPT® 70553) approved at completion of radiotherapy and should then be imaged according to surveillance guidelines.
- Patients age ≤ 10 years with incompletely resected tumors are commonly treated with chemotherapy and can have MRI Brain without and with contrast (CPT® 70553) approved every 2 cycles during active treatment and at the end of planned chemotherapy.
- Spinal imaging is not indicated during treatment response for patients without evidence of spinal cord involvement at initial diagnosis.
- Spinal imaging is appropriate every 2 cycles during induction chemotherapy for patients with measurable spinal cord disease on MRI.
**Low Grade Gliomas Surveillance:**

- MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter.
  - MRI Orbits without and with contrast (CPT® 70543) can be approved for patients with optic pathway glioma and either a history of intra-orbital involvement or a history of NF1
- MRI Spine is not indicated during surveillance in patients without prior history of spinal involvement except to evaluate symptoms suspicious for spinal cord recurrence
- For patients with cord involvement at diagnosis, MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved after completion of therapy every 3 months for 2 years, then every 6 months for 3 years, then annually thereafter.
  - MRI Spine with contrast only can be approved (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain
- MR Spectroscopy and PET Brain Metabolic are not indicated for routine surveillance
**PEDONC-4.3: High Grade Gliomas (HGG)**

Rare in children compared with the adult population, but represent 10 to 20% of pediatric CNS tumors. Prognosis is very poor, and survival significantly beyond 3 years from diagnosis is rare, even with complete surgical resection at initial diagnosis.

These tumors are defined as having a WHO histologic grade of III or IV (out of IV) can occur anywhere in the CNS (though the majority occur in the brain), and includes the following tumors:

- Anaplastic astrocytoma
- Glioblastoma multiforme
- Diffuse intrinsic pontine glioma (DIPG, or “Brainstem glioma”)
- Gliomatosis cerebri
- Gliosarcoma
- Anaplastic oligodendroglioma
- Anaplastic ganglioglioma
- Anaplastic mixed glioma
- Anaplastic mixed ganglioneuronal tumors
- Any other glial tumor with a WHO grade of III or IV

PET Brain Metabolic Imaging (CPT® 78608) can be approved in the following circumstances:

- To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy
- To evaluate inconclusive MRI findings when the PET findings will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance
- To evaluate a brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed
- PET Brain is not indicated in gliomas occurring in the brain stem due to poor uptake and lack of impact on patient outcomes

MR Spectroscopy (MRS, CPT® 76390) can be approved in the following circumstances:

- To distinguish low grade from high grade gliomas
- To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed
- To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy.
**High Grade Gliomas Initial Staging:**
- MRI Brain without and with contrast (CPT® 70553) is indicated for all HGG
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved for all HGG patients if requested, and spinal imaging is particularly recommended for patients with:
  - Multicentric tumors
  - Intracranial leptomeningeal disease
  - Clinical signs or symptoms suggesting spinal cord involvement
  - MRI spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain

**High Grade Gliomas Treatment Response:**
- Patients who have resection of the tumor can have a single MRI Brain without and with contrast (CPT® 70553) approved following resection to establish baseline imaging and those with a complete resection should then be imaged according to surveillance guidelines
- If receiving adjuvant radiotherapy after a completely resected tumor, an additional MRI Brain without and with contrast (CPT® 70553) can be approved at the end of radiotherapy
- Patients with incompletely resected tumors are commonly treated with chemotherapy and can have MRI Brain without and with contrast (CPT® 70553) approved every 2 cycles during active treatment and at the end of planned chemotherapy
- Spinal imaging is not indicated during treatment response for patients without evidence of spinal cord involvement at initial diagnosis
- Spinal imaging is appropriate every 2 cycles during induction chemotherapy for patients with measurable spinal cord disease on MRI
High Grade Gliomas Surveillance:

- MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 3 years, then every 6 months thereafter

- MRI Spine is not indicated during surveillance in patients without prior history of spinal involvement except to evaluate symptoms suspicious for spinal cord recurrence

- For patients with cord involvement at diagnosis, MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved after completion of therapy every 3 months for 3 years, then every 6 months thereafter
  - MRI Spine can be performed with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain

- MR Spectroscopy and PET Brain Metabolic are not indicated for routine surveillance


**PEDONC-4.4: Medulloblastoma (MDB), Supratentorial Primitive Neuroectodermal Tumors (sPNET), and Pineoblastoma**

Account for 15 to 25% of pediatric CNS tumors, prognosis is generally favorable. Leptomeningeal spread is common and can occur after initial diagnosis.

<table>
<thead>
<tr>
<th>Includes the following tumors:</th>
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<tr>
<td>➢ Medulloblastoma and Pineoblastoma</td>
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<td>➢ sPNET</td>
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<td>∙ Medulloepithelioma</td>
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<td>∙ Cerebral or cerebellar ganglioneuroblastoma</td>
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<td>∙ Ependymoblastoma</td>
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**Risk assessment is important in determining optimal treatment**

**High risk features include the following:**

➢ Spinal metastasis (including cytology positive only)
➢ Multifocal intracranial tumors
➢ Anaplastic histology
➢ All sPNET and pineoblastomas
➢ > 1.5 cm² residual tumor area on postoperative MRI and age < 3 years

**Patients without any high risk features are considered “average risk”**

➢ PET Brain Metabolic Imaging (CPT® 78608) can be approved in the following circumstances:
  ❖ To distinguish radiation-induced tumor necrosis from progressive disease within 18 months of completing radiotherapy
  ❖ To evaluate inconclusive MRI findings when the PET findings will be used to determine need for biopsy or change in therapy, including a change from active therapy to surveillance
  ❖ To evaluate a Brain lesion of indeterminate nature when the PET findings will be used to determine whether biopsy/resection can be safely postponed

➢ MR Spectroscopy (CPT® 76390) can be approved in the following circumstances:
  ❖ To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed
Medulloblastoma, sPNET, Pineoblastoma Initial Staging:

- Preoperative MRI Brain without and with contrast (CPT® 70553) is indicated for all patients.
- Postoperative MRI Brain without and with contrast (CPT® 70553) is required (preferably within 48 hours of surgery) to quantify residual tumor volume.
- MRI spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is required for all patients either preoperatively or within 28 days postoperatively.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.

Medulloblastoma, sPNET, Pineoblastoma Treatment Response:

Patients generally proceed to chemoradiotherapy within 31 days of surgical resection. All patients receive adjuvant chemotherapy lasting 6 to 12 months that begins ~6 weeks after completion of chemoradiotherapy.

- MRI Brain without and with contrast (CPT® 70553) and MRI spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the start of adjuvant chemotherapy and every 2 cycles until therapy is completed.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
  - Children age < 3 years are often treated with multiple cycles of high dose chemotherapy with autologous stem cell rescue in lieu of radiotherapy, and disease evaluations may occur prior to each cycle (every 4 to 6 weeks) if needed for response determination.

- End of treatment evaluation should include MRI Brain without and with contrast (CPT® 70553) and MRI Spine (with or without and with contrast).

Medulloblastoma, sPNET, Pineoblastoma Surveillance:

- MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 2 years, then every 6 months for 3 years, then annually for 10 years.
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved after completion of therapy every 3 months for 2 years, then every 6 months for 3 years, then annually for 10 years.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
- MR Spectroscopy and PET Brain Metabolic are not indicated for routine surveillance.
**PEDONC-4.5: Atypical Teratoid/Rhabdoid Tumors (ATRT)**

Highly aggressive tumor occurring primarily in very young children that has a clinical presentation very similar to medulloblastoma with a much higher rate of leptomeningeal spread. Metastases can occur outside the CNS, and associated tumors can also arise in the kidneys (Malignant Rhabdoid Tumor of the Kidney, MRT). Rhabdoid malignancies occurring outside the CNS should be imaged according to PEDONC-7.6: Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites.

Overall prognosis is poor, with < 20% of patients surviving beyond 2 years from diagnosis.

**Atypical Teratoid/Rhabdoid Tumor Initial Staging:**

- Preoperative MRI Brain without and with contrast (CPT® 70553) is indicated for all patients
- Postoperative MRI Brain without and with contrast (CPT® 70553) is required (preferably within 48 hours of surgery) to quantify residual tumor volume
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is required for all patients either preoperatively or within 28 days postoperatively
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain
- Renal US (CPT® 76770) is indicated to evaluate for renal masses at initial diagnosis
  - CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved if a renal lesion is detected on US.
  - If a renal lesion is also present, imaging guidelines for MRT should be followed (See: PEDONC-7.6: Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites)
- PET Brain Metabolic does not have a defined role in the evaluation of ATRT at this time
- MR Spectroscopy (CPT® 76390) can be approved in the following circumstances:
  - To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed
Atypical Teratoid/Rhabdoid Tumor Treatment Response:

Patients generally proceed to induction chemotherapy shortly following surgical resection or biopsy.

- MRI Brain without and with contrast (CPT® 70553) and MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate after every 2 cycles of induction chemotherapy.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
  - Children with ATRT are often treated using consolidation chemotherapy with 2 to 4 cycles of high dose chemotherapy with autologous stem cell rescue. Disease evaluation is indicated following the end of the planned stem cell rescues but may occur prior to each cycle (every 4 to 6 weeks) if needed for response determination.

- Following completion of chemotherapy some patients will proceed to radiotherapy. MRI performed at the end of consolidation therapy should serve as the diagnostic MRI prior to radiotherapy.

- MRI Brain without and with contrast (CPT® 70553) and MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the end of all planned therapy.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.

Atypical Teratoid/Rhabdoid Tumor Surveillance:

- MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 2 years, then every 6 months for 3 years, then annually for 10 years.

- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved after completion of therapy every 3 months for 2 years, then every 6 months for 3 years, then annually for 10 years.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.

- MR Spectroscopy is not indicated for routine surveillance.
PEDONC-4.6: Pineocytomas
Low grade malignancy that is similar in presentation to low grade glioma (LGG).
PET Brain Metabolic imaging and MR Spectroscopy do not have a defined role in the evaluation of pineocytoma.

Pineocytomas Initial Staging:
- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved for patients with:
  - Multicentric tumors
  - Atypical histology including pineoblastoma-like elements
  - Clinical signs or symptoms suggesting spinal cord involvement
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain

Pineocytomas Treatment Response:
- Surgical resection is curative for most patients. Patients who have resection of the tumor can have a single MRI Brain without and with contrast (CPT® 70553) approved following resection to establish baseline imaging and those with a complete resection should then be imaged according to surveillance guidelines
- Patients with incompletely resected tumors may receive adjuvant radiation therapy and can have a single MRI Brain without and with contrast (CPT® 70553) approved at completion of radiotherapy and should then be imaged according to surveillance guidelines
  - Spinal imaging is not indicated for patients without evidence of spinal cord involvement at initial diagnosis
  - Spinal imaging is appropriate at completion of radiotherapy for patients with measurable spinal cord disease on MRI

Spinal imaging is not indicated for patients without evidence of spinal cord involvement at initial diagnosis.
Spinal imaging is appropriate at completion of radiotherapy for patients with measurable spinal cord disease on MRI.
**Pineocytomas Surveillance:**

- MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually thereafter.

- MRI Spine is not indicated during surveillance in patients without prior history of spinal involvement except to evaluate symptoms suspicious for spinal cord recurrence.

- For patients with cord involvement at diagnosis, MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved after completion of therapy every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually thereafter.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
PEDONC-4.7: CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT)

More common in older school age children and younger adolescents, but can occur throughout the pediatric age range. Although leptomeningeal spread is common, prognosis is excellent due to high sensitivity to chemotherapy and radiotherapy.

Includes the following tumors:

- CNS Germinoma
- Non-Germinomatous Germ Cell Tumors (NGGCT)
  - Embryonal carcinoma
  - Yolk sac tumor
  - Choriocarcinoma
  - Teratoma
  - Mixed germ cell tumor

- PET Metabolic Brain imaging does not have a defined role in the evaluation of CNS GCT.

- MR Spectroscopy (CPT® 76390) can be approved in the following circumstances:
  - To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed

CNS Germinoma & NGGCT Initial Staging:

- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is indicated for all patients
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain
**CNS Germinoma & NGGCT Treatment Response:**

Patients generally proceed to chemotherapy shortly following surgical resection or biopsy and will usually receive 2 to 4 cycles.

- MRI Brain without and with contrast (CPT® 70553) is appropriate after every 2 cycles of induction chemotherapy
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the end of induction chemotherapy for patients with localized intracranial tumors
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain
  - Spinal imaging is appropriate every 2 cycles during induction chemotherapy for patients with measurable spinal cord disease on MRI
- Following completion of chemotherapy, patients with residual disease will proceed to second-look surgery and/or radiotherapy
  - MRI of all known sites of measurable disease can be performed prior to surgery and prior to radiotherapy, if necessary
- MRI Brain without and with contrast (CPT® 70553) and MRI Spine (with or without and with contrast) is appropriate at the end of all planned therapy

**CNS Germinoma & NGGCT Surveillance:**

- MRI Brain without and with contrast (CPT® 70553) can be approved every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually until 5 years after completion of therapy
  - For additional imaging guidelines for patients in long term follow up after CNS tumor treatment that included radiation therapy, See **PEDONC-19.3: Second Malignant Neoplasms (SMN)**
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually until 5 years after completion of therapy
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain
- Patients with new or worsening neurologic symptoms (including worsening of diabetes insipidus):
  - MRI Brain without and with contrast (CPT® 70553)
  - MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158)
    - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain

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End of PEDONC-4.7
PEDONC-4.8: Ependymoma

Occur primarily intracranially, roughly 2/3 in the posterior fossa. Overall prognosis is very good, with supratentorial tumors faring better. Primary spinal tumors can also occur, and are more common in adult patients than pediatric patients.

- Surgery is the primary treatment modality. Radiotherapy +/- chemotherapy is used for:
  - Incompletely resected tumors
  - Anaplastic histology
  - Infratentorial location

- PET Brain Metabolic imaging does not have a defined role in the evaluation of ependymoma.

- MR Spectroscopy (CPT® 76390) can be approved in the following circumstances:
  - To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed

**Ependymoma Initial Staging:**

- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is indicated for all patients
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain
**Ependymoma Treatment Response:**

- Patients who have resection of the tumor can have a single MRI Brain without and with contrast (CPT® 70553) or MRI without and with contrast of involved spinal level(s) approved following resection to establish baseline imaging and those with a complete resection should then be imaged according to surveillance guidelines.

- Patients with incomplete resection or high risk histology receiving adjuvant radiation therapy can have a single MRI Brain without and with contrast (CPT® 70553) or involved spinal level(s) approved at completion of radiotherapy and should then be imaged according to surveillance guidelines.

- Patients treated with chemotherapy can have MRI Brain without and with contrast (CPT® 70553) or involved spinal level(s) approved every 2 cycles during active treatment and at the end of planned chemotherapy.

- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the end of induction chemotherapy for patients with localized intracranial tumors.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.

- MRI Brain without and with contrast (CPT® 70553) is appropriate at the end of induction chemotherapy for patients with localized intraspinal tumors.

- Following completion of chemotherapy some patients will proceed to second-look surgery and/or radiotherapy.
  - MRI of all known sites of measurable disease can be performed prior to surgery and prior to radiotherapy, if necessary.

- MRI Brain without and with contrast (CPT® 70553) and MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the end of all planned therapy for all patients.
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
Ependymoma Surveillance:

For patients with primary intracranial ependymoma:
- MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 1 year, then every 6 months for 1 year, then annually for 10 years
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved annually for 2 years after completion of therapy for patients with no history of spinal cord involvement
- For patients with metastatic cord involvement at diagnosis, MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved after completion of therapy every 3 months for 1 year, then every 6 months for 1 year, then annually for 10 years
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain

For patients with primary intraspinal ependymoma:
- MRI without and with contrast of the involved spinal level(s) can be approved after completion of therapy every 3 months for 1 year, then every 6 months for 1 year, then annually for 10 years
- MRI Brain without and with contrast (CPT® 70553) can be approved annually for 2 years after completion of therapy for patients with no history of intracranial involvement
- For patients with metastatic intracranial involvement at diagnosis, MRI Brain without and with contrast (CPT® 70553) can be approved after completion of therapy every 3 months for 1 year, then every 6 months for 1 year, then annually for 10 years

MR Spectroscopy is not indicated for routine surveillance
**PEDONC-4.9: Malignant Tumors of the Spinal Cord**

Treatment principles are the same as tumors of the brain, and should follow imaging guidelines according to the specific histologic type.

Multiple spinal cord tumors should raise suspicion for neurofibromatosis.

Common histologies of primary spinal cord tumor in children include:

- Low Grade Glioma, See [PEDONC-4.2: Intracranial Low Grade Glioma (LGG)] for guidelines
- Ependymoma, See [PEDONC-4.8: Ependymoma] for guidelines
- Any type can occur, but other histologies are rare

Primary site imaging should always include MRI Spine without and with contrast of all involved levels (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT®72158)

- Entire spine imaging may be indicated based on the histologic type

MRI Brain without and with contrast (CPT® 70553) is indicated at initial diagnosis, but may be not be necessary during treatment response and surveillance
- Given the rarity of primary spinal cord tumors in children, MRI Brain requests should, in general, be approved for surveillance after recent evaluation by a physician with significant training and/or experience in pediatric spinal cord tumors (most commonly a pediatric neurosurgeon or pediatric oncologist) as the need for intracranial surveillance is highly individualized

Asymptomatic surveillance imaging should generally end at the time point appropriate for the specific tumor type

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End of PEDONC-4.9
PEDONC-4.10: Craniopharyngioma and Other Hypothalamic/Pituitary Region Tumors

Imaging guidelines and treatment approaches for pediatric pituitary tumors other than craniopharyngioma are consistent with those used for adults with pituitary tumors. For these tumors follow guidelines in **HD-19: Pituitary**

Craniopharyngiomas are less common, accounting for 6 to 8% of pediatric CNS tumors. Most commonly affects children in the preadolescent ages. Several key imaging findings can be used to differentiate the tumors in this region including the presence of calcifications, cysts, and T1/T2 enhancement patterns in craniopharyngiomas. These are best evaluated using a COMBINATION of both MRI and CT modalities. Preoperative prediction is much more successful when BOTH modalities are obtained prior to biopsy.

Other less common tumors in the optic chiasm, sella, and suprasella region may include Germ Cell Tumors (GCT, see **PEDONC-4.7**) and Langerhans Cell Histiocytosis (LCH, see **PEDONC-18**).

- PET Brain Metabolic Imaging and MR Spectroscopy do not have a defined role in the evaluation of craniopharyngioma.

**Craniopharyngioma Initial Staging:**

- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients
- Concurrent CT Head without contrast (CPT® 70450) can be approved in addition to MRI if craniopharyngioma is suspected
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved for patients with:
  - Multicentric tumors
  - Clinical signs or symptoms suggesting spinal cord involvement
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain
**Craniopharyngioma Treatment Response:**

- Surgical resection is curative for many patients. Patients who have resection of the tumor can have a single MRI Brain without and with contrast (CPT® 70553) approved following resection to establish baseline imaging and those with a complete resection should then be imaged according to surveillance guidelines.
- Patients with incomplete resection and receiving adjuvant radiation therapy can have a single MRI Brain (CPT® 70553) approved at completion of radiotherapy and should then be imaged according to surveillance guidelines.
- Those rare patients who are treated with chemotherapy can have MRI Brain without and with contrast (CPT® 70553) approved every 2 cycles during active treatment and at the end of planned chemotherapy.
  - Spinal imaging is appropriate every 2 cycles during induction chemotherapy for patients with measurable spinal cord disease on MRI.

**Craniopharyngioma Surveillance:**

- MRI Brain without and with contrast (CPT® 70553) can be approved every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually until 10 years after completion of therapy as late progressions can occur.
  - For additional imaging guidelines for patients in long term follow up after CNS tumor treatment that included radiation therapy, See PEDONC-19.3: Second Malignant Neoplasms (SMN).
- MRI Spine is not indicated during surveillance in patients without prior history of spinal involvement except to evaluate symptoms suspicious for spinal cord recurrence.
**PEDONC-4.11: Primary CNS Lymphoma**

Primary CNS lymphoma is a solitary or multifocal mass occurring in the brain without evidence of systemic (bone marrow or lymph node) involvement. Usually associated with immunodeficiency, this is a very rare entity in pediatrics accounting for < 0.1% of pediatric malignancies, so age-specific guidelines have not been established.

Primary CNS lymphoma imaging indications in pediatric patients are identical to those for adult patients. See [ONC-2.7: CNS Lymphoma](#) for imaging guidelines.

CNS lymphomas also involving bone marrow and/or lymph nodes should be imaged according to: **PEDONC-5.3: Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL).**

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**PEDONC-4.12: Meningiomas**

Account for 1 to 3% of pediatric CNS tumors. Usually associated with neurofibromatosis type 2 (NF-2) or prior therapeutic radiation exposure to the brain. Lifetime risk may be as high as 20% for young children receiving whole brain radiotherapy, most commonly occurring 15 to 20 years after radiation exposure.

Meningioma imaging indications in pediatric patients are identical to those for adult patients. See [ONC-2.8: CNS Meningioma](#) for imaging guidelines.

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End of PEDONC-4.12
**PEDONC-4.13: Choroid Plexus Tumors**

As a group these account for 1 to 4% of pediatric CNS tumors, and 70% of choroid plexus tumors present within the first 2 years of life.

- Includes the following tumors:
  - Choroid plexus papilloma
  - Choroid plexus adenoma, or atypical choroid plexus papilloma
  - Choroid plexus carcinoma

- PET Metabolic Brain imaging does not have a defined role in the evaluation of choroid plexus tumors.

- MR Spectroscopy (CPT® 76390) can be approved in the following circumstances:
  - To evaluate a brain lesion of indeterminate nature when the MRS findings will be used to determine whether biopsy/resection can be safely postponed

**Choroid Plexus Papilloma**

Choroid plexus papillomas outnumber other choroid plexus tumors by 4 to 5 times. These ventricular tumors commonly present with hydrocephalus caused by increased CSF production, resulting in signs of increased intracranial pressure. Appearance on MRI Brain without and with contrast (CPT® 70553) is typical, and they are usually treated by excision.

- Regrowth is rare, but repeat MRI Brain without and with contrast (CPT® 70553) is indicated if return of hydrocephalus is suspected or seen on CT imaging

**Choroid Plexus Adenoma or Atypical Choroid Plexus Papilloma**

These are extremely rare tumors with features midway in the malignant spectrum between papillomas and carcinomas. They are more prone to local invasion, but rarely to metastasis. Presenting symptoms are similar to papillomas. Appearance on MRI Brain with and without contrast (CPT® 70553) is typical, and they are usually treated by excision.

- Spinal imaging may be approved if requested at initial diagnosis
- Regrowth is rare, but repeat MRI Brain without and with contrast is indicated if return of hydrocephalus is suspected or seen on CT imaging

**Choroid Plexus Carcinoma**

This is a very aggressive malignancy, with high rates of metastasis to other parts of the CNS. Prognosis is significantly less favorable than for papillomas with overall survival rates of 35 to 40%. Overall incidence of metastases in choroid plexus carcinoma is 12–50%, which is associated with a worse outcome. TP53 mutations and alternative lengthening telomeres (ALT) are common in patients with choroid plexus carcinoma.
Choroid Plexus Carcinoma Initial Staging:

- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is indicated for all patients
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain

Choroid Plexus Carcinoma Treatment Response:

- Surgical gross total resection is curative for many patients. Patients who have gross or subtotal resection of the tumor can have a single MRI Brain without and with contrast (CPT® 70553) approved following resection to establish baseline imaging.
    - Patients with confirmed gross total resection should then be imaged according to surveillance guidelines.
- Patients with incomplete resection who receive adjuvant radiation therapy can have a single MRI Brain without and with contrast (CPT® 70553) approved at completion of radiotherapy and should then be imaged according to surveillance guidelines.
- Patients treated with chemotherapy can have MRI Brain without and with contrast (CPT® 70553) approved every 2 cycles during active treatment and at the end of planned chemotherapy.
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the end of chemotherapy for patients with localized intracranial tumors.
    - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
    - Spinal imaging is appropriate every 2 cycles during chemotherapy for patients with measurable spinal cord disease on MRI.
- Following completion of chemotherapy some patients will proceed to second-look surgery and/or radiotherapy.
    - MRI of all known sites of measurable disease can be performed prior to surgery and prior to radiotherapy, if necessary.
- MRI Brain without and with contrast (CPT® 70553) and MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is appropriate at the end of all planned therapy.
    - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain.
**Choroid Plexus Carcinoma Surveillance:**

- MRI Brain without and with contrast (CPT® 70553) can be approved every 4 months for 3 years, then every 6 months for 2 years after completion of therapy
  - For additional imaging guidelines for patients in long term follow up after CNS tumor treatment that included radiation therapy, See **PEDONC-19.3: Second Malignant Neoplasms (SMN)**

- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved at 12 and 24 months after completion of therapy for patients with no history of spinal cord involvement

- For patients with cord involvement at diagnosis, MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) can be approved every 4 months for 3 years, then every 6 months for 2 years after completion of therapy
  - MRI Spine with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) can be approved if being performed immediately following a contrast-enhanced MRI Brain

- MR Spectroscopy is not indicated for routine surveillance
References –PEDONC-4


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PEDONC-5.1: Pediatric Lymphoma – General Considerations

- Lymphoma mostly commonly involves the lymph nodes (LN). However, lymphoma can also arise from primary lymphoid tissues (bone marrow or thymus) or various secondary lymphoid tissues (spleen, mucosa-associated lymphoid tissue) or non-lymphoid organs (skin, bone, brain, lungs, liver, salivary glands, etc).

- Pediatric lymphomas are generally Hodgkin Lymphomas, Aggressive B-Cell Non-Hodgkin Lymphomas, Lymphoblastic Lymphomas, or Anaplastic Large Cell Lymphomas.

- Patients with Lymphoblastic Lymphoma (even those with bulky nodal disease) are treated using the leukemia treatment plan appropriate to the cell type (B or T cell). These patients should be imaged using guidelines in PEDONC-3.2: Acute Lymphoblastic Leukemia.

- Other histologies are rare in pediatric patients, and should be imaged according to the following guidelines:
  - Follicular lymphoma: ONC-27.3: Follicular Lymphoma
  - Marginal zone or MALT lymphomas: ONC-27.4: Marginal Zone Lymphomas
  - Mantle cell lymphomas: ONC-27.5: Mantle Cell Lymphoma
  - Cutaneous lymphomas: ONC-27.8: Cutaneous Lymphomas and T Cell Lymphomas
    - **Exception:** Cutaneous B-Lymphoblastic Lymphoma should be imaged using guidelines in PEDONC-3.2: Acute: Lymphoblastic Leukemia
  - Castleman’s Disease: ONC-31.11: Castleman’s Disease (Unicentric and Multicentric)

- All CT imaging recommended in this section refers to CT with contrast only.
  - Noncontrast CT imaging has not been shown to be beneficial in the management of pediatric lymphomas
  - Given the limited utility of noncontrast CT imaging in pediatric lymphomas, MRI without or without and with contrast is recommended in place of CT for patients who cannot tolerate CT contrast due to allergy or impaired renal function

- MRI without and with contrast of symptomatic or previously involved bony areas can be approved in known lymphoma patients without prior plain x-ray or bone scan evaluation
  - Bone scan is inferior to MRI for evaluation of known or suspected bone metastases in lymphoma

- MRI Brain without and with contrast (CPT® 70553) is the preferred study for evaluation of suspected Brain metastases in pediatric lymphoma
  - CT Head with (CPT® 70460) or without and with contrast (CPT® 70470) can be approved when MRI is contraindicated
**PEDONC-5.2: Pediatric Hodgkin Lymphoma (HL)**

**Pediatric Hodgkin Lymphoma Initial Staging:**
- All patients should undergo CT Neck (CPT® 70491), Chest (CPT® 71260), Abdomen/Pelvis (CPT® 74177), and CT with contrast or MRI without and with contrast of any other symptomatic body area (See **PEDONC-5.1: Pediatric Lymphoma – General Considerations**) as pediatric patients have a high rate of neck and Waldeyer’s ring involvement with Hodgkin Lymphoma.
- PET/CT (CPT® 78815) is indicated for initial staging of all patients, and can be performed prior to biopsy if necessary for patient scheduling.
  - Whole body PET/CT (CPT® 78816) may be approved if there is clinical suspicion of skull or distal lower extremity involvement.
- CT or MRI of other body areas (See **PEDONC-5.1: Pediatric Lymphoma – General Considerations**) may be indicated for rare patients based on physical findings or PET/CT results.

**Pediatric Hodgkin Lymphoma Treatment Response:**
- Restaging for treatment response can be performed as often as every 2 cycles of chemotherapy.
- Both CT of Neck (CPT® 70491), Chest (CPT® 71260), and Abdomen/Pelvis (CPT® 74177) and other previously involved areas and PET/CT (CPT® 78815) can be approved during early treatment response evaluations as decisions about chemotherapy drug selection and radiation treatment are frequently made based on both anatomic (CT-based) and metabolic (PET/CT-based) responses.
  - For patients with low risk (stage IA or IIA) mixed cellularity Hodgkin lymphoma, PET/CT can be performed for treatment response after cycles 1 and 3 instead of cycles 2 and 4.
- Once a particular patient has a negative PET/CT (either Deauville or Lugano 1, 2 or 3 as reported in formal radiology interpretation), all subsequent treatment response evaluations should use CT only, including end of therapy evaluation.
Pediatric Hodgkin Lymphoma Surveillance:
Most patients experiencing recurrence are detected based on physical findings, and frequent CT surveillance imaging of Hodgkin Lymphoma after completion of therapy does not improve post-recurrence overall survival.

- CT of the Neck (CPT® 70491), Chest (CPT® 71260), Abdomen/Pelvis (CPT® 74177) and other previously involved or currently symptomatic areas OR PET/CT (CPT® 78815 or 78816) should be approved for any patient with clinical symptoms suggesting recurrence

- Patients with stage I or II HL:
  - CT of the Neck/Chest (CPT® 70491 and CPT® 71260) and other previously involved areas at 6 months and 12 months after completing therapy
  - Surveillance at other time points from the end of therapy should use physical exam and CXR only

- Patients with stage III or IV HL:
  - CT of the Neck (CPT® 70491), Chest (CPT® 71260), and Abdomen/Pelvis (CPT® 74177) and other previously involved areas at 6 months and 12 months after completing therapy
  - Surveillance at other time points from the end of therapy should use physical exam and CXR only

- Patients with recurrent HL with no evidence of disease following successful treatment:
  - CT of the Neck/Chest/Abdomen/Pelvis every 3 months for 1 year after completing therapy for recurrence

- PET/CT is not indicated for surveillance, but can be approved to clarify inconclusive findings on conventional imaging to evaluate the need for biopsy to establish recurrence. These requests should be forwarded for Medical Director review.
PEDONC-5.3: Pediatric Aggressive Mature B-Cell Non-Hodgkin Lymphomas (NHL)

- Aggressive mature B-Cell NHL includes all of the following diagnoses, all of which should be imaged according to this section:
  - Burkitt's lymphoma/leukemia (BL)
  - Diffuse Large B-Cell Lymphoma (DLBCL)
  - Primary Mediastinal Large B-Cell Lymphoma (PMBCL)
  - Post-transplant Lymphoproliferative Disorder (PTLD)
    - Most commonly occurs following solid organ or stem cell transplantation
    - Viral-associated lymphoproliferative disorders
    - Most commonly occurs following hematopoietic stem cell transplantation or in patients with primary immunodeficiency

Pediatric Aggressive Mature B-Cell NHL Initial Staging:

- CT of the Neck (CPT® 70491), Chest (CPT® 71260), and Abdomen/Pelvis (CPT® 74177)
  - May substitute MRI Abdomen without and with contrast (CPT® 74183) and MRI Pelvis without and with contrast (CPT® 72197) in place of CT Abdomen/Pelvis, if requested.
- Additionally, CT with contrast or MRI without and with contrast any other symptomatic body area is indicated for all patients (See PEDONC-5.1: Pediatric Lymphoma – General Considerations)
- Abdominal ultrasound (CPT® 76700 or 76705) may be approved at initial presentation if CT/MRI not available.
- MRI Brain without and with contrast (CPT® 70553) is indicated if symptoms or extent of disease suggest intracranial extension (skull base involvement, for example) or metastasis
- PET/CT (CPT® 78815) is indicated for initial staging for all patients
  - Whole body PET/CT (CPT® 78816) may be approved if there is clinical suspicion of skull or distal lower extremity involvement.
  - Due to the extremely aggressive nature of this group of tumors (the doubling time can be as short as 8 hours) it may not be possible to obtain PET/CT prior to therapy initiation. PET/CT should be approved for treatment response in these cases as these lymphomas are nearly universally FDG-avid.
Pediatric Aggressive Mature B-Cell NHL Treatment Response:

- Initial treatment is usually 7 days of low intensity therapy, with early response evaluation determining next steps in therapy using CT with contrast or MRI without and with contrast of previously involved areas performed around day 6.
  - Patients are customarily still inpatient for this evaluation so outpatient requests should be rare for this time point.

- Following initial response evaluation, restaging for treatment response using CT with contrast or MRI without and with contrast (should be same modality as initial diagnosis if possible) of previously involved areas and PET/CT can be performed as often as every cycle of chemotherapy (~every 3 weeks).

- Once a particular patient has a negative PET/CT (either Deauville or Lugano 1, 2 or 3 as reported in formal radiology interpretation), all subsequent treatment response evaluations should use CT imaging only, including end of therapy evaluation.
  - PET/CT may be indicated to assess disease activity in inconclusive residual masses seen on conventional imaging.

Pediatric Aggressive Mature B-Cell NHL Supportive Care:

- CT Abdomen/Pelvis with contrast (CPT® 74177) may be approved in patients being treated with Rituximab who present with abdominal pain, due to risk of bowel perforation and obstruction.
  - US, x-ray, or other red flags are not required prior to CT.

Pediatric Aggressive Mature B-Cell NHL Surveillance:

Routine asymptomatic surveillance with advanced imaging has not been found to impact patient outcomes as the majority of these patients present clinically at relapse due to the highly aggressive nature of these lymphomas.

- CXR and Abdominal (CPT® 76700) and Pelvic (CPT® 76856) ultrasound are sufficient to follow asymptomatic patients with residual masses in the chest or abdomen/pelvis. Surveillance imaging with CT or MRI has not been shown to improve patient outcomes following recurrence and is not the standard of care.

- CT of the Neck (CPT® 70491), Chest (CPT® 71260), Abdomen/Pelvis (CPT® 74177) and other previously involved or currently symptomatic areas OR PET/CT (CPT® 78815 or 78816) should be approved for any patient with clinical symptoms or laboratory findings suggesting recurrence.
  - PET/CT (CPT® 78815) can be approved for suspected PTLD recurrence with documentation of new palpable nodes, rising LDH, or rising quantitative EBV PCR.

- PET/CT is not indicated for surveillance, but can be approved to clarify inconclusive findings on conventional imaging to evaluate the need for biopsy to establish recurrence. These requests should be forwarded for Medical Director review.
**PEDONC-5.4: Anaplastic Large Cell Lymphoma (ALCL)**

Similar in presentation to Hodgkin Lymphoma, and may be indistinguishable until immunocytology and molecular studies are complete.

**Anaplastic Large Cell Lymphoma Initial Staging:**

- All patients should undergo CT of the Neck/Chest/Abdomen/Pelvis (CPT® 70491, CPT® 71260, and CPT® 74177) and CT with contrast or MRI without and with contrast any other symptomatic body area (See **PEDONC-5.1: Pediatric Lymphoma – General Considerations**).

- PET/CT (CPT® 78815) is indicated for initial staging of all patients and can be performed prior to biopsy if necessary for patient scheduling.
  - Whole body PET/CT (CPT® 78816) may be approved if there is clinical suspicion of skull or distal lower extremity involvement.

- CT or MRI of other body areas may be indicated for rare patients based on physical findings or PET/CT results. Rarely patients will have primary tumor sites outside the Neck→Pelvis region, and MRI without and with contrast may be substituted for soft tissue extremity or paraspinal primary masses as necessary.

- Bone scan (See **PEDONC-1.3: Modality General Considerations**) is indicated for patients with bony primary tumors or metastatic disease.

**Anaplastic Large Cell Lymphoma Treatment Response:**

- Restaging for treatment response using CT with contrast or MRI without and with contrast of previously involved areas (should be same modality as initial diagnosis if possible) should be performed at the end of induction chemotherapy (commonly 4 to 6 weeks).

- For patients treated with cytotoxic chemotherapy, either CT of previously involved areas or PET/CT may be approved for treatment response as often as every 2 cycles of chemotherapy as decisions about chemotherapy drug selection and radiation treatment can be made based on either anatomic or metabolic responses.
  - If CT is performed for primary treatment response, PET/CT can be approved to clarify inconclusive findings detected on conventional imaging.
  - If PET/CT is performed for primary treatment response, CT or MRI can be approved to clarify inconclusive findings detected on PET imaging.

- Once a particular patient has a negative PET/CT (either Deauville or Lugano 1, 2 or 3 as reported in formal radiology interpretation), all subsequent treatment response evaluations should use CT imaging only, including end of therapy evaluation.
Anaplastic Large Cell Lymphoma Surveillance:

- CT of the Neck (CPT® 70491), Chest (CPT® 71260), Abdomen/Pelvis (CPT® 74177) and other previously involved or currently symptomatic areas should be approved for any patient with clinical symptoms suggesting recurrence.

- CT with contrast or MRI without and with contrast of all previously involved areas is indicated at 3, 6, 12, and 18 months after therapy is completed.

- Bone scan (See PEDONC-1.3: Modality General Considerations) is indicated at 3, 6, 12, and 18 months after therapy is completed for patients with bony primary tumors or metastatic disease.

- PET/CT is not indicated for surveillance, but can be approved to clarify inconclusive findings on conventional imaging to evaluate the need for biopsy to establish recurrence. These requests should be forwarded for Medical Director review.
References – PEDONC-5


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<td>PEDONC-6.5: Neuroblastoma – Surveillance Imaging (Risk Group Dependent)</td>
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</table>
**PEDONC-6.1: Neuroblastoma – General Considerations**

Neuroblastoma is the most common extracranial solid tumor of childhood, and generally arises from the adrenal gland or along the sympathetic chain. Neuroblastoma is divided into very low, low, intermediate, and high risk disease based on International Neuroblastoma Risk Group (INRG) Staging System (see: PEDONC-6.5). The treatment approaches for each risk group vary widely and have distinct imaging strategies.

90 to 95% of neuroblastomas secrete homovanillic acid (HVA) and vannilylmandelic acid (VMA) in the urine, and urine HVA/VMA should be performed at every disease evaluation for patients with positive HVA or VMA at diagnosis.

- Esthesioneuroblastoma should be imaged according to guidelines in ONC-3: *Squamous Cell Carcinomas Of The Head And Neck*

- PET imaging is rarely indicated in neuroblastoma, but can be approved in the following situations:
  - **Patients with MIBG-negativity documented at initial diagnosis**
    - For these patients, MIBG should not be repeated and whole body PET (CPT® 78816) may be performed rather than MIBG for metabolic tumor assessment.
    - Patients who are MIBG positive at diagnosis and then become MIBG negative in response to treatment should continue to use MIBG (CPT® 78800, 78801, 78802, 78803, or 78804) for metabolic imaging indications.
  - For all patients, PET may be approved at major decision points such as hematopoietic stem cell transplantation or surgery if MIBG and CT/MRI findings are inconclusive.
  - **Patients currently receiving medications that may interfere with MIBG uptake** that cannot safely be discontinued prior to imaging, including:
    - Tricyclic antidepressants (amitriptyline, imipramine, etc.)
    - Selective serotonin reuptake inhibitors (SSRI's, sertraline, paroxetine, escitolapram, etc.)
    - Neuroleptics (risperidone, haloperidol, etc.)
    - Antihypertensive drugs (alpha or beta blockers, calcium channel blockers)
    - Decongestants (phenylephrine, ephedrine, pseudoephedrine)
    - Stimulants (methylphenidate, dextroamphetamine, etc.)
    - PET should only be approved for this indication when specific documentation of the medication interaction is included with the current PET imaging request. These requests will be forwarded for Medical Director review.

- 99mTc-MDP bone scan does not identify foci of disease that affect staging or clinical management and provides no advantage over MIBG scintigraphy and is not used for evaluation of most patients with neuroblastoma.

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**End of PEDONC-6.1**
PEDONC-6.2: Staging and Risk Grouping – Neuroblastoma

Most recent treatment protocols are using the recently validated International Neuroblastoma Risk Group (INRG) staging system, which is primarily defined by the complexity of local tumor extension and the presence or absence of distant metastases:

- **L1**: Localized tumor not involving vital structures as defined by the list of image-defined risk factors and confined to one body compartment
  - Image-defined risk factors include a list of specific imaging findings defining patients less likely to be candidates for complete surgical resection
  - These risk factors involve the encasement of major blood vessels, airway, skull base, costovertebral junction, brachial plexus, spinal canal, or major organs or structures
- **L2**: Locoregional tumor with presence of one or more image-defined risk factors
- **M**: Distant metastatic disease (except stage MS)
- **MS**: Metastatic disease in children younger than 18 months with metastases confined to skin, liver, and/or bone marrow with < 10% involvement (MIBG must be negative in bone and bone marrow)

### INRG Neuroblastoma Risk Grouping

<table>
<thead>
<tr>
<th>Very low risk neuroblastoma (28% of patients, event-free survival &gt; 85%) includes:</th>
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<tr>
<td>Stage L1 or L2 maturing ganglioneuroma or intermixed ganglioneuroblastoma</td>
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<tr>
<td>Stage MS patients meeting all of the following:</td>
</tr>
<tr>
<td>- Age &lt; 18 months</td>
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<tr>
<td>- Without MYCN amplification</td>
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<tr>
<td>- Without 11q aberration</td>
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<thead>
<tr>
<th>Low Risk Neuroblastoma (27% of patients, event-free survival &gt; 75 to ≤ 85%) includes:</th>
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<tr>
<td>Stage L2 patients age &lt; 18 months meeting all of the following:</td>
</tr>
<tr>
<td>- Any histology except maturing ganglioneuroma or intermixed ganglioneuroblastoma</td>
</tr>
<tr>
<td>- Without MYCN amplification</td>
</tr>
<tr>
<td>- Without 11q aberration</td>
</tr>
<tr>
<td>Stage L2 patients age ≥ 18 months meeting all of the following:</td>
</tr>
<tr>
<td>- Differentiating neuroblastoma or nodular ganglioneuroblastoma</td>
</tr>
<tr>
<td>- Without MYCN amplification</td>
</tr>
<tr>
<td>- Without 11q aberration</td>
</tr>
<tr>
<td>Stage M patients meeting all of the following:</td>
</tr>
<tr>
<td>- Age &lt; 18 months</td>
</tr>
<tr>
<td>- Without MYCN amplification</td>
</tr>
<tr>
<td>- With hyperdiploidy (tumor DNA index &gt; 1)</td>
</tr>
</tbody>
</table>
## Intermediate Risk Neuroblastoma

(9% of patients, event-free survival ≥ 50 to ≤ 75%) includes:

- Stage L2 patients age < 18 months meeting all of the following:
  - any histology except maturing ganglioneuroma or intermixed ganglioneuroblastoma
  - With 11q aberration
- Stage L2 patients age ≥ 18 months meeting all of the following:
  - Neuroblastoma or nodular ganglioneuroblastoma
  - Without *MYCN* amplification
  - With 11q aberration
- Stage M patients meeting all of the following:
  - Age < 18 months
  - Without *MYCN* amplification
  - With diploidy (tumor DNA index = 1)

## High Risk Neuroblastoma

(36% of patients, event-free survival < 50%, includes the following)

- All patients age ≥ 18 months with stage M disease regardless of other factors
- All patients with neuroblastoma and *MYCN* amplification regardless of other factors
- All stage MS patients with 11q aberration regardless of other factors
PEDONC-6.3: Neuroblastoma – Initial Staging

- One of the following imaging groups for all patients:
  - CT with contrast of the Neck/Chest/Abdomen/Pelvis (CPT® 70491, 71260, and 74177) OR
  - MRI without and with contrast of the Neck/Chest/Abdomen/Pelvis (CPT® 70543, 71552, 74183, and 72197)
- MRI without and with contrast is preferred for evaluation of paraspinal tumors where cord compression is a possibility
- Metabolic imaging in neuroblastoma:
  - Adrenal nuclear imaging (CPT® 78075) can be approved for evaluation of suspected adrenal neuroblastoma, ganglioneuroblastoma, or ganglioneuroma when CT or MRI is inconclusive
  - $^{123}$I-metaiodobenzylguanidine (MIBG - CPT® 78800, 78801, 78802, 78803, or 78804) scintigraphy is the preferred metabolic imaging for neuroblastoma and is positive in 90 to 95% of neuroblastomas.
    - MIBG provides superior sensitivity and sensitivity for detecting viable osseous disease compared with bone scintigraphy so technetium bone scan is not necessary when MIBG is utilized
  - Most MIBG imaging studies are SPECT/CT studies using CT for localization only. Separate diagnostic CT codes should not be approved for this purpose. See PREFACE-4.6: SPECT/CT imaging.
  - Occasionally MIBG cannot be performed prior to initiation of therapy. In this circumstance MIBG should be completed within 3 weeks of therapy initiation as the reduction in MIBG avidity in response to chemotherapy is not immediate. Inability to complete MIBG before starting therapy is not an indication to approve PET imaging.
  - PET imaging is inferior to MIBG in neuroblastoma, and should not be used unless one of the exceptions stated in section PEDONC-6.1 is present
- Brain metastases are rare in neuroblastoma, but if clinical signs/symptoms suggest brain involvement, MRI Brain without and with contrast (CPT® 70553) is preferred for evaluation.
  - MRI Brain of asymptomatic patients with no history of brain metastases is not indicated for neuroblastoma.
**PEDONC-6.4: Neuroblastoma – Treatment Response Imaging (Risk Group Dependent)**

Risk grouping will not be known at the time of initial staging, but is critical for all imaging decisions after initial staging is complete. The treating oncologist should always know the patient’s risk grouping. It is not possible to establish the appropriate imaging plan for a neuroblastoma patient without knowing his/her risk group.

**All Very Low Risk and Low Risk Neuroblastoma Not Receiving Chemotherapy:**

- All patients can have CT with contrast or MRI without and with contrast of the primary tumor site 6 to 8 weeks after diagnosis to determine if additional treatment is necessary.
  - Ultrasound may be used in place of CT or MRI to avoid radiation and/or anesthesia exposure in low risk patients
- Many patients will be treated with surgical resection only without adjuvant therapy, and these patients enter immediately into surveillance.

**All Intermediate Risk Neuroblastoma and Very Low Risk or Low Risk Neuroblastoma Receiving Chemotherapy:**

Patients generally receive 2 to 12 cycles of moderate-intensity chemotherapy depending on response to treatment.

Surgical resection may occur prior to or following chemotherapy depending on disease stage. Restaging prior to surgery is appropriate.

- Treatment response assessment can be approved as often as every 2 cycles of chemotherapy (~every 6 weeks and at the end of planned treatment) and includes:
  - CT with contrast of the Chest/Abdomen/Pelvis (CPT® 71260, and CPT® 74177) or MRI without and with contrast, (CPT® 71552, CPT® 74183, and CPT® 72197) and other sites with prior measurable disease
  - Urine HVA/VMA (if positive at diagnosis)
  - Bone marrow aspiration/biopsy if positive at diagnosis
- MIBG scan (CPT® 78800, 78801, 78802, 78803, or 78804) can be approved every 4 cycles and at the end of planned treatment
**High Risk Neuroblastoma:**

This group of patients receives highly aggressive therapy using sequential chemotherapy, surgery, high dose chemotherapy with stem cell rescue, radiotherapy, monoclonal antibody (mAb) immunotherapy, and biologic therapy.

- Treatment response assessment can be approved as often as every 2 cycles of chemotherapy, mAb, or biologic therapy (~every 6 weeks) and includes:
  - CT with contrast, of the Chest/Abdomen/Pelvis (CPT® 71260, and CPT® 74177) or MRI without and with contrast, (CPT® 71552, CPT® 74183, and CPT® 72197) and other sites with prior measurable disease
  - Urine HVA/VMA (if positive at diagnosis)
  - Bone marrow aspiration/biopsy if positive at diagnosis
  - MIBG scan (CPT® 78800, 78801, 78802, 78803, or 78804)
    - 123I-MIBG scan is also indicated following 131I-MIBG therapy, but FDG-PET cannot be used after 131I-MIBG therapy

- Treatment response assessment is necessary at every change in modality (prior to surgery, HSCT, XRT, and mAb therapy) as well as at the end of therapy

- More frequent imaging can be approved around the time of surgery if needed for preoperative planning
**PEDONC-6.5: Neuroblastoma – Surveillance Imaging (Risk Group Dependent)**

**Very Low Risk and Low Risk Neuroblastoma:**

- Urine HVA/VMA (if positive at diagnosis) at 1, 2, 3, 6, 9, 12, 18, 24, 36, 48, and 60 months after surgery
- CT with contrast or MRI without and with contrast of the primary tumor site 3, 6, 9, 12, 18, 24, and 36 months after surgery. If negative at 36 months, no further advanced imaging is necessary.
  - Ultrasound may be sufficient to evaluate the primary tumor site for certain patients and may be approved if requested to replace CT or MRI.
- MIBG is not indicated for surveillance of low risk neuroblastoma, but can be used to clarify findings suspicious for disease recurrence
- CT Chest is not indicated in asymptomatic surveillance imaging of neuroblastoma patients with no prior history of thoracic disease

**Intermediate Risk Neuroblastoma:**

- Urine HVA/VMA (if positive at diagnosis) every month until 12 months after completion of therapy, then at 14, 16, 18, 21, 24, 30, and 36 months after completion of therapy, then annually until 10 years after completion of therapy
- CT with contrast or MRI without and with contrast of the primary tumor and known metastatic sites at 3, 6, 9, 12, 18, 24, and 36 months after completion of therapy. If negative at 36 months, no further advanced imaging is necessary.
  - Ultrasound may be sufficient to evaluate the primary tumor site for certain patients and may be approved if requested to replace CT or MRI.
- For all patients with stage 4 or M disease or patients with stage 4S or MS disease AND positive MIBG at completion of therapy, MIBG scan (CPT® 78800, 78801, 78802, 78803, or 78804) at 3, 6, 9, 12, 24, and 36 months after completion of therapy.
  - If negative at 36 months, no further MIBG imaging is necessary.
  - For all other intermediate risk neuroblastoma patients, MIBG (or PET, if MIBG-negative at initial diagnosis) during surveillance is not indicated.
- CT Chest is not indicated in asymptomatic surveillance imaging of neuroblastoma patients with no prior history of thoracic disease.
**High Risk Neuroblastoma:**

- Urine HVA/VMA (if positive at diagnosis) at 3, 6, 9, 12, 18, 24, 30, 36, 42, 48, 54, and 60 months after completion of therapy, then annually until 10 years after completion of therapy.

- CT with contrast or MRI without and with contrast of the primary tumor site at 3, 6, 9, 12, 18, 24, 30, 36, 42, 48, 54, and 60 months, then annually until 10 years after completion of therapy. If negative at 10 years, no further advanced imaging is necessary.

- MIBG scan (CPT® 78800, 78801, 78802, 78803, or 78804) at 3, 6, 9, 12, 18, 24, 30, and 36 months after completion of therapy. If negative at 36 months, no further MIBG or PET imaging is necessary.
  - Early detection of recurrence with $^{123}$I-MIBG has been shown to improve post-relapse outcomes in high risk neuroblastoma

- CT Chest is not indicated in asymptomatic surveillance imaging of neuroblastoma patients with no prior history of thoracic disease.

- For patients with suspected recurrence:
  - CT with contrast, of the Chest/Abdomen/Pelvis (CPT® 71260, and CPT® 74177) or MRI without and with contrast, (CPT® 71552, CPT® 74183, and CPT® 72197) and other sites of prior measurable disease or current symptoms
  - MIBG scan (CPT® 78800, 78801, 78802, 78803, or 78804)
  - Urine HVA/VMA
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PEDONC-7.1: Pediatric Renal Tumors – General Considerations

A variety of tumors can occur in the pediatric kidney, and include the following:

- Wilms Tumor
  - Favorable Histology (FHWT)
  - Focal Anaplasia (FAWT)
  - Diffuse Anaplasia (DAWT)
  - Bilateral Wilms Tumor (BWT)
- Renal Cell Carcinoma (RCC)
- Clear Cell Sarcoma of the Kidney (CCSK)
- Malignant Rhabdoid Tumor of the Kidney (MRT)
- Congenital Mesoblastic Nephroma (CMN)
- Other cancers occurring in the kidney:
  - Neuroblastoma
  - Primitive Neuroectodermal Tumor
  - Rhabdomyosarcoma
  - Non-Rhabdomyosarcoma Soft Tissue Sarcomas
  - These and other rare tumors have been reported occurring primarily in the kidney and should be imaged according to the guidelines for the specific histologic diagnosis.
PEDONC-7.2: Unilateral Wilms Tumor (UWT)

Unilateral Wilms Tumor Initial Staging:
Many patients will present with an asymptomatic abdominal mass, and will undergo ultrasound as a primary evaluation. Doppler ultrasound to evaluate for tumor thrombus is no longer necessary unless CT findings are inconclusive, and should not be performed if CT is already completed.

- CT Abdomen/Pelvis with contrast (CPT® 74177) is indicated for all unilateral Wilms tumor patients
  - If bilateral renal lesions are noted on ultrasound or CT, MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast should be strongly considered for better characterization
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) should be completed prior to anesthesia exposure if possible
- MRI Brain without and with contrast (CPT® 70553) is indicated for initial staging for any patient with neurologic signs or symptoms raising suspicion of CNS metastases as only ~0.5% of Wilms tumor patients will ever develop brain metastases
- Bone scan (See PEDONC-1.3) is indicated for any patient with signs or symptoms raising suspicion of bony metastases
- PET is not indicated in the initial staging of any pediatric renal tumor

Unilateral Wilms Tumor Treatment Response:
A very low risk subset of stage I FHWT will be observed after nephrectomy, and enter directly into surveillance.

The majority of patients will receive chemotherapy with or without XRT, beginning within 14 days of initial surgery.

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned therapy
- CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast can be performed every 2 cycles during treatment and at the end of planned therapy
- PET is not routinely utilized to assess treatment response in Wilms tumor.
  - However, since most Wilms tumors are FDG-avid, rare circumstances may occur where PET imaging should be approved to establish the presence of active disease only when a major therapeutic decision depends on PET avidity.
  - These requests will be forwarded for Medical Director review.
Unilateral Wilms Tumor Surveillance Imaging:

There are no data to support the use of PET imaging for routine surveillance in any patient with Wilms tumor.

- Very low risk FHWT treated with nephrectomy only:
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) OR CXR at 3, 6, 12, and 18 months after nephrectomy
  - CT Abdomen and Pelvis with contrast (CPT® 74177) OR Ultrasound (CPT® 76700 and 76506) of Abdomen and Pelvis at 3, 6, 12, and 18 months after nephrectomy
  - Surveillance pelvic imaging is indicated in this patient group due to higher risk of recurrence in surgery only treatment
  - Other surveillance imaging should be by Abdominal US (CPT® 76700) and CXR

- FHWT treated with chemotherapy with or without XRT:
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 6 months for 3 years after completion of all therapy
  - CT Abdomen with contrast (CPT® 74160), MRI Abdomen without and with contrast (CPT® 74183), or Ultrasound (CPT® 76700) of the Abdomen every 6 months for 3 years after completion of all therapy
  - Pelvic imaging is not indicated for surveillance unless prior pelvic involvement has been documented or there was tumor rupture at diagnosis
  - Other surveillance imaging should be by Abdominal US and CXR

- FAWT or DAWT treated with chemotherapy with or without XRT:
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 2 years after completion of all therapy
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) every 3 months for 2 years after completion of all therapy
  - Other surveillance imaging should be by Abdominal US and CXR

- Surveillance imaging with CT of the Chest/Abdomen/Pelvis (CPT® 71260 and CPT® 74177) following successful treatment for recurrent unilateral Wilms tumor can be approved at every 3 months for 1 year after completing therapy for recurrence.
  - Surveillance imaging later than 12 months after completing therapy for recurrence should follow the standard timing listed in this surveillance section.
**PEDONC-7.3: Bilateral Wilms Tumor (BWT)**

**Bilateral Wilms Tumor Initial Staging:**

Many patients will present with an asymptomatic abdominal mass, and will undergo ultrasound as a primary evaluation. Doppler ultrasound to evaluate for tumor thrombus is no longer necessary unless CT findings are inconclusive, and should not be performed if CT is already completed.

Patients with bilateral Wilms Tumor may begin therapy without a histologic diagnosis to preserve a localized disease stage and attempt to shrink the tumors to allow for renal-sparing surgical approaches.

- MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is the preferred imaging modality for patients with bilateral Wilms tumor
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is often performed prior to discovery of bilateral lesions and should not prevent MRI from being approved
  - CT Abdomen and Pelvis with contrast (CPT® 74177) may be used for patients with a contraindication to MRI
    - Avoidance of anesthesia exposure is not a contraindication to MRI for these patients
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated in the initial workup of all pediatric renal tumors and should be completed prior to anesthesia exposure if possible
- MRI Brain without and with contrast (CPT® 70553) is indicated for initial staging for any patient with neurologic signs or symptoms raising suspicion of CNS metastases as only ~0.5% of Wilms tumor patients will ever develop brain metastases
- Bone scan (See PEDONC-1.3: Modality General Considerations) is indicated for any patient with signs or symptoms raising suspicion of bony metastases
- PET is not indicated in the initial staging of any pediatric renal tumor
**Bilateral Wilms Tumor Treatment Response:**

- MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be performed every 2 cycles during treatment and at the end of planned therapy
  - CT Abdomen and Pelvis with contrast (CPT® 74177) may be used for patients with a contraindication to MRI
  - If treating with chemotherapy without a biopsy, disease evaluation is indicated at week 6. If either tumor has not shrunk 50%, then open biopsy is indicated to confirm favorable histology.
  - If partial nephrectomy still not feasible at week 6, the next disease evaluation is at week 12. Surgical resection should occur no later than week 12.
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned therapy
- PET is not routinely utilized to assess treatment response in Wilms tumor.
  - However, since most Wilms tumors are FDG-avid, rare circumstances may occur where PET should be approved to establish the presence of active disease only when a major therapeutic decision depends on PET avidity.
  - These requests will be forwarded for Medical Director review.

**Bilateral Wilms Tumor Surveillance Imaging:**

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 6 months for 3 years after completion of all therapy
- CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) every 6 months for 3 years after completion of therapy
  - “Extra” one-time imaging is supported at 3 months after completion of all therapy because close surgical margins occur frequently in patients undergoing nephron-sparing surgical approaches, and the risk for early local recurrence is higher
- Pelvic imaging is not indicated for surveillance unless prior pelvic involvement has been documented or there was tumor rupture at diagnosis
- Other surveillance imaging should be by Abdominal US (CPT® 76700) and CXR
  - When CT or MRI Abdomen no longer indicated, patients with bilateral Wilms tumor should have screening Abdominal ultrasound every 3 months until age 8
- Surveillance imaging with CT of the Chest/Abdomen/Pelvis (CPT® 71260 and CPT® 74177) following successful treatment for recurrent bilateral Wilms tumor can be approved every 3 months for 1 year after completing therapy for recurrence.
  - Surveillance imaging later than 12 months after completing therapy for recurrence should follow the standard timing listed in this surveillance section.
**PEDONC-7.4: Pediatric Renal Cell Carcinoma (RCC)**

A majority of pediatric cases have a novel subtype involving TFE3 or TFEB translocations, which have a different natural history than “adult type” RCC. Patients of any age with TFE3 or TFEB translocated RCC should be imaged according to this guideline section.

40 to 45% of pediatric RCC cases have similar histologies to adult RCC (clear cell, papillary, chromophobe, etc.) and imaging decisions will be similar to adult oncology guidelines. Patients with all other subtypes of RCC should be imaged according to **ONC-17: Renal Cell Cancer (RCC).**

**Pediatric Renal Cell Carcinoma Initial Staging:**

Many patients will present with an asymptomatic abdominal mass, and will undergo ultrasound as a primary evaluation. Doppler ultrasound to evaluate for tumor thrombus is no longer necessary unless CT findings are inconclusive, and should not be performed if CT is already completed.

- CT Abdomen and Pelvis with contrast (CPT® 74177) is indicated in all patients
  - If bilateral renal lesions are noted on ultrasound or CT, MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) should be strongly considered
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) should be completed prior to anesthesia exposure if possible
- Other staging imaging should be deferred until a histologic diagnosis is made, by complete nephrectomy for most unilateral renal tumors and biopsy for bilateral renal tumors or inoperable unilateral tumors
- MRI Brain without and with contrast (CPT® 70553) is indicated for any patient with neurologic signs or symptoms raising suspicion of CNS metastases
- Bone scan (See **PEDONC-1.3: Modality General Considerations**) is indicated for any patient with signs or symptoms raising suspicion of bony metastases
- PET scan is not indicated in the initial staging of any pediatric renal tumor
**Pediatric Renal Cell Carcinoma Treatment Response:**

Most patients will have surgical resection of all disease at the time of diagnosis and will enter directly into surveillance.

- Patients with residual measurable disease after initial surgery and receiving adjuvant medical therapy can have CT Chest with (CPT® 71260) or without contrast (CPT® 71250) and CT Abdomen with contrast (CPT® 74160) every 2 cycles during active treatment.
- Pelvic imaging is not indicated unless prior pelvic involvement has been documented.
- PET is not routinely utilized to assess treatment response in pediatric RCC.
  - However, since some RCC tumors are FDG-avid, rare circumstances may occur where PET should be approved to establish the presence of active disease only when a major therapeutic decision depends on PET avidity.
  - These requests will be forwarded for Medical Director review.

**Pediatric Renal Cell Carcinoma Surveillance Imaging:**

- All pediatric RCC patients:
  - MRI Brain without and with contrast (CPT® 70553) every 6 months for 2 years after completion of all therapy only for patients with documented CNS metastases or new signs/symptoms suggestive of CNS recurrence.
- TFE3 or TFEB subtype:
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 2 years, then every 6 months for 2 years after completion of all therapy.
  - CT Abdomen with contrast (CPT® 74160) or MRI Abdomen without and with contrast (CPT® 74183) every 3 months for 2 years, then every 6 months for 2 years after completion of all therapy.
  - Pelvic imaging is not indicated for surveillance unless prior pelvic involvement has been documented.
- All other histologies:
  - Surveillance imaging is appropriate as listed in the adult Oncology Imaging Guidelines: [ONC-17.4: Renal Cell Cancer (RCC) – Surveillance](#)
**PEDONC-7.5: Clear Cell Sarcoma of the Kidney (CCSK)**

Be careful not to confuse the diagnosis with clear cell RCC. See **ONC-17: Renal Cell Cancer (RCC)** for imaging guidelines.

**Clear Cell Sarcoma Of The Kidney Initial Staging:**

Many patients will present with an asymptomatic abdominal mass, and will undergo ultrasound as a primary evaluation. Doppler ultrasound to evaluate for tumor thrombus is no longer necessary unless CT findings are inconclusive, and should not be performed if CT is already completed.

- CT Abdomen and Pelvis with contrast (CPT® 74177) is indicated in all patients.
  - If bilateral renal lesions are noted on ultrasound or CT, MRI Abdomen and Pelvis without and with contrast should be strongly considered.
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) should be completed prior to anesthesia exposure if possible.
- Other staging imaging should be deferred until a histologic diagnosis is made, by complete nephrectomy for most unilateral renal tumors and biopsy for bilateral renal tumors or inoperable unilateral tumors.
- MRI Brain without and with contrast (CPT® 70553) is indicated for initial staging in all patients with clear cell sarcoma of the kidney.
- Bone scan (See **PEDONC-1.3: Modality General Considerations**) is indicated in all patients with clear cell sarcoma of the kidney.
- PET is not indicated in the initial staging of any pediatric renal tumor.

**Clear Cell Sarcoma Of The Kidney Treatment Response:**

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned therapy.
- CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be performed every 6 weeks during treatment and at the end of planned therapy.
- MRI Brain without and with contrast (CPT® 70553) can be performed:
  - Every 2 cycles during treatment for patients with CNS metastases at initial staging.
  - At the end of planned therapy for all patients with CCSK.
- Bone scan (See **PEDONC-1.3: Modality General Considerations**) at the end of planned therapy.
- PET is not routinely utilized to assess treatment response in CCSK.
  - However, since clear cell sarcomas have been shown to be FDG-avid in other anatomic locations, rare circumstances may occur where PET should be approved to establish the presence of active disease only when a major therapeutic decision depends on PET avidity.
  - These requests will be forwarded for Medical Director review.
**Clear Cell Sarcoma Of The Kidney Surveillance Imaging:**

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 2 years after completion of all therapy
- CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) every 3 months for 2 years after completion of all therapy
- MRI Brain without and with contrast (CPT® 70553) every 6 months for 3 years after completion of all therapy
- Bone scan (See **PEDONC-1.3: Modality General Considerations**) every 3 months for 1 year, then every 6 months for 1 year after completion of all therapy
  - If negative at 36 months, no further advanced imaging is necessary.
- Other surveillance imaging should be by Abdominal US (CPT® 76700) and CXR
**PEDONC-7.6: Malignant Rhabdoid Tumor of the Kidney (MRT) and Other Extracranial Sites**

Be careful not to confuse the diagnosis with rhabdomyosarcoma. See **PEDONC-8.2: Rhabdomyosarcoma (RMS) for Imaging Guidelines**.

A highly aggressive histologic variant that can also occur in other locations and all non-CNS sites should follow these guidelines.

Primary CNS rhabdoid malignancies should be imaged according to **PEDONC-4.5: Atypical Teratoid/Rhabdoid Tumors (ATRT)**.

**Malignant Rhabdoid Tumor Initial Staging:**

Many patients will present with an asymptomatic abdominal mass, and will undergo ultrasound as a primary evaluation. Doppler ultrasound to evaluate for tumor thrombus is no longer necessary unless CT findings are inconclusive, and should not be performed if CT is already completed.

- CT Abdomen and Pelvis with contrast (CPT® 74177) is indicated in all patients
  - If bilateral renal lesions are noted on ultrasound or CT, MRI Abdomen and Pelvis without and with contrast should be strongly considered
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) should be completed prior to anesthesia exposure if possible
- Other staging imaging should be deferred until a histologic diagnosis is made, by complete nephrectomy for most unilateral renal tumors and biopsy for bilateral renal tumors or inoperable unilateral tumors
- MRI Brain without and with contrast (CPT® 70553) is indicated for all patients with MRT of the kidney or other non-CNS site
- Bone scan (See **PEDONC-1.3: Modality General Considerations** is indicated in all patients with MRT of the kidney or other non-CNS site
- PET is not indicated in the initial staging of any pediatric renal tumor
**Malignant Rhabdoid Tumor Treatment Response:**

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned therapy

- CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be performed every 2 cycles during treatment and at the end of planned therapy
  - If primary site other than kidney, perform CT with contrast or MRI without and with contrast of primary site in place of abdominal and pelvic imaging

- MRI Brain without and with contrast (CPT® 70553) can be performed:
  - Every 2 cycles during treatment for patients with CNS metastases at initial staging
  - At the end of planned therapy for all patients with MRT

- Bone scan (See PEDONC-1.3: Modality General Considerations) at the end of planned therapy only if positive at initial diagnosis

- PET is not routinely utilized to assess treatment response in MRT.
  - However, since malignant rhabdoid tumors have been shown to be FDG-avid, rare circumstances may occur where PET should be approved to establish the presence of active disease only when a major therapeutic decision depends on PET avidity.
  - These requests will be forwarded for Medical Director review.

**Malignant Rhabdoid Tumor Surveillance Imaging:**

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 2 years after completion of all therapy

- CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) every 3 months for 3 years after completion of all therapy
  - If primary site other than kidney, perform CT with contrast or MRI without and with contrast of primary site in place of abdominal imaging

- MRI Brain without and with contrast (CPT® 70553) every 3 months for 1 year, then every 6 months for 1 year after completion of all therapy

- Bone scan (See PEDONC-1.3: Modality General Considerations) every 3 months for 1 year, then every 6 months for 1 year after completion of all therapy only if positive at initial diagnosis
  - If negative at 36 months, no further advanced imaging is necessary

- Other surveillance imaging should be by Abdominal US (CPT® 76700) and CXR
**PEDONC-7.7: Congenital Mesoblastic Nephroma (CMN)**

This is the most common primary renal tumor occurring in young infants, and the overall prognosis is very good.

Complete surgical removal is curative in most cases, and histologically confirmed metastatic disease or bilateral disease has never been reported.

**Congenital Mesoblastic Nephroma Initial Staging**

Many patients will present with an asymptomatic abdominal mass at the time of birth or abnormal prenatal ultrasound, and will undergo ultrasound as a primary evaluation.

- CT Abdomen and Pelvis with contrast (CPT® 74177) is indicated in all patients
- CT Chest with (CPT® 71260) can be approved to evaluate inconclusive findings on Chest X-ray
- PET is not indicated in the initial staging of any pediatric renal tumor

**Congenital Mesoblastic Nephroma Treatment Response:**

- Surgical resection is curative in most patients. Children who have resection of the tumor can have a single CT Abdomen and Pelvis with contrast (CPT® 74177) approved following resection to establish baseline imaging and those with a complete resection should then be imaged according to surveillance guidelines
- Some patients will receive preoperative chemotherapy to facilitate safer resection and can have CT Abdomen and Pelvis with contrast (CPT® 74177) approved every 2 cycles of therapy until surgery, and should then be imaged according to surveillance guidelines after their postoperative baseline imaging study

**Congenital Mesoblastic Nephroma Surveillance Imaging**

- Recurrences are rare, but most occur within 12 months of diagnosis
- Given the young age of the patients with CMN, ultrasound is the preferred surveillance imaging modality to avoid radiation and anesthesia exposures
  - CT Abdomen and Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved every 3 months for 1 year after completion of all therapy for patients with residual abnormalities present on post-operative imaging or inconclusive findings on ultrasound

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PEDONC-8.1: Pediatric Soft Tissue Sarcomas – General Considerations

Soft tissue sarcomas occur in both adult and pediatric patients, but some histologic types are more common in one age group than the other. Unless specified below, patients who are <18 years old should be imaged according to this guideline section. Exceptions include:

- Rhabdomyosarcoma patients of all ages should be imaged according to guidelines in PEDONC-8.2: Rhabdomyosarcoma (RMS)
- Kaposi’s sarcoma patients of all ages should be imaged according to guidelines in ONC-31.10: Kaposi’s Sarcoma

Pediatric soft tissue sarcomas are divided into two groups:

1. Rhabdomyosarcoma (RMS) accounts for ~60% of soft tissue sarcomas in young patients, but only ~25% of soft tissue sarcomas in adolescents
2. Non-rhabdomyosarcoma soft tissue sarcomas (NRSTS) which encompasses all other histologic subtypes

- Evaluation of soft tissue masses of uncertain nature prior to biopsy should follow general imaging guidelines in PEDMS-3: Soft Tissue and Bone Masses for patients who are age 0 (newborn) through 17 years old, and MS-10: Soft Tissue Mass Or Lesion Of Bone for patients who are ≥18 years old.

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End of PEDONC-8.1
PEDONC-8.2: Rhabdomyosarcoma (RMS)

Rhabdomyosarcoma Initial Staging:

- Because RMS can arise from any muscle tissue, the presenting symptoms and primary tumor sites vary widely and strongly influence the appropriate imaging decisions.
  - Either CT with contrast or MRI without and with contrast is acceptable for primary site imaging of RMS arising in the abdomen or pelvis at the discretion of the treating oncologist.
  - CT with contrast is the preferred primary site imaging modality for RMS arising in the thoracic cavity (not the chest wall).
  - MRI without and with contrast is the preferred primary site imaging modality for RMS occurring in all other anatomic locations, including the chest wall.

- Evaluation for lung metastases using CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated in the initial workup of all pediatric soft tissue sarcomas and should be completed prior to anesthesia exposure if possible.

- Other staging imaging should be deferred until a histologic diagnosis is made.
  - PET/CT is superior to conventional imaging for detection of nodal and bony metastases in pediatric RMS and is indicated in the initial staging of all patients after histologic diagnosis is established.
    - Whole body PET/CT (CPT® 78816) is the preferred study for initial staging of RMS.
    - Bone scan (See PEDONC-1.3: Modality General Considerations) may be substituted for PET imaging if PET not available.
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is not routinely indicated in the initial metastatic staging of all patients with pediatric RMS, but can be approved in the following situations:
    - Evaluation of inconclusive PET findings
    - Primary site of abdomen or pelvis
    - Lower extremity primary sites
  - MRI Brain (CPT® 70553) and Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) is indicated for initial staging in the following pediatric RMS:
    - Primary site involving the paraspinal or paravertebral region
    - PET or bone scan-avid lesions in skull, neck, vertebrae
    - Any patient with neurologic signs or symptoms raising suspicion of CNS metastases.
Rhabdomyosarcoma Treatment Response:

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned therapy for all patients.

- Primary site imaging:
  - CT with contrast or MRI without and with contrast can be performed every 2 cycles during treatment and at the end of planned therapy.
  - Restaging imaging is appropriate after local control surgery (complete or partial resection) is completed.

- Metastatic site imaging:
  - Repeat imaging of all known metastatic sites using the same modality as during initial staging is appropriate whenever primary site imaging is necessary.

- PET is not routinely utilized to assess treatment response in RMS, but is indicated in the following circumstances:
  - Response assessment prior to local control surgery or radiation therapy.
  - Evaluation of residual mass visible on conventional imaging as part of end of therapy evaluation.
  - Response assessment of disease visible on PET but not conventional imaging.
  - Once PET has been documented to be negative for a given patient’s cancer or all PET-avid disease has been surgically resected, PET should not be used for continued disease monitoring or surveillance unless one of the exceptions in section PEDONC-1: General Guidelines applies. These requests will be forwarded for Medical Director review.
  - PET is generally not indicated during active treatment for recurrent pediatric cancer. In rare circumstances, PET may be appropriate when results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance. These requests will be forwarded for Medical Director review.
**Rhabdomyosarcoma Surveillance Imaging:**

- All patients with localized RMS:
  - Primary tumor site should be imaged with either CT with contrast or MRI without and with contrast every 3 months for 1 year, then every 4 months for 2 years, then every 6 months for 1 year after completion of all therapy
  - CXR every 3 months for 1 year, then every 4 months for 2 years, then every 6 months for 1 year after completion of all therapy
    - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated for new or worsening clinical symptoms of chest disease or new findings on CXR

- All patients with metastatic RMS:
  - Primary tumor site should be imaged with either CT with contrast or MRI without and with contrast every 3 months for 1 year, then every 4 months for 2 years, then every 6 months for 1 year after completion of all therapy
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) and all known metastatic sites every 3 months for 1 year, then every 4 months for 2 years, then every 6 months for 1 year after completion of all therapy
  - Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) should be used for surveillance of known bony metastases every 3 months for 1 year, then every 4 months for 2 years, then every 6 months for 1 year after completion of all therapy

- PET should not be used for surveillance imaging of RMS unless one of the following applies:
  - Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive or suspicious for recurrence and PET avidity will determine whether biopsy or continued observation is appropriate
    - Residual mass that has not changed in size since the last conventional imaging does not justify PET imaging
    - PET avidity in a residual mass at the end of planned therapy is not an indication for PET imaging during surveillance.
  - Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities. These requests will be forwarded for Medical Director review.
PEDONC-8.3: Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS)

All soft tissue sarcomas other than RMS fall into this category.

**NRSTS Initial Staging:**

- Because soft tissue sarcomas can arise from any soft tissue, the presenting symptoms and primary tumor sites vary widely and strongly influence the appropriate imaging decisions.
  - Either CT with contrast or MRI without and with contrast is acceptable for primary site imaging of NRSTS arising in the abdomen or pelvis at the discretion of the treating oncologist.
  - CT with contrast is the preferred primary site imaging modality for NRSTS arising in the thoracic cavity (not the chest wall).
  - MRI without and with contrast is the preferred primary site imaging modality for NRSTS occurring in all other anatomic locations, including the chest wall.

- In addition, evaluation for lung metastases using CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated in the initial workup of all pediatric soft tissue sarcomas and should be completed prior to anesthesia exposure if possible.

- Other staging imaging should be deferred until a histologic diagnosis is made:
  - PET/CT (CPT® 78815) may be considered in the following:
    - Desmoplastic small round cell tumor
    - Prior to neoadjuvant chemotherapy
    - Evaluating inconclusive findings found on conventional imaging
    - Whole body PET/CT (CPT® 78816) may be approved if there is clinical suspicion of skull or distal lower extremity involvement
  - Nuclear bone scan (See PEDONC-1.3: Modality General Considerations) is used to evaluate for bony metastases but should be omitted if PET is performed.
  - CT Abdomen and Pelvis with contrast (CPT® 74177) is not routinely indicated in the initial metastatic staging of pediatric NRSTS, but can be approved in the following situations:
    - Evaluation of inconclusive PET findings
    - Primary site of abdomen or pelvis
    - Lower extremity primary sites
    - Desmoplastic small round cell tumor
  - MRI Brain (CPT® 70553) and Spine (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) without and with contrast is indicated for initial staging in the following pediatric NRSTS:
    - Primary site of paraspinal or paravertebral region
    - PET or nuclear bone scan-avid lesions in skull, neck, vertebrae
    - Any patient with neurologic signs or symptoms raising suspicion of CNS metastases
NRSTS Treatment Response:
Many patients with NRSTS will be treated with surgical resection alone, and these patients enter immediately into surveillance

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned therapy

- Primary site imaging:
  - CT with contrast or MRI without and with contrast can be performed every 2 cycles during treatment and at the end of planned therapy
  - Restaging imaging is appropriate after local control surgery (complete or partial resection) is completed

- Metastatic site imaging:
  - Repeat imaging of all known metastatic sites using the same modality as during initial staging is appropriate whenever primary site imaging is necessary

- PET imaging is not routinely utilized to assess treatment response in NRSTS, but is indicated in the following circumstances if positive at initial diagnosis.
  - Response assessment prior to local control surgery or radiation therapy
  - Evaluation of residual mass visible on conventional imaging as part of end of therapy evaluation
  - Response assessment of disease visible on PET but not conventional imaging
  - Once PET has been documented to be negative for a given patient’s cancer or all PET-avid disease has been surgically resected, PET should not be used for continued disease monitoring or surveillance unless one of the exceptions in section PEDONC-1: General Guidelines applies. These requests will be forwarded for Medical Director review.
  - PET imaging is generally not indicated during active treatment for recurrent pediatric cancer. In rare circumstances, PET imaging may be appropriate when results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance. These requests will be forwarded for Medical Director review.
Surveillance Imaging:

- All patients with localized NRSTS:
  - Primary site should be imaged with either CT with contrast or MRI without and with contrast every 6 months for 5 years after completion of all therapy
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 6 months for 5 years after completion of all therapy

- All patients with metastatic NRSTS:
  - Primary site should be imaged with either CT with contrast or MRI without and with contrast every 6 months for 5 years after completion of all therapy
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) and all known metastatic sites every 6 months for 5 years after completion of all therapy
  - Nuclear bone scan (See PEDONC-1.3: Modality General Considerations) should be used for surveillance of known bony metastases every 6 months for 5 years after completion of all therapy

- Surveillance after recurrence:
  - Surveillance imaging using CT Chest (CPT® 71260) and CT with contrast or MRI without and with contrast of the primary site following successful treatment for recurrent NRSTS can be approved every 3 months for 1 year after completing therapy for recurrence.
    - Surveillance imaging later than 12 months after completing therapy for recurrence should follow the standard timing listed in this surveillance section.

- PET should not be used for surveillance imaging of NRSTS unless one of the following applies:
  - Conventional imaging (CT, MRI, US, plain film) reveals findings that are inconclusive or suspicious for recurrence and PET avidity will determine whether biopsy or continued observation is appropriate
    - Residual mass that has not changed in size since the last conventional imaging does not justify PET
    - PET avidity in a residual mass at the end of planned therapy is not an indication for PET imaging during surveillance.
  - Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities
  - These requests will be forwarded for Medical Director review.
References – PEDONC-8


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PEDONC-9.1: Bone Tumors – General Considerations

These guidelines include both benign and malignant lesions.

- Bone tumors occur in both adult and pediatric patients, but some are more common in one age group than the other. Unless specified below, patients who are < 18 years old should be imaged according to this guideline section. Exceptions include:
  - Osteogenic sarcoma patients of all ages should be imaged according to guidelines in PEDONC-9.3: Osteogenic Sarcoma (OS)
  - Ewing sarcoma and primitive neuroectodermal tumor patients of all ages should be imaged according to guidelines in PEDONC-9.4: Ewing Sarcoma and Primitive Neuroectodermal Tumors (ESFT).
  - Chondrosarcoma patients of all ages should be imaged according to guidelines in ONC-12.6: Bone Sarcomas – Initial Work-up/Staging
  - Chordoma patients of all ages should be imaged according to guidelines in ONC-12.6: Bone Sarcomas – Initial Work-up/Staging
  - Giant cell tumor of bone and enchondroma patients of all ages should be imaged according to guidelines in ONC-12.9: Benign Bone Tumors – General Considerations
  - Other benign bone tumor patients of all ages should be imaged according to guidelines in PEDONC-9.2: Benign Bone Tumors

All bone tumors should be evaluated by plain x-ray prior to any advanced imaging.

*PET does not reliably distinguish between benign and malignant bone tumors and should not be performed prior to biopsy.*
PEDONC-9.2: Benign Bone Tumors

- Osteochondroma
  - Plain x-ray appearance is diagnostic for the majority of patients and advanced imaging is generally unnecessary
  - MRI without and with contrast can be approved after evaluation by the operating surgeon for preoperative planning
  - MRI without contrast OR without and with contrast, as requested, is appropriate for patients with osteochondroma when there is clinical concern for malignant transformation based on new or worsening pain symptoms or a change on a recent plain x-ray

- Osteoid osteoma
  - CT without contrast is often the primary study when osteoid osteoma is suspected based on clinical history and plain film findings
  - Bone scan SPECT (CPT® 78803, or 78831), or hybrid SPECT/CT (CPT® 78830 or 78832) is indicated for suspected osteoid osteoma
  - Some patients will require both CT without contrast as well as MRI without and with contrast to make a definitive diagnosis

- Other benign tumors
  - Variety of diagnoses, including osteoid osteoma, osteoblastoma, aneurysmal bone cysts, fibrous dysplasia, chondroblastoma and others,
  - Plain x-ray appearance is diagnostic for many benign bone tumors and advanced imaging is generally unnecessary except for preoperative planning
  - MRI without and with contrast is the primary modality for advanced imaging of bone tumors, and can be approved to help narrow differential diagnoses and determine whether biopsy is indicated
    - For certain tumors, CT (contrast as requested) provides better visualization of specific bony details, and requests after evaluation by the operating surgeon for preoperative planning should generally be approved

- Surveillance imaging, when indicated, should utilize plain x-ray
  - Some benign bone tumor types carry a risk of malignant degeneration over time, but routine advanced imaging surveillance has not been shown to improve outcomes for these patients
  - MRI without and with contrast can be approved to evaluate new findings on plain X-ray or new/worsening clinical symptoms not explained by a recent plain x-ray

- There are no data to support the use of PET in the evaluation of benign bone tumors, and PET requests should not be approved without biopsy confirmation of a malignancy.
PEDONC-9.3: Osteogenic Sarcoma (OS)

Osteogenic Sarcoma Initial Staging:

- All bone tumors should be evaluated by plain x-ray prior to any advanced imaging.
- MRI without and with contrast is the preferred primary site imaging.
  - CT, contrast as requested, can be approved if there is a contraindication to MRI or if requested after evaluation by the operating surgeon to clarify inconclusive MRI findings for preoperative planning.
  - MRA and/or CTA may rarely be indicated for complicated surgical resections, and can be approved after evaluation by the operating surgeon to clarify inconclusive MRI findings for preoperative planning.
  - Requests for CT, MRA, or CTA should be forwarded for Medical Director review.
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is superior to PET/CT for the detection of pulmonary metastases, and is indicated in the initial workup of all suspected malignant bone tumors and should be completed prior to anesthesia exposure if possible.
- Other staging imaging should be deferred until a histologic diagnosis is made, initially by biopsy, as definitive resection is usually performed after neoadjuvant chemotherapy.
  - Distant bony metastases are rare in OS, but cause a significant change in treatment approach.
  - Whole body PET/CT (CPT® 78816) is the preferred study for initial staging of OS after histologic diagnosis is established.
    - PET has superior sensitivity to bone scan (95% vs. 76%) but equivalent overall diagnostic accuracy (98% vs. 96%) for detection of bony metastases in pediatric OS.
    - Nuclear bone scan (See PEDONC-1.3: Modality General Considerations) may be substituted for PET imaging if PET not available.
    - If PET/CT is negative at initial diagnosis, bone scan (See PEDONC-1.3: Modality General Considerations) is preferred for asymptomatic surveillance for bony metastases at time points after local control surgery.
- CT Abdomen and Pelvis with contrast (CPT® 74177) is not routinely indicated in the initial metastatic staging of pediatric OS, but can be approved in the following situations:
  - Evaluation of inconclusive PET findings.
  - Primary site of abdomen or pelvis.
Osteogenic Sarcoma Treatment Response:

Most OS patients undergo restaging after 10 to 12 weeks of neoadjuvant chemotherapy prior to local control surgery to confirm the absence of progressive disease prior to the extended break necessary for postoperative healing.

- Restaging at this time point should include:
  - MRI without and with contrast of primary site
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)
  - Whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations)

- Following local control surgery, the following imaging guidelines should be used until the end of planned chemotherapy:
  - MRI without and with contrast of primary site ~6 weeks after surgical procedure and at the end of planned chemotherapy
  - Plain x-rays of the primary site and chest every 2 months
  - CT Chest (with or without contrast, as requested):
    - Measurable pulmonary metastases: every 6 weeks and at the end of planned chemotherapy
    - No measurable pulmonary metastases: every 4 months and at the end of planned chemotherapy
  - Bone scan (See PEDONC-1.3: Modality General Considerations) every 4 months and at the end of planned chemotherapy
    - Whole body PET/CT can be used in place of bone scan, if positive for distant bone metastases at initial diagnosis

- Patients with metastatic disease do not routinely undergo local control surgery unless metastatic disease has resolved with chemotherapy.
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned chemotherapy
  - MRI without and with contrast of primary site can be performed every 2 cycles during treatment and at the end of planned chemotherapy
  - If previously positive for bony metastases, whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations) every 2 cycles during treatment and at the end of planned chemotherapy
  - Imaging may be indicated more frequently around the time of surgical resection of primary or metastatic lesions to assess for resectability

- PET is generally not indicated during active treatment for recurrent pediatric cancer. In rare circumstances, PET imaging may be appropriate when results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance. These requests will be forwarded for Medical Director review.
**Osteogenic Sarcoma Surveillance Imaging:**

- Appendicular bone primary tumor site:
  - Plain x-rays of the primary tumor site should be completed every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy.
  - MRI is not routinely indicated for surveillance imaging of appendicular primary sites but should be approved for the following:
    - The patient does not have an endoprosthesis that will cause MRI or CT artifact
    - To clarify inconclusive findings on plain x-ray
    - To evaluate significant pain symptoms suggestive of primary site recurrence

- Axial bone primary tumor site:
  - MRI without and with contrast of the primary tumor site can be approved every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy.

- Metastatic disease surveillance:
  - Patients with localized OS:
    - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 1 year then every 4 months for 1 year after completion of all therapy
      - Chest X-ray (CXR) should be used for pulmonary recurrence surveillance after 24 months, and CT Chest can be approved to clarify inconclusive CXR findings
  - Patients with metastatic or recurrent OS:
    - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy
  - Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) should be used for evaluation of distant bony metastases every 3 months for 1 year, then every 6 months for 2 years, then annually for 2 years after completion of all therapy
  - PET/CT has no established role for asymptomatic surveillance of OS, but can be approved in the following circumstances:
    - Conventional imaging reveals findings that are inconclusive or suspicious for recurrence and PET avidity will determine whether biopsy or continued observation is appropriate
    - Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities
    - Restaging after biopsy-confirmed recurrence
    - These requests will be forwarded for Medical Director review.
PEDONC-9.4: Ewing Sarcoma Family of Tumors (ESFT), Including Primitive Neuroectodermal Tumors (PNET)

ESFT Initial Staging:

► All bone tumors should be evaluated by plain x-ray prior to any advanced imaging.
► ESFT can also occur in the soft tissues, soft tissue masses without bony involvement that are ill-defined or non-discrete should be evaluated by limited ultrasound prior to any advanced imaging.
► MRI without and with contrast is the preferred primary site imaging
  ◆ CT, contrast as requested, can be approved if there is a contraindication to MRI or if requested after evaluation by the operating surgeon to clarify inconclusive MRI findings for preoperative planning
  ◆ MRI Chest without and with contrast is indicated for chest wall primary tumors, in addition to the CT Chest for pulmonary metastasis detection
  ◆ MRA and/or CTA may rarely be indicated for complicated surgical resections, and can be approved after evaluation by the operating surgeon to clarify inconclusive MRI findings for preoperative planning
  ◆ Requests for CT, MRA, or CTA should be forwarded for Medical Director review
► CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is superior to PET/CT for the detection of pulmonary metastases, and is indicated in the initial workup of all suspected malignant bone tumors and should be completed prior to anesthesia exposure if possible
► Other staging imaging should be deferred until a histologic diagnosis is made, initially by biopsy, as definitive resection is performed after neoadjuvant chemotherapy
  ◆ Bone and bone marrow metastases can occur in ESFT, and cause a significant change in treatment approach. PET/CT can replace bone scan and bone marrow biopsy in ESFT patients and is indicated in the initial staging of all ESFT patients after histologic diagnosis is established
    ▪ Whole body PET/CT (CPT® 78816) is the preferred study for initial staging of ESFT
    ▪ Bone scan (See PEDONC-1.3: Modality General Considerations) may be substituted for PET imaging if PET not available
    ▪ If PET/CT is negative for bony metastases at initial diagnosis, bone scan (See PEDONC-1.3: Modality General Considerations) is preferred for asymptomatic surveillance at all-time points after completion of therapy
  ◆ CT Abdomen and Pelvis with contrast (CPT® 74177) is not routinely indicated in the initial metastatic staging of pediatric ESFT, but can be approved in the following situations:
    ▪ Evaluation of inconclusive PET findings
    ▪ Primary site involving the abdomen or pelvis
ESFT Treatment Response:

All ESFT patients undergo restaging after ~12 weeks of neoadjuvant chemotherapy prior to local control surgery to confirm the absence of progressive disease prior to the extended break necessary for postoperative healing.

- Restaging at this time point should include:
  - MRI without and with contrast of primary site
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)
  - Whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations)

- Following local control surgery, the following imaging guidelines should be used until the end of planned chemotherapy:
  - MRI without and with contrast of primary site 3 months after surgical procedure and at the end of planned chemotherapy
  - Plain x-rays of the primary site and chest immediately after local control then every 3 months
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250):
    - Measurable pulmonary metastases: every 6 weeks and at the end of planned chemotherapy
    - No measurable pulmonary metastases: every 3 months and at the end of planned chemotherapy
  - Whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations) at the end of planned chemotherapy

- Patients with metastatic disease do not routinely undergo local control surgery unless metastatic disease has resolved with chemotherapy.
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be performed every 2 cycles during treatment and at the end of planned chemotherapy
  - MRI without and with contrast of primary site can be performed every 2 cycles during treatment and at the end of planned chemotherapy
  - If previously positive for bony metastases, whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations) every 2 cycles during treatment and at the end of planned chemotherapy
  - Imaging may be indicated more frequently around the time of surgical resection of primary or metastatic lesions to assess for resectability

- PET is generally not indicated during active treatment for recurrent pediatric cancer. In rare circumstances, PET may be appropriate when conventional imaging is inconclusive and results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance. These requests will be forwarded for Medical Director review.
**ESFT Surveillance Imaging:**

- **Appendicular bone primary tumor site:**
  - Plain x-rays of the primary tumor site should be completed every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy
  - MRI is not routinely indicated for surveillance imaging of these primary sites after completion of chemotherapy but should be approved for the following:
    - The patient does not have an endoprosthesis that causes MRI or CT artifact
    - To clarify inconclusive findings on plain x-ray
    - To evaluate significant pain symptoms suggestive of primary site recurrence

- **Axial bone or any soft tissue primary site:**
  - CT with contrast or MRI without and with contrast of the primary tumor site can be approved every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy

- **Metastatic disease surveillance:**
  - **Patients with localized ESFT:**
    - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 1 year then every 4 months for 1 year after completion of all therapy
    - Chest X-ray (CXR) should be used for pulmonary recurrence surveillance after 24 months, and CT Chest can be approved to clarify inconclusive CXR findings
  - **Patients with metastatic or recurrent ESFT:**
    - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy
  - Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) should be used for evaluation of distant bony metastases every 3 months for 1 year, then every 4 months for 1 year, then every 6 months for 1 year, then annually for 2 years after completion of all therapy
  - PET/CT has no established role for asymptomatic surveillance of ESFT, but can be approved in the following circumstances:
    - Conventional imaging reveals findings that are inconclusive or suspicious for recurrence and PET avidity will determine whether biopsy or continued observation is appropriate
    - Rare circumstances where obvious clinical symptoms show strong evidence suggesting recurrence and PET would replace conventional imaging modalities
    - Restaging after biopsy-confirmed recurrence
  - These requests will be forwarded for Medical Director review.
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**PEDONC-10: Pediatric Germ Cell Tumors**

Malignant pediatric germ cell tumors commonly include one of four histologic subtypes (yolk sac tumor, choriocarcinoma, embryonal carcinoma, or mixed histology), but the overall treatment strategies are similar for all malignant germ cell tumors. Tumors can occur in testicular, ovarian or extragonadal primary locations.

- This section applies to primary germ cell tumors occurring outside the central nervous system in children who are ≤15 years old at the time of initial diagnosis. For patients who are >15 years old at diagnosis, the overall prognosis is inferior and these patients should be imaged according to adult guidelines in: [ONC-20: Testicular, Ovarian and Extragonadal Germ Cell Tumors](#) in the Oncology Imaging Guidelines.

- Sex cord stromal tumors (granulosa cell, theca, sertoli, and leydig tumors) are rare in pediatrics and should be imaged according to adult guidelines in: [ONC-20: Testicular, Ovarian and Extragonadal Germ Cell Tumors](#) in the Oncology Imaging Guidelines.

- For CNS germ cell tumors, use the imaging guidelines in: [PEDONC-4.7: CNS Germinomas and Non-Germinomatous Germ Cell Tumors (NGGCT)](#).
**Pediatric GCT Initial Staging:**

- Ovarian, testicular, and abdominal extragonadal GCT should have ultrasound and tumor markers (AFP, β-hCG) as initial evaluation
  - Mediastinal primary tumors should be evaluated by CT Chest with contrast
  - Ovarian masses that are <10 cm in size, have minimal or no visible solid component on ultrasound, and have normal tumor markers are almost universally benign teratomas or functional cysts and advanced imaging is not necessary unless ultrasound is insufficient for immediate preoperative planning.

- Once a primary mass suspected to be GCT is discovered, initial staging with CT Abdomen/Pelvis with contrast (CPT® 74177) is indicated prior to histologic confirmation
  - The degree of abdominal exploration and node sampling necessary for adequate staging is determined in part by imaging findings and is required for preoperative planning
  - Testicular primary tumors can defer abdominal imaging until after histologic confirmation at the discretion of the operating surgeon
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved to clarify inconclusive CT findings or for patients with a known contraindication to CT contrast

- CT Chest with contrast (CPT® 71260) is indicated in the initial workup of all pediatric GCT and should be completed prior to anesthesia exposure if possible

- MRI Brain without and with contrast (CPT® 70553) can be approved for patients with symptoms suggesting CNS metastases

- Nuclear bone scan (See [PEDONC-1.3: Modality General Considerations](#)) should be used for initial evaluation of bony metastases in patients with systemic symptoms or bone pain

- There has been no published evidence to date supporting the routine use of PET/CT in the evaluation of pediatric GCT
  - Additionally, PET has been found to have similar efficacy to CT imaging in initial staging of adults with non-seminomatous GCT (the majority of pediatric GCT are non-seminomatous)
**Pediatric GCT Treatment Response:**

Patients with localized GCT are often cured with surgery alone and do not receive adjuvant therapy. These patients should be imaged using surveillance guidelines after surgery is completed.

Patients receiving adjuvant chemotherapy are usually treated with 4 to 6 cycles of combination chemotherapy.

- The primary method of response assessment is by tumor marker decrease
  - For patients with disease not completely resected at initial diagnosis, repeat imaging with CT Chest/Abdomen/Pelvis (CPT® 71260 and CPT® 74177) with contrast can be approved every 2 cycles (~every 6 weeks)
  - CT imaging may be indicated more frequently to assess for surgical resectability in patients who have received more than 4 cycles of chemotherapy

- CT Chest/Abdomen/Pelvis with contrast (CPT® 71260 and CPT® 74177) is indicated at the end of planned chemotherapy or following neoadjuvant chemotherapy for initially unresectable tumors

- Imaging of any metastatic sites should be approved every 2 cycles and at the end of planned therapy with the same modality used during initial staging

- PET as a marker of treatment response has been shown not to be predictive of patient outcomes in GCT and should not be approved
  - Suspicious lesions seen on conventional imaging should be biopsied to confirm active disease
  - Alternatively, a short-interval CT study can be approved if the relapse risk is determined to be low by the treating physician and biopsy would cause unnecessary morbidity for the patient
**Pediatric GCT Surveillance Imaging:**

The primary method of surveillance in pediatric GCT is frequent assessment of serum tumor markers, unless tumor markers were not elevated at diagnosis.

- **CT Chest/Abdomen/Pelvis with contrast (CPT® 71260 and CPT® 74177)** should be approved for any clinically significant rise in tumor markers or symptoms suggesting recurrent disease.

- **CT Abdomen/Pelvis with contrast (CPT® 74177)** can be approved every 6 months for 2 years then every 12 months for 3 years after completion of all therapy for patients with normal tumor markers at the time of diagnosis.

- **For stage I patients age 0-10 years treated with surgery only:**
  - Chest X-ray (CXR) should be completed every 3 months for 1 year after completion of all therapy
    - CT Chest is indicated to evaluate abnormal CXR findings or if the primary tumor site was in the thoracic cavity
  - CT Abdomen/Pelvis with contrast (CPT® 74177) can be approved every 3 months for 1 year after completion of all therapy

- **For stage I patients ages 11+ years treated with surgery only:**
  - Chest X-Ray (CXR) should be completed every 4 months for 2 years, then every 6 months for 1 year, then every 12 months for 1 year after completion of all therapy
    - CT Chest is indicated to evaluate abnormal CXR findings or in lieu of CXR if the primary tumor site was in the thoracic cavity
  - CT Abdomen/Pelvis with contrast (CPT® 74177) can be approved every 4 months for 2 years, then every 6 months for 1 year, then every 12 months for 1 year after completion of all therapy

- **For stage II-IV patients:**
  - Chest X-ray (CXR) should be completed every 6 months for 2 years then every 12 months for 1 year after completion of all therapy
    - CT Chest is indicated to evaluate abnormal CXR findings or in lieu of CXR if a primary or metastatic tumor site was in the thoracic cavity
  - CT Abdomen/Pelvis with contrast (CPT® 74177) can be approved every 6 months for 2 years, then every 12 months for 1 year completion of all therapy

- Patients with brain or bone metastases should have surveillance imaging on the same schedule as the primary site imaging with the same modality used during initial staging.
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PEDONC-11.1: Pediatric Liver Tumors – General Considerations

Pediatric liver tumors primarily include hepatoblastoma and hepatocellular carcinoma, but hepatic germ cell tumors and primary hepatic sarcomas occur with some frequency. Tumor markers are useful for initial evaluation as well as treatment response, particularly in hepatoblastoma. Early consideration of liver transplant may be undertaken in children and adolescents with unrespectable localized disease, provided that the disease remains confined to the liver.

- Primary hepatic germ cell tumors should follow imaging guidelines in: PEDONC-10: Pediatric Germ Cell Tumors.
- Primary hepatic sarcomas should follow imaging guidelines in: PEDONC-8.3: Non-Rhabdomyosarcoma Soft Tissue Sarcomas (NRSTS).
- Imaging requests relating to liver transplant surgery and surveillance should follow guidelines in section AB-42: Transplant in the abdomen imaging guidelines.

End of PEDONC-11.1
PEDONC-11.2: Hepatoblastoma

Hepatoblastoma Initial Staging:
Hepatoblastoma occurs most commonly in very young children (median diagnosis age of 19 months). Most cases of hepatoblastoma are sporadic, but some are associated with genetic abnormalities, including Beckwith-Wiedemann syndrome, familial adenomatous polyposis, and trisomy 18. Most suspected liver tumors will have ultrasound and tumor markers (AFP, β-HCG, CEA) as part of the initial evaluation.

- Ultrasound may be approved even after MRI or CT imaging in order to allow evaluation for tumor thrombus.
- Once a primary liver mass is discovered, definitive imaging is indicated prior to histologic diagnosis, and may involve any of the following:
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) is preferred for evaluating tumor margins and vascular anatomy.
  - CT Abdomen/Pelvis with contrast (CPT® 74177)
    - Noncontrast imaging is not indicated due to the increased radiation exposure and limited additive benefit.
  - Some tumors may require both MRI and CT during initial evaluation.
  - MRA (CPT® 74185) or CTA (CPT® 74175) Abdomen are often indicated to evaluate vascular invasion.
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated in the initial work-up of all pediatric liver tumors and should be completed prior to anesthesia exposure if possible.
- MRI Brain without and with contrast (CPT® 70553) can be approved only for patients with symptoms suggesting CNS metastases.
- Bone scan (See PEDONC-1.3: Modality General Considerations) should be used for initial evaluation of bony metastases only in patients with systemic symptoms or bone pain.
- There has been no published evidence to date supporting the routine use of PET/CT imaging in the evaluation of pediatric hepatoblastoma.
  - PET/CT should only be considered in very rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision making.
  - PET/CT should not be approved in lieu of biopsy of suspicious lesions.
  - These requests will be forwarded for Medical Director review.
**Hepatoblastoma Treatment Response:**

Patients with localized hepatoblastoma of pure fetal histology are often cured with surgery alone and do not receive adjuvant therapy. These patients should be imaged using surveillance guidelines after surgery is completed.

Patients receiving adjuvant chemotherapy are usually treated with 2 to 8 cycles of combination chemotherapy. Tumor marker decrease is important in response assessment but does not eliminate the need for advanced imaging in patients with unresected hepatoblastoma.

- For patients with disease not completely resected at initial diagnosis, the following can be approved every 2 cycles (~6 weeks) and at the end of planned therapy for all patients:
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)
  - CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
    - While the majority of patients will require abdomen and pelvis imaging at all time points, the pelvis imaging may be omitted at the discretion of the ordering physician based on the patient’s specific clinical situation
    - MRA (CPT® 74185) or CTA (CPT® 74175) Abdomen are often indicated to evaluate vascular invasion
  - Imaging of any metastatic sites with the same modality used during initial staging

- Imaging may be indicated more frequently to assess for surgical resectability in patients who have received more than 4 cycles of chemotherapy.

- Abdominal ultrasound is indicated if tumor thrombus was detected at initial diagnosis
  - If no tumor thrombus was present, continued ultrasound evaluations are not indicated without a specific reason documented in the clinical records

- PET/CT should only be considered in very rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision making.
  - PET/CT should not be approved in lieu of biopsy of suspicious lesions.
  - These requests will be forwarded for Medical Director review.
Hepatoblastoma Surveillance Imaging:

The primary method of surveillance in hepatoblastoma is frequent assessment of serum tumor markers (primarily AFP).

- No specific imaging is indicated for surveillance in patients with an AFP of >100 ng/ml at diagnosis or recurrence.
  - CT Chest and Abdomen with contrast (CPT® 71260 and CPT® 74160) can be approved for any clinically significant rise in tumor markers or symptoms suggesting recurrent disease

- For patients with AFP ≤100 ng/ml at diagnosis or recurrence, the following imaging is appropriate:
  - CT Abdomen with contrast (CPT® 74160) should be completed every 3 months for 2 years then every 4 months for 2 years after completion of all therapy
  - Chest X-ray or CT Chest with contrast (CPT® 71260) should be completed every 3 months for 2 years then every 4 months for 2 years after completion of all therapy
  - Patients with brain or bone metastases should have surveillance imaging on the same schedule as the primary site imaging with the same modality used during initial staging.

- PET/CT has no documented role in the surveillance evaluation of pediatric hepatoblastoma
PEDONC-11.3: Pediatric Hepatocellular Carcinoma (HCC)

Pediatric HCC Initial Staging:

HCC, including its rare histologically distinct variant fibrolamellar hepatocellular carcinoma (FL-HCC), occurs mostly in older children and adolescents. Despite recent advances in treatment, overall survival of pediatric HCC diagnosed in advanced stages remains exceedingly poor, with five-year survival of only 17% to 22% for all stages of pediatric HCC (and FL-HCC). Most suspected liver tumors will have ultrasound and tumor markers (AFP, β-HCG, CEA) as initial evaluation.

- Ultrasound may be approved even after MRI or CT imaging in order to allow evaluation for tumor thrombus.

- Once a primary liver mass is discovered, definitive imaging is indicated prior to histologic diagnosis, and may involve any of the following:
  - CT Abdomen/Pelvis with contrast (CPT® 74177)
  - MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
  - Some tumors may require both MRI and CT during initial evaluation
  - MRA (CPT® 74185) or CTA (CPT® 74175) Abdomen are often indicated to evaluate vascular invasion

- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) is indicated in the initial work-up of all pediatric liver tumors and should be completed prior to anesthesia exposure if possible

- MRI Brain without and with contrast (CPT® 70553) can be approved only for patients with symptoms suggesting CNS metastases

- Nuclear bone scan (See PEDONC-1.3: Modality General Considerations) should be used for initial evaluation of bony metastases only in patients with systemic symptoms or bone pain

- PET/CT should only be considered in very rare circumstances for preoperative planning when MRI and CT are insufficient for surgical decision making.
  - PET/CT should not be approved in lieu of biopsy of suspicious lesions
  - These requests require Medical Director review.
**Pediatric HCC Treatment Response:**

The majority of hepatocellular carcinoma patients are treated with surgery alone and do not receive adjuvant therapy. Patients with successful upfront gross total resection should be imaged using surveillance guidelines after surgery is completed.

- For patients with disease not completely resected at initial diagnosis, the following can be approved every 2 cycles (~6 weeks) and at the end of planned therapy for all patients:
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250)
  - CT Abdomen/Pelvis with contrast (CPT® 74177) or MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197)
    - While the majority of patients will require abdomen and pelvis imaging at all time points, the pelvis imaging may be omitted at the discretion of the ordering physician based on the patient’s specific clinical situation
    - MRA (CPT® 74185) or CTA (CPT® 74175) Abdomen are often indicated to evaluate vascular invasion
  - Imaging of any metastatic sites with the same modality used during initial staging
- Abdominal ultrasound is indicated if tumor thrombus was detected at initial diagnosis
  - If no tumor thrombus was present, continued ultrasound evaluations are not indicated without a specific reason documented in the clinical records
- PET/CT should only be considered in very rare circumstances for preoperative planning when MRI and CT scans are insufficient for surgical decision making.
  - PET/CT should not be approved in lieu of biopsy of suspicious lesions
  - These requests will be forwarded for Medical Director review.

**Pediatric HCC Surveillance Imaging:**

- CT Abdomen/Pelvis with contrast (CPT® 74177) can be completed every 3 months for 1 year then every 6 months for 1 year, then annually for 3 years after completion of all therapy
- Chest X-ray or CT Chest with contrast (CPT® 71260) should be every 3 months for 1 year then every 6 months for 1 year, then annually for 3 years after completion of all therapy
- Patients with brain or bone metastases should have surveillance imaging on the same schedule as the primary site imaging with the same modality used during initial staging.
- PET/CT has no documented role in the surveillance evaluation of pediatric hepatocellular carcinoma

End of PEDONC-11.3
References – PEDONC-11


### PEDONC-12: Retinoblastoma

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**PEDONC-12.1: Retinoblastoma – General Considerations**

Retinoblastoma (RB) is primarily a disease of the infant and young child, and presents with leukocoria (loss of red reflex). About 75% of patients are diagnosed before the age of two years (bilateral RB presents at 12 months of age). Retinoblastoma can occur as heritable (25% of cases) or nonheritable (75%) disease. Heritable RB is associated with a germline mutation in the RB1 gene often resulting typically in bilateral disease. Individuals who carry the RB1 mutation also have increased risk of developing other cancers, such as osteosarcoma, soft tissue sarcomas, or melanoma. For more information on heritable retinoblastoma, see **PEDONC-2.12: Familial Retinoblastoma Syndrome**.

Detailed evaluation by a physician with significant training and/or experience in retinoblastoma (most commonly a pediatric ophthalmologist or pediatric oncologist) is indicated prior to considering advanced imaging.

Retinoblastoma can be unilateral, bilateral, or trilateral (involving the pineal gland). Extraocular spread of retinoblastoma is rare and generally confined to the brain.
**PEDONC-12.2: Retinoblastoma – Imaging**

**Retinoblastoma Initial Staging**
- Tumor biopsy is NOT required prior to imaging
- MRI Orbits (CPT® 70543) and Brain (CPT® 70553) without and with contrast can be approved in the initial work-up of all patients with retinoblastoma
  - Brain imaging may be omitted or deferred at the discretion of the treating ophthalmologist or oncologist
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) may be approved if there is evidence of CNS metastasis on:
  - Ophthalmologic exam
  - MRI Brain
  - Lumbar CSF cytology
- CT should generally be avoided in retinoblastoma patients under one year of age or with family history of retinoblastoma (heritable) due to substantially increased risks for secondary malignancy
  - CT Chest (CPT® 71260) and MRI Abdomen and Pelvis without and with contrast (CPT® 74183 and CPT® 72197) can be approved for patients with clinical symptoms to suggest metastatic disease
- CT Orbital (contrast as requested) and orbital ultrasound can be approved if ordered by the treating ophthalmologist for a specified indication
- Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) is the preferred imaging modality for patients with systemic bone pain suggestive of bony metastases
- PET has no documented role in the evaluation of retinoblastoma

**Retinoblastoma Treatment Response:**
- MRI Orbits (CPT® 70543) and/or Brain (CPT® 70553) can be approved every 2 cycles (~ every 6 weeks) and at the end of planned therapy
- For patients with metastatic disease, imaging of known positive areas using the same modality at initial staging can be approved every 2 cycles (~6 to 8 weeks) and at the end of planned therapy
Retinoblastoma Surveillance:

- The primary method of surveillance in retinoblastoma is examination under anesthesia (EUA), although some older children can be sufficiently evaluated by exam without anesthesia (EWA).
  - Surveillance using advanced imaging is generally not indicated for unilateral retinoblastoma after enucleation or exenteration, but can be approved for evaluation of specific clinical concerns.
  - Patients undergoing ocular salvage treatment approaches can have MRI Orbits (CPT® 70543) and Brain (CPT® 70553) approved every 6 months for 2 years following completion of therapy.
- Patients with bilateral retinoblastoma or germline mutation in RB1 are at increased risk for subsequent pineoblastoma, so MRI Brain without and with contrast (CPT® 70553) can be approved every 6 months for 5 years for the time of diagnosis with retinoblastoma.
  - Routine MRI follow up for pineal disease is not currently supported by evidence in unilateral retinoblastoma patients without germline RB1 mutations.

References – PEDONC-12

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PEDONC-13.1: Pediatric Nasopharyngeal Carcinoma – General Considerations

Pediatric nasopharyngeal carcinoma (NPC) is rare in comparison to adult NPC but is responsible for up to 50% of nasopharyngeal cancers in children and has higher rates of aggressive type III EBV-associated histology than adult NPC.

Metastasis frequently occurs in cervical lymph nodes and retropharyngeal space. Distal metastasis usually appears in bones, lungs, mediastinum, and rarely, in the liver. In many patients, the initial presentation is a cervical adenopathy, and diagnosis is made with a lymph node biopsy.

Standard upfront treatment in pediatric NPC consists of 3 to 4 cycles of neoadjuvant chemotherapy followed by definitive chemoradiotherapy. Rare patients with lower stage disease may be treated with radiotherapy alone.
PEDONC-13.2: Pediatric NPC – Imaging

Pediatric NPC Initial Staging:
Quantitative EBV DNA PCR should be measured at initial diagnosis, as it can serve as an effective tumor marker if elevated at initial diagnosis.

- MRI Brain without and with contrast (CPT® 70553) and MRI Neck without and with contrast (CPT® 70543) is indicated in the initial staging of all pediatric NPC patients
  - CT Head without and with contrast (CPT® 70470), CT Maxillofacial without and with contrast (CPT® 70488) and/or CT Neck with contrast (CPT® 70491) can be approved for patients with documented contraindication to MRI imaging (avoidance of sedation should not be the sole reason)
  - Skull base invasion is common in pediatric NPC and has a dramatic impact on prognosis, and is more easily recognized on MRI imaging
- CT Chest with contrast (CPT® 71260) is indicated in initial staging of all patients
- Whole body PET/CT (CPT® 78816) is approvable after histologic confirmation of NPC to evaluate for distant bony metastases
  - Bone scan (See PEDONC-1.3: Modality General Considerations) can be used for patients when PET/CT is unavailable
Pediatric NPC Treatment Response:

- MRI Brain without and with contrast (CPT® 70553) and MRI Neck without and with contrast (CPT® 70543) are indicated for response assessment at the following time points:
  - Following completion of neoadjuvant chemotherapy
  - Following completion of chemoradiotherapy

- CT Chest with contrast (CPT® 71260) and whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations) are indicated at the following time points:
  - Following completion of neoadjuvant chemotherapy only if positive at initial diagnosis
  - Following completion of chemoradiotherapy

- PET is generally not indicated during active treatment for recurrent pediatric cancer. In rare circumstances, PET may be appropriate when results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance. These requests will be forwarded for Medical Director review.

Pediatric NPC Surveillance:

- MRI Brain without and with contrast (CPT® 70553) and MRI Neck without and with contrast (CPT® 70543) are indicated every 3 months for 1 year, then every 6 months for 2 years after completion of all planned therapy

- CT Chest with contrast (CPT® 71260) is indicated every 3 months for 1 year, then every 6 months for 2 years after completion of all planned therapy

- Whole body PET/CT (CPT® 78816) or bone scan (See PEDONC-1.3: Modality General Considerations) are not indicated for routine surveillance in asymptomatic patients but can be approved in the following situations:
  - Clarification of specified inconclusive findings seen on conventional imaging (should not replace biopsy)
  - Restaging to identify sites of disease when EBV PCR levels are abnormally high and conventional imaging is negative
  - Restaging after histologically confirmed recurrence of NPC
  - These requests will be forwarded for Medical Director review.

End of PEDONC-13.2
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**PEDONC-14.1: Pediatric Adrenocortical Carcinoma – General Considerations**

Pediatric Adrenocortical Carcinoma (ACC) is a rare but aggressive tumor, with fewer than 25 cases diagnosed each year. Most patients are diagnosed because of virilizing symptoms, Cushing syndrome, and rarely with feminization and hyperaldosteronism or detection on screening imaging recommended for specified cancer predisposition syndromes. The mainstay of treatment is surgery. Chemotherapy, adrenal suppression, and radiotherapy typically follow resection. See: **PEDONC-2: Cancer Predisposition Syndromes & Screening Strategies**
**PEDONC-14.2: Pediatric ACC – Imaging**

**Pediatric ACC Initial Staging:**
- CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is indicated in the initial staging of all pediatric ACC patients.
- CT Chest with contrast (CPT® 71260) is indicated in initial staging of all patients.
- Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) is indicated to evaluate for bony metastases in all patients at initial diagnosis.
- PET has no documented role in the evaluation and treatment of pediatric ACC.

**Pediatric ACC Treatment Response:**
Many ACC patients are treated with surgery alone and do not receive adjuvant therapy. These patients should be imaged using surveillance guidelines after surgery is completed.
- For patients treated with chemotherapy, CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is indicated for response assessment every 2 cycles (~6 weeks) during chemotherapy and following completion of all planned chemotherapy.
- CT Chest with contrast (CPT® 71260) is indicated every 2 cycles (~6 weeks) during chemotherapy and following completion of all planned chemotherapy.
- Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) is indicated every 2 cycles (~6 weeks) during chemotherapy only if positive for distant metastases at initial diagnosis, and following completion of chemotherapy.
- For patients treated with radiotherapy, CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is indicated for response assessment at the completion of radiotherapy.

**Pediatric ACC Surveillance:**
- CT Abdomen without and with contrast (CPT® 74170) or MRI Abdomen without and with contrast (CPT® 74183) is indicated every 3 months for 2 years, then every 6 months for 3 years after completion of all planned therapy.
- Surveillance CT Chest is not indicated for patients with localized disease at diagnosis.
- For patients with metastatic ACC, CT Chest with contrast (CPT® 71260) is indicated every 3 months for 2 years, then every 6 months for 3 years after completion of all planned therapy.
- Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**) is indicated in all patients with suspected bone recurrence.

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End of PEDONC-14.2
References – PEDONC-14


Pediatric melanoma is historically rare, but has a steadily rising incidence, especially in adolescents and young adults (AYAs). Staging is assigned using the American Joint Committee on Cancer (AJCC) staging for adult melanoma. Most cases of melanoma arising in children and AYAs (~75%) are localized at diagnosis, and approximately 90% of patients with pediatric melanoma are amenable to radical excision. The clinical management of adolescents and young adults with melanoma is still challenging and evolving because it is difficult to diagnose, and there is no standard treatment.

Non-melanoma skin cancers (mostly basal cell carcinoma and squamous cell carcinoma) are extremely rare in pediatric patients. In many cases, predisposing factors such as prolonged immunosuppression, radiation therapy, chemotherapy, voriconazole use, or a combination of the factors are present, and established age-specific guidelines for management of these skin tumors do not exist.

Imaging guidelines and treatment approaches are consistent with those used for adults with melanoma and other skin cancers, and these patients should follow the imaging guidelines in section ONC-5: Melanomas and Other Skin Cancers.

References – PEDONC-15

The majority of pediatric salivary gland tumors arise in the parotid gland. Approximately 10 to 15% of tumors arise in the submandibular, sublingual, or minor salivary glands.

Roughly 75% of pediatric salivary gland tumors are benign, most commonly pleomorphic adenoma.

The most common malignant tumors occurring in the salivary glands are mucoepidermoid carcinoma, adenoid cystic carcinoma, acinic cell carcinoma, undifferentiated carcinoma, and rarely adenocarcinoma.

American Joint Committee on Cancer (AJCC) staging is used for pediatric as well as adult salivary gland tumors.

Imaging and treatment guidelines for malignant pediatric salivary gland tumors are consistent with those used for adults with salivary gland tumors, and these patients should follow the imaging guidelines in section **ONC-4: Salivary Gland Cancers**.

References – PEDONC-16


PEDONC-17: Pediatric Breast Masses

Less than 1% of pediatric breast lesions are malignant, and advanced imaging is generally not recommended without histological confirmation of malignancy.

- Ultrasound (CPT® 76641 and CPT® 76642) is the primary and preferred modality used for evaluation of pediatric breast masses.

- Mammography has limited utility in pediatric breast mass evaluation due to the high mammographic breast density in this age group, and the risk of the radiation exposure outweighs the benefit of this modality. As a result, mammography is NOT recommended for evaluation of pediatric or adolescent breast masses.
  - BI-RADS classification may overstate the risk of malignancy or need for biopsy in pediatric patients.

- MRI has very limited utility in evaluation of pediatric breast masses prior to biopsy, but may be indicated in rare cases for surgical planning when ultrasound is non-diagnostic.
  - All advanced imaging requests for pediatric breast masses should be forwarded for Medical Director review.

- Pediatric patients with confirmed breast cancer should be imaged according to section ONC-11: Breast Cancer.

References – PEDONC-17


# PEDONC-18: Histiocytic Disorders

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PEDONC-18.1: Histiocytic Disorders – General Considerations

The majority of histiocytic disorders occurring in the pediatric population are either Langerhans Cell Histiocytosis (LCH) or Hemophagocytic Lymphohistiocytosis (HLH).

The Non-Langerhans cell histiocytoses encompass a variety of diseases, and have limited imaging considerations except as specified later in this section.
**PEDONC-18.2: Langerhans Cell Histiocytosis (LCH)**

Includes a heterogeneous group of disorders formerly known by other names, including histiocytosis X, eosinophilic granuloma, Letterer-Siwe Disease, Hand-Schuller-Christian Disease, and diffuse reticuloendotheliosis. LCH has a widely variable clinical presentation, ranging from single indolent lesions to disseminated multisystem disease.

Most common sites of involvement are skin, bones, liver, lung, and pituitary, though other sites are possible.

This guideline may be used for all ages of patients.

**LCH Initial Imaging Studies:**

- For all patients:
  - Chest X-ray (CXR)
  - Abdominal ultrasound (CPT® 76700)
  - Skeletal survey
    - PET should not be used to replace skeletal survey in LCH
- MRI Brain without and with contrast (CPT® 70553) for any of the following:
  - Headaches or visual or neurologic disturbances
  - Polyuria/polydipsia or other endocrine abnormalities
  - Skull or craniofacial (including jaw) bone involvement
  - Otorrhea or hearing loss (CT Temporal Bone may be substituted if requested)
  - Other signs or symptoms suggesting intracranial involvement, including neurodegeneration syndrome
- CT Chest with (CPT® 71260) or without contrast (CPT® 71250) for any of the following:
  - Abnormal CXR
  - Symptoms of pulmonary involvement and normal CXR
- MRI Abdomen without and with contrast (CPT® 74183) for any of the following:
  - Elevated liver function tests (usually > 5x upper limit of normal)
  - Abnormalities seen on abdominal ultrasound
  - CT Abdomen with contrast (CPT® 74160) can be substituted if requested by ordering physician to avoid general anesthesia
- MRI Spine without and with contrast (Cervical-CPT® 72156, Thoracic-CPT® 72157, Lumbar-CPT® 72158) for any of the following:
  - Vertebral lesions seen on skeletal survey
  - Clinical symptoms (including back pain) suggesting spinal involvement and negative skeletal survey
- Whole body PET/CT (CPT® 78816) for any of the following:
  - Multifocal bone involvement seen on skeletal survey
  - Bone pain and negative skeletal survey
  - Other clinical symptoms suggesting multisite disease
- Whole body Tc-99m bone scan (CPT® 78306) can be approved in lieu of PET for the same indications if PET is unavailable
LCH Treatment Response:

Patients with localized or single site disease are often treated only with local therapies or observed, and should be imaged according to surveillance guidelines

- Patients receiving systemic therapy will usually undergo treatment for ~12 months. Treatment response is assessed using any modalities showing disease at initial diagnosis after ~6 weeks of treatment.
  - Those with persistent measurable disease will usually be evaluated again after week 12 of therapy
    - Once PET/CT shows no remaining FDG-avid lesions, additional PET imaging is not indicated
    - As a general rule, both PET/CT and CT with contrast or MRI without and with contrast should not be approved for simultaneous treatment response evaluation without specific documentation showing that both are necessary

- Following the initial phase, patients can have treatment response evaluation every ~3 months while receiving active treatment.
  - Shorter interval imaging can be approved for documented signs or symptoms concerning for disease progression

- All patients should have the following studies at the end of planned therapy:
  - Chest X-ray (CXR)
  - Abdominal ultrasound (CPT® 76700)
  - Skeletal survey
  - Repeat of all additional imaging studies positive at initial workup (except PET)

- PET is generally not indicated during active treatment for recurrent pediatric cancer. In rare circumstances, PET may be appropriate when results are likely to result in a treatment change for the patient, including a change from active treatment to surveillance. These requests will be forwarded for Medical Director review.
**LCH Surveillance Imaging:**

Surveillance imaging is determined by areas of disease involvement.

- **Bone involvement**
  - Plain x-ray of involved bony areas at 6 weeks, then at 3 and 6 months after completion of therapy
  - Additional films are not necessary unless symptoms suggest new or recurrent disease
  - PET is not indicated for surveillance, but can be considered to evaluate patients with recurrent disease
  - Skull or craniofacial (including jaw) bone involvement at diagnosis are at higher risk for CNS recurrence, and should be imaged according to CNS involvement section below

- **Pulmonary involvement**
  - CXR every 6 months after completion of therapy
  - CT Chest with (CPT® 71260) or without contrast (CPT® 71250) can be approved for new abnormalities on CXR or new pulmonary symptoms with a negative CXR

- **CNS involvement**
  - CNS LCH has a particularly high rate of refractory and recurrent disease, and requires longer imaging surveillance
  - MRI Brain without and with contrast (CPT® 70553) is indicated for patients with previously documented measurable intracranial lesions at 6 weeks, 3 months, and 6 months after completion of all therapy.
    - If negative at that time, continued surveillance is indicated at 1, 2, 4, 7, and 10 years after completion of all planned therapy
    - If residual measurable intracranial lesions are present at 6 months, imaging can be repeated every 3 months until negative or unchanged on two consecutive studies, at which time the schedule in the previous bullet should begin
  - MRI Brain without and with contrast (CPT® 70553) is indicated for patients with documented hypothalamic-pituitary dysfunction at 1, 2, 4, 7, and 10 years after completion of all planned therapy.
    - MRI can be approved at any time for worsening neurologic symptoms
  - Intraspinal lesions are rare, but should be imaged according to the same guidelines as brain imaging using MRI without and with contrast of all involved spine levels

- **Liver involvement**
  - Persistent liver involvement is rare, and imaging after completion of LCH therapy will be highly individualized depending on degree of liver dysfunction and plans for supportive therapy or liver transplant
  - Most patients with liver involvement will receive surveillance Abdominal ultrasound (CPT® 76700) every 6 months

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End of PEDONC-18.2
PEDONC-18.3: Hemophagocytic Lymphohistiocytosis (HLH)

There are no standard imaging studies required for the diagnosis and initial evaluation of HLH. Most cases are diagnosed with a combination of physical findings, laboratory testing, and bone marrow evaluation. Advanced imaging studies may be necessary to assess organ dysfunction as HLH commonly affects the liver, spleen, and bone marrow, and less commonly the kidneys, lungs, and brain

- Common studies that may be indicated in the initial evaluation of HLH include:
  - Abdominal ultrasound (CPT® 76700)
  - CT Abdomen and/or Pelvis (contrast as requested)
  - MRI Abdomen (CPT® 74183) and/or Pelvis (CPT® 72197) without and with contrast
  - CXR
  - CT Chest with contrast (CPT® 71260)
  - MRI Brain without and with contrast (CPT® 70553)

_It is NOT required to perform ultrasound or plain film in a stepwise fashion if CT or MRI is planned as patients with HLH can deteriorate rapidly._

- There is no established standard role for PET in the diagnosis or treatment response evaluation of HLH
  - Secondary HLH is very difficult to treat if the primary cause is not concurrently treated
  - In these cases, if conventional imaging has been completed and is unrevealing, whole body PET/CT (CPT® 78816) can be considered for the purpose of identifying a site for tissue diagnosis of a primary source of infection or malignancy
  - If a malignancy is identified as the inciting factor for HLH, additional imaging decisions for that malignancy should be based on the appropriate diagnosis-specific guidelines
**PEDONC-18.4: Non-Langerhans Cell Histiocytoses**

Includes diagnoses such as juvenile xanthogranuloma (JXG), sinus histiocytosis with lymphadenopathy (Rosai-Dorfman Disease, RDD), and Erdheim-Chester Disease (ECD).

In general, these are localized cutaneous or nodal disease without need for regular advanced imaging, but important exceptions are listed in this section.

**Juvenile Xanthogranuloma (JXG):**

- Generally involves only skin or cervical nodes, and involutes spontaneously, imaging of involved nodal areas may be appropriate using CT with contrast of appropriate area.
- Systemic JXG is associated with multi-organ involvement and imaging studies may include:
  - MRI Brain (CPT® 70553) and/or Orbits (CPT® 70543) without and with contrast
  - CT Neck (CPT® 70491), Chest (CPT® 71260), and/or Abdomen (CPT® 74160) with contrast
- There is no established role for PET in the diagnosis or treatment of JXG

**Rosai-Dorfman Disease (RDD):**

Characterized by bulky adenopathy (usually cervical) with frequent systemic involvement.

Appropriate imaging studies may include:

- MRI Brain (CPT® 70553) and/or Orbits (CPT® 70543) without and with contrast
- Nuclear bone scan (See **PEDONC-1.3: Modality General Considerations**)
- CT Neck (CPT® 70491), Chest (CPT® 71260) and/or Abdomen/Pelvis (CPT® 74177) with contrast
- There is no established role for PET in the diagnosis or treatment of RDD, but whole body PET/CT (CPT® 78816) may be approved if PET/CT will provide critical information for major treatment decision making that cannot be obtained using conventional imaging or biopsy.
  - Because of the paucity of evidence for PET in RDD, PET/CT should not be used to replace tissue confirmation for any clinical scenario in RDD.
  - These requests will be forwarded for Medical Director review.
- There is no established role for routine surveillance imaging of asymptomatic patients after treatment for RDD, but CT with contrast can be approved for evaluation of new or worsening clinical symptoms suggesting recurrent disease.
**Erdheim-Chester Disease (ECD):**
An aggressive histiocytic disorder with overall poor prognosis that is characterized by long bone involvement with frequent spread to multiple organs

**ECD Initial Imaging Studies:**
Appropriate imaging studies at initial diagnosis may include:
- MRI Brain (CPT® 70553) and/or Orbits (CPT® 70543) without and with contrast
- Nuclear bone scan (See PEDONC-1.3: Modality General Considerations)
- Whole body PET/CT (CPT® 78816)
- CT Neck (CPT® 70491), Chest (CPT® 71260) and/or Abdomen/Pelvis (CPT® 74177) with contrast
- CTA or MRA of Chest (CPT® 71275 or CPT® 71555) or Abdomen (CPT® 74175 or CPT® 74185) to evaluate vascular tree involvement
- Cardiac MRI without and with contrast (CPT® 75561)

**ECD Treatment Response:**
- Most patients will receive systemic therapy. Treatment response imaging can be approved every 3 months during active treatment using any modalities showing disease at initial diagnosis, including PET/CT.
  - Once PET/CT shows no remaining FDG-avid lesions, additional PET imaging is not indicated unless conventional imaging studies are inconclusive and acute treatment decisions will be made based on PET results. These requests will be forwarded for Medical Director review.

**ECD Surveillance Imaging:**
- Surveillance imaging can be approved every 3 months for the first year after completion of treatment, then every 6 months using any modalities showing disease at initial diagnosis.
- PET/CT is not supported for routine surveillance of ECD, but can be approved if conventional imaging is inconclusive for suspected recurrence. These requests will be forwarded for Medical Director review.
References – PEDONC-18


PEDONC-19: Long Term Pediatric Cancer Survivors

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<td>PEDONC-19.4: Osteonecrosis in Long Term Cancer Survivors</td>
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PEDONC-19.1: Long Term Pediatric Cancer Survivors – General Considerations

This section applies to patients who have passed the end of the surveillance imaging period for their specific cancer, or 5 years after completion of therapy, whichever occurs first.

As these are long term survivors, many patients falling under this guideline section will have reached adult age. However, these guidelines relate specifically to late effects of childhood cancer treatment and should be applied to all long term childhood cancer survivors regardless of current age.

The Children’s Oncology Group has published comprehensive guidelines for the management of long-term childhood cancer survivors, and these are available at: http://www.survivorshipguidelines.org.

A summary of cancer treatment should be available for all patients in this category and should generally include, at minimum:

- Type of cancer and stage
- Dates of diagnosis, recurrence, cancer-related surgeries, beginning and end dates of chemotherapy, radiotherapy, and/or stem cell transplant
- Protocol number used for treatment and cumulative chemotherapy drug dose exposures
- Cumulative radiation dose, fraction number, modality, and field exposure

Annual detailed history and complete physical examination is a critical component of cancer survivorship care and along with laboratory testing serves as the primary method of screening for the majority of late effects.

- Advanced imaging for asymptomatic screening is not routinely indicated except as specified in this section.

- Imaging requests related to new clinical signs or symptoms in a long term cancer survivor not explicitly covered in this section should be reviewed according to the guideline for the patient’s cancer type or the relevant non-malignant clinical problem.
**PEDONC-19.2: Cardiotoxicity and Echocardiography**

Exposure to cardiotoxic anthracycline chemotherapy agents is common in pediatric Oncology due to the high success rate of this drug class in the treatment of pediatric cancers. Screening echocardiography (CPT® 93306, CPT® 93307, or CPT® 93308) for life is indicated after exposure to anthracycline chemotherapy or cardiac exposure to radiotherapy.

Cardiotoxic drugs include the following:

- Doxorubicin
- Daunorubicin
- Idarubicin
- Epirubicin
- Mitoxantrone

Cardiac risk is assessed based on the age of the patient at the time of treatment initiation, the cumulative drug exposure expressed as doxorubicin equivalent mg/m², and the presence or absence of radiotherapy exposure to cardiac muscle.

<table>
<thead>
<tr>
<th>Age at time of Exposure</th>
<th>Cumulative Doxorubicin Equivalent Dose</th>
<th>Cumulative radiation dose to cardiac muscle</th>
<th>Echocardiogram frequency</th>
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<tr>
<td>All ages</td>
<td>None</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>0-0.99 years</td>
<td>≥250 mg/m²</td>
<td>None</td>
<td>Annual</td>
</tr>
<tr>
<td></td>
<td>0-249 mg/m²</td>
<td>Any dose</td>
<td>Annual</td>
</tr>
<tr>
<td></td>
<td>0-249 mg/m²</td>
<td>None</td>
<td>Every 2 years</td>
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<td>1-4.99 years</td>
<td>≥250 mg/m²</td>
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<td></td>
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<td>15-34.99 Gy</td>
<td>Every 2 years</td>
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<td>0-14.99 Gy</td>
<td>Every 5 years</td>
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<tr>
<td>5+ years</td>
<td>≥250 mg/m²</td>
<td>Any dose</td>
<td>Every 2 years</td>
</tr>
<tr>
<td></td>
<td>0-249 mg/m²</td>
<td>15+ Gy</td>
<td>Every 2 years</td>
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<td>0-14.99 Gy</td>
<td>None</td>
</tr>
<tr>
<td>All ages with known ventricular dysfunction</td>
<td></td>
<td></td>
<td>Annual</td>
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</tbody>
</table>
Stress echocardiography is not indicated as a screening study for anthracyclines cardiotoxicity in the absence of coronary artery disease symptoms. See **CD-1.4: Stress Testing with Imaging – Indications** for imaging guidelines.

Female cancer survivors who are pregnant or planning to become pregnant:
- If any of the following are present, echocardiogram is recommended as a baseline exam, repeated as needed during and immediately following pregnancy:
  - ≥250 mg/m² cumulative doxorubicin equivalent exposure
  - ≥35 Gy chest radiotherapy
  - Any cardiotoxic drug exposure from the list above AND ≥15 Gy chest radiotherapy
PEDONC-19.3: Second Malignant Neoplasms (SMN)

**SMN—Breast Cancer**
Clinical breast exam every 6 months supplemented with:

- Annual Breast MRI (CPT® 77049) and annual mammogram is recommended beginning at age 25 or 8 years after completion of radiotherapy (whichever occurs later) for patients receiving a cumulative radiation exposure of ≥ 20 Gy in the following fields for any pediatric cancer type except Wilms tumor:
  - Chest (thorax)
  - Whole lung
  - Mediastinal
  - Axilla
  - Mini-mantle, mantle, or extended mantle
  - Total (TLI) or subtotal (SLTI) lymphoid irradiation
  - Total body irradiation (TBI)

- Annual breast MRI (CPT® 77049) and annual mammogram is recommended beginning at age 25 or 8 years after completion of radiotherapy (whichever occurs later) for patients receiving ≥ 12 Gy of whole lung radiation for treatment of Wilms tumor

**SMN – CNS Tumors**
These are associated with radiation exposure to the brain and with neurofibromatosis.

- Routine surveillance of most completely asymptomatic patients with normal neurologic exams is not supported by evidence
  - MRI Brain without and with contrast (CPT® 70553) can be approved every 2 years after completion of radiotherapy for patients with NF1 or NF2

- MRI Brain without and with contrast (CPT® 70553) should be approved if requested for any patient with history of brain radiotherapy and new neurologic symptoms including simple headache

- MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast should be approved if requested for any patient with history of spine radiotherapy and new neurologic symptoms including change in quality of pain
  - MRI Spine can be performed with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain

- For patients with history of brain radiotherapy and persistent neurologic symptoms, annual MRI Brain without and with contrast (CPT® 70553) can be approved

- For patients with history of spine radiotherapy and persistent neurologic symptoms, annual MRI Cervical (CPT® 72156), Thoracic (CPT® 72157), and Lumbar spine (CPT® 72158) without and with contrast can be approved
  - MRI Spine can be performed with contrast only (Cervical-CPT® 72142, Thoracic-CPT® 72147, Lumbar-CPT® 72149) if being performed immediately following a contrast-enhanced MRI Brain
SMN—Colorectal Cancer

Colonoscopy is recommended every 5 years beginning at age 30 or 5 years after radiation exposure (whichever is later) for patients with ≥ 30 Gy radiation exposure to the following fields:

- Thoracic, Lumbar, Sacral, or Whole Spine
- Abdomen
- Pelvis
- Total Body Irradiation (TBI)

Colonoscopy is also recommended every 5 years beginning at age 30 or 5 years after radiation exposure (whichever is later) for patients with:

- Personal history of ulcerative colitis, GI malignancy, adenomatous polyps, or hepatoblastoma
- Familial polyposis
- Family history of colorectal cancer or polyps in a first degree (parent or sibling) relative

While the American Cancer Society recently added computed tomographic colonography (CTC) (AKA “Virtual Colonoscopy”) as an acceptable option for colorectal cancer screening of average-risk adults, the National Comprehensive Cancer Network and United States Preventive Services Task Force concluded that data was too premature to warrant its use in screening. Colonoscopy remains the preferred screening modality for survivors at highest risk of colorectal cancer.
PEDONC-19.4: Osteonecrosis in Long Term Cancer Survivors

Osteonecrosis is associated with corticosteroid, chemotherapy, and radiation exposure during treatment for ALL, NHL, and allogeneic HSCT in pediatrics. Osteonecrosis occurs primarily in hips, knees, and ankles and is frequently multifocal.

Osteoradionecrosis of the jaw can occur in patients receiving radiotherapy to the mandible or maxilla; those receiving ≥ 40 Gy are at highest risk. Although unusual, it can also occur in any bone without symptoms. It is rare in other disease types.

- Plain films of symptomatic areas are indicated prior to advanced imaging.
- Routine bone density screening using DEXA or Quantitative CT screening has not been well normalized in the pediatric population, but imaging can be approved for those with symptoms to suggest bone density issues
  - DEXA or Quantitative CT screening is generally not recommended until age 18 unless a specific intervention will be planned based on the imaging results.
- Serial advanced imaging is not indicated in osteonecrosis without specific documentation regarding how the advanced imaging will change current patient management
  - When advanced imaging is necessary for acute management decisions, MRI without contrast of the affected joint(s) can be approved.
  - Surveillance imaging of asymptomatic patients to detect osteonecrosis has not been shown to impact patient outcomes, and it is not standard to alter treatment based on imaging findings alone without symptoms.
    - Follow up MRI of incidentally discovered osteonecrosis findings in asymptomatic patients has not been shown to impact patient outcomes and is not necessary
- See PEDONC-3.2: Acute Lymphoblastic Leukemia (ALL) for information on imaging osteonecrosis in ALL patients during active treatment.

End of PEDONC-19.4
References – PEDONC-19


### Pediatric Pelvis Imaging Guidelines

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## Procedure Codes Associated with Pelvis Imaging

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<th>Modality</th>
<th>Code</th>
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<tr>
<td>MRI</td>
<td>72195</td>
<td>MRI Pelvis without contrast</td>
</tr>
<tr>
<td>MRI</td>
<td>72196</td>
<td>MRI Pelvis with contrast (rarely used)</td>
</tr>
<tr>
<td>MRI</td>
<td>72197</td>
<td>MRI Pelvis without and with contrast</td>
</tr>
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<td>MRA Pelvis</td>
</tr>
<tr>
<td>CT</td>
<td>74176</td>
<td>CT Abdomen and Pelvis without contrast</td>
</tr>
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<td>74177</td>
<td>CT Abdomen and Pelvis with contrast</td>
</tr>
<tr>
<td>CT</td>
<td>74178</td>
<td>CT Abdomen and Pelvis without and with contrast</td>
</tr>
<tr>
<td>CT</td>
<td>72192</td>
<td>CT Pelvis without contrast</td>
</tr>
<tr>
<td>CT</td>
<td>72193</td>
<td>CT Pelvis with contrast</td>
</tr>
<tr>
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<td>72194</td>
<td>CT Pelvis without and with contrast</td>
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<td>CT</td>
<td>77012</td>
<td>CT Guidance for Needle Placement (Biopsy, Aspiration, Injection, etc.)</td>
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<td>PET Imaging: skull base to mid-thigh (this code not used in pediatrics)</td>
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<td>Nuclear Medicine</td>
<td>78813</td>
<td>PET Imaging: whole body (this code not used in pediatrics)</td>
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<tr>
<td>Nuclear Medicine</td>
<td>78814</td>
<td>PET with concurrently acquired CT; limited area (this code rarely used in pediatrics)</td>
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<td>78815</td>
<td>PET with concurrently acquired CT; skull base to mid-thigh</td>
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<tr>
<td>Nuclear Medicine</td>
<td>78816</td>
<td>PET with concurrently acquired CT; whole body</td>
</tr>
<tr>
<td>Nuclear Medicine</td>
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<td>Urinary Bladder Residual Study</td>
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<td>Ureteral Reflux Study (Radiopharmaceutical Voiding Cystogram)</td>
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<td>Nuclear Medicine</td>
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<td>Radiopharmaceutical Imaging of Lymphatic System</td>
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<td>Radiopharmaceutical Localization Imaging Limited Area</td>
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<td>Radiopharmaceutical Localization Imaging Whole Body</td>
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<td>Ultrasound, scrotum and contents</td>
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<tr>
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<td>PEDPV-1.3: Pediatric Pelvis Imaging Modality General Considerations</td>
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</table>
**PEDPV-1.1: Pediatric Pelvis Imaging Age Considerations**

Many conditions affecting the pelvis in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are <18 years old should be imaged according to the Pediatric Pelvis Imaging Guidelines and patients who are ≥18 years should be imaged according to the Adult Pelvis Imaging Guidelines, except where directed otherwise by a specific guideline section.

**PEDPV-1.2: Pediatric Pelvis Imaging Appropriate Clinical Evaluation**

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering the use of an advanced imaging (CT, MRI, Nuclear Medicine) procedure. An exception can be made if the patient is undergoing guideline-supported, scheduled follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the pelvis is not supported. Advanced imaging of the pelvis should only be approved in patients who have documented active clinical signs or symptoms of disease involving the pelvis.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the pelvis are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

**PEDPV-1.3: Pediatric Pelvis Imaging Modality General Considerations**

- Ultrasound
  - Ultrasound should be the initial imaging in most pelvic conditions to rule out those situations that do not require additional advanced imaging.
  - For those patients who do require advanced imaging after ultrasound, ultrasound can be very beneficial in selecting the proper modality, body area, image sequences, and contrast level that will provide the most definitive information for the patient.
  - CPT® codes vary by body area and presence or absence of Doppler imaging and are included in the table at the beginning of this guideline.
  - Transabdominal ultrasound is appropriate in all pediatric patients.
  - Transvaginal (TV) ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Ultrasound (complete CPT® 76856 or, limited CPT® 76857) should substitute for TV in pediatric patients or non-sexually active adult females.
MRI

- MRI Pelvis is generally performed without and with contrast (CPT® 72197) unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
- Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years) as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
  - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
    - Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast.
    - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
  - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
- The presence of surgical hardware or implanted devices may preclude MRI.
- The selection of best examination may require coordination between the provider and the imaging service.

CT

- CT Pelvis typically extends from the iliac crest to the ischial tuberosities, and CT Abdomen and Pelvis extends from the dome of the diaphragm through the ischial tuberosities.
  - In general, CT Pelvis is appropriate when evaluating solid pelvic organs.
  - In general, CT Abdomen and Pelvis is appropriate when evaluating inflammatory or infections processes, hematuria, or conditions which appear to involve both the abdomen and the pelvis.
  - In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
The contrast level in pediatric CT imaging is specific to the clinical indication, as listed in the specific guideline sections.

- CT Pelvis or Abdomen and Pelvis may be indicated for further evaluation of abnormalities suggested on prior US or MRI Procedures.
- CT may be appropriate without prior MRI or US, as indicated in specific sections of these guidelines.
- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
- The selection of best examination may require coordination between the provider and the imaging service.

**Nuclear Medicine**

- Nuclear medicine studies are rarely used in imaging of the pediatric pelvis, but are indicated in rare circumstances, including the following:
  - Lymph system mapping (CPT® 78195) is indicated for lower extremity lymphedema with recent negative Doppler ultrasound, or a history of Milroy’s disease or prior pelvic lymph node dissection.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

**References**

PEDPV-2: Abnormal Uterine Bleeding

- Abnormal uterine bleeding imaging indications in pediatric patients are very similar to those for adult patients. See PV-2: Abnormal Uterine Bleeding in the Pelvis Imaging Guidelines.

- The causes of vaginal bleeding in children differ from those in adolescents. Vaginal bleeding after the first week or so of life but before menarche is always abnormal and warrants evaluation. Common conditions before normal menarche include vaginal foreign bodies, infections, precocious puberty, and estrogen exposure. After menarche, pregnancy and excessive menstrual bleeding (dysfunction) must be considered.

- Pediatric-specific imaging considerations include the following:
  - Transabdominal ultrasound is appropriate in all pediatric patients.
  - Transvaginal (TV) ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in pediatric patients or in patients who have never been sexually active.
  - MRI Pelvis without contrast or without and with contrast (CPT® 72195 or CPT® 72197) is indicated if ultrasound is inconclusive.

References
PEDPV-3: Pelvic Inflammatory Disease (PID)

Pelvic inflammatory disease imaging indications in pediatric patients are very similar to those for adult patients. See PV-7: Pelvic Inflammatory Disease (PID) in the Pelvis Imaging Guidelines.

Pediatric-specific imaging considerations include the following:
- Transabdominal ultrasound is appropriate in all pediatric patients.
- Transvaginal (TV) ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in patients who are pre-pubescent or victims of abuse.
- MRI Pelvis without contrast (CPT® 72195) or without and with contrast (CPT® 72197) is indicated if US is inconclusive.
- CT Pelvis with contrast (CPT® 72193) is indicated if MRI is not readily available.

Reference
PEDPV-4: Amenorrhea

Girls with primary amenorrhea and any of the following should be evaluated initially with pelvic ultrasound (CPT® 76856 or CPT® 76857):
- Amenorrhea is usually primary and refers to absence of menstrual periods by age 16.
  - Normal pubertal development and negative pregnancy test.
  - Transabdominal ultrasound is appropriate in all pediatric patients.
  - Transvaginal (TV) ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound (CPT® 76830) can also be approved if requested for better view of genitourinary anomalies in sexually active females.
  - Delayed puberty with follicle-stimulating hormone (FSH) or luteinizing hormone (LH) that is elevated for the patient’s age and Tanner stage.

MRI Pelvis without contrast or without and with contrast (CPT® 72195 or CPT® 72197) +/- MRI Abdomen without contrast or without and with contrast (CPT® 74181 or CPT® 74183) are indicated for the following:
- Evaluation of congenital anomalies of the uterus and/or urinary system identified on abdominal and pelvic ultrasound (CPT® 76700 and CPT® 76856) in order to better define complex anatomy.
- Preoperative planning in girls with distention of the vagina by fluid (hydrocolpos) or blood (hematocolpos) due to congenital vaginal obstruction.

References
**PEDPV-5: Endometriosis**

- Endometriosis imaging indications in pediatric patients are very similar to those for adult patients. See [PV-6: Endometriosis](#) in the Pelvis Imaging Guidelines.

- Pediatric-specific imaging considerations include:
  - Transabdominal ultrasound is appropriate in all pediatric patients.
  - Transvaginal (TV) ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in patients who are pre-pubescent or have never been sexually active.

**Reference**

PEDPV-6: Suspected Adnexal Mass

- Suspected adnexal mass imaging indications in pediatric patients are very similar to those for adult patients. See PV-5: Adnexal Mass/Ovarian Cysts in the Pelvis Imaging Guidelines. Ultrasound is the first study indicated for evaluation of a suspected adnexal mass.

- Pediatric-specific imaging considerations include the following:
  - Transabdominal ultrasound is appropriate in all pediatric patients.
  - Transvaginal (TV) Ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in patients who are pre-pubescent or have never been sexually active.
  - Adnexal masses with a solid component in patients, age ≥15 years, should be imaged according to PEDONC-10: Pediatric Germ Cell Tumors in the Pediatric Oncology Imaging Guidelines.

References

PEDPV-7: Pelvic Pain/Dyspareunia, and Ovarian Torsion

Pelvic Pain/Dyspareunia imaging indications in pediatric patients are identical to those for adult patients. See PV-11: Pelvic Pain/Dyspareunia, Female in the Pelvis Imaging Guidelines.

Ovarian torsion in children is typically associated with a normal ovary. Spontaneous torsion of a normal ovary is more common than torsion caused by a lead mass, such as a cyst or tumor. Torsion involves both the ovary and fallopian tube and typically presents with acute onset of lower abdominal pain, often associated with nausea or vomiting.

- Transabdominal ultrasound is appropriate in all pediatric patients.
- Transvaginal (TV) ultrasound is appropriate in pediatric patients who are sexually active or use a tampon and consent to the study. Transvaginal ultrasound is generally not appropriate in patients who are pre-pubescent or have never been sexually active.

Reference
PEDPV-8: Polycystic Ovary Syndrome

Polycystic ovary syndrome imaging indications in pediatric patients are identical to those for adult patients. See PV-8: Polycystic Ovary Syndrome in the Pelvis Imaging Guidelines.

Reference
PEDPV-9: Periurethral Cysts and Urethral Diverticula

- Periurethral cysts and urethral diverticula imaging indications in pediatric patients are identical to those for adult patients. See PV-13: Periurethral Cysts and Urethral Diverticula in the Pelvis Imaging Guidelines.
PEDPV-10: Fetal MRI

- Fetal MRI indications in pediatric patients are identical to those for adult patients. See PV-15: Fetal MRI in the Pelvis Imaging Guidelines.
PEDPV-11: Undescended Testis

- Boys with a history of cryptorchidism (undescended testis) have a several-fold risk increase of testicular cancer. It is important to diagnose and treat this condition either by bringing the undescended testis into the scrotum, or resecting the testis.

- Pediatric-specific imaging considerations include the following:
  - Suspected undescended testis is an indication for referral to a surgical subspecialist who should make the decision on necessary imaging studies.
  - The following imaging is indicated for boys with suspected undescended testis based on a recent detailed physical exam.
    - Scrotal ultrasound (CPT® 76870) if testis not palpable in the scrotal sac and there is concern for retractile or inguinal testis,
      - If ultrasound is inconclusive, either of the following may be approved:
        - MRI Abdomen (CPT® 74183) and Pelvis (CPT® 72197) without and with contrast, however MRI has a high false negative rate.
        - CT Abdomen and Pelvis with contrast (CPT® 74177).

References
4. Poppas DP and Medina C. Undescended testicle or cryptorchidism. Cornell University Institute for Pediatric Urology.
PEDPV-12: Scrotal Pathology

Scrotal pathology imaging indications in pediatric patients are very similar to those for adult patients. See **PV-20: Scrotal Pathology** in the Pelvis Imaging Guidelines.

Pediatric-specific imaging considerations include the following:

- Scrotal US (CPT® 76870) with Doppler (CPT® 93975 or CPT® 93976) is indicated for concerns of testicular torsion.
- MRI is not typically used for the acute scrotum due to the limited availability of equipment and the long examination time involved. However, MRI Pelvis without (CPT® 72195) or without and with (CPT® 72197) contrast is indicated if torsion is unlikely on ultrasound and no surgical exploration is planned.
- Since the acceptance of Doppler US as the primary imaging for evaluation of acute scrotum, scintigraphy is not indicated. The unavailability of nuclear medicine imaging in many practices and its use of ionizing radiation, its poor anatomical details, and the time required for imaging are other limiting factors.

**References**

PEDPV-13: Penis-Soft Tissue Mass

Penile soft tissue masses are very rare in pediatric patients, and imaging indications are identical to those for adult patients. See PV-18: Penis–Soft Tissue Mass in the Pelvis Imaging Guidelines.
PEDPV-14: Incontinence

- Incontinence imaging indications in pediatric patients are very similar to those for adult patients. See PV-22: Urinary Incontinence/Pelvic Prolapse/Fecal Incontinence in the Pelvis Imaging Guidelines.

- Most often incontinence in children is not due to a medical condition. Several uncommon disorders that can lead to urinary incontinence include a spinal cord defect such as spina bifida, ureteral duplication with ectopic insertion, and overactive bladder or dysfunctional voiding.

- No imaging is needed if primary enuresis is suspected; however, imaging evaluation may be warranted if ureteral duplication or overactive bladder or dysfunctional voiding is suspected. The physician should obtain a full medical history and urinalysis before imaging is done.

- Radiopharmaceutical urinary bladder residual study (CPT® 78730) is indicated for suspicion of urinary retention and a recent non-diagnostic ultrasound.

- Pediatric-specific imaging considerations include the following:
  - MRI Pelvis without and with contrast (CPT® 72197) is indicated if ultrasound is inconclusive or spinal abnormality is suspected.
  - CT Pelvis with contrast (CPT® 72193) is approvable if MRI is not readily available.

References
PEDPV-15: Patent Urachus

- Ultrasound pelvis (CPT® 76856) is indicated as the initial evaluation for patent urachus.
  - ANY of the following are indicated if the ultrasound is inconclusive or insufficient for preoperative planning:
    - MRI Pelvis without contrast (CPT® 72195)
    - MRI Pelvis without and with contrast (CPT® 72197)
    - CT Pelvis with contrast (CPT® 72193)

- Repeat imaging of asymptomatic patients is not generally necessary, but is indicated for the following:
  - New or worsening symptoms
  - Preoperative planning

**Practice Note**
The urachus is a “tube” connecting the fetal bladder to the umbilical cord. It is usually obliterated during fetal growth, but if it remains patent, there can be a complete or partial connection between the bladder and the umbilicus.

Ultrasound has an accuracy greater than 90%.

**References**
# Pediatric Peripheral Nerve Disorders (PND) Imaging Guidelines

## Procedure Codes Associated with Peripheral Nerve Disorders (PND) Imaging

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PEDPN-1.1: Age Considerations
Many conditions affecting the peripheral nervous system in the pediatric population are
different diagnoses than those occurring in the adult population. For those diseases
which occur in both pediatric and adult populations, minor differences may exist in
management due to patient age, comorbidities, and differences in disease natural
history between children and adults.

- Patients who are <18 years old should be imaged according to the Pediatric
  Peripheral Nerve Disorders Imaging Guidelines, and patients who are ≥18 years old
  should be imaged according to the Adult Peripheral Nerve Disorders Imaging
  Guidelines, except where directed otherwise by a specific guideline section.

PEDPN-1.2: Appropriate Clinical Evaluation

- A recent (within 60 days) evaluation including a detailed history, physical
  examination with a thorough neurologic examination, and appropriate laboratory
  studies should be performed prior to considering advanced imaging (CT, MRI,
  Nuclear Medicine), unless the patient is undergoing guideline-supported scheduled
  follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging
to screen asymptomatic patients for disorders involving the peripheral nervous
system is not supported. Advanced imaging of the peripheral nervous system should
only be approved in patients who have documented active clinical signs or
symptoms of disease involving the peripheral nervous system.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the
  peripheral nervous system are not necessary unless there is evidence for
  progression of disease, new onset of disease, and/or documentation of how repeat
  imaging will affect patient management or treatment decisions.

PEDPN-1.3: Modality General Considerations

- MRI
  - MRI without and with contrast is the preferred modality for pediatric peripheral
    nerve imaging unless otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize
    patient movement, anesthesia is usually required for almost all infants (except
    neonates) and young children (age <7 years) as well as older children with
delays in development or maturity. This anesthesia may be administered via oral
  or intravenous routes. In this patient population, MRI sessions should be
  planned with a goal of minimizing anesthesia exposure by adhering to the
  following considerations:
    - MRI procedures can be performed without and/or with contrast use as
      supported by these condition based guidelines. If intravenous access will
      already be present for anesthesia administration and there is no
      contraindication for using contrast, imaging without and with contrast may
      be appropriate if requested. By doing so, the requesting provider may avoid
repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.

- Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain after the use of MRI contrast.
- The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.

- If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.

- **CT**
  - CT is rarely used in the evaluation of pediatric peripheral nerve disorders. See specific guideline sections for indications.

- **Ultrasound**
  - Ultrasound is rarely used in the evaluation of pediatric peripheral nerve disorders. See specific guideline sections for indications.

- **Nuclear Medicine**
  - Nuclear medicine studies are not generally indicated in the evaluation of peripheral nerve disorders. See PEDPN-2: Neurofibromatosis for specific imaging guidelines regarding PET/CT in evaluation of peripheral nerve tumors.

- The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.
References


**PEDPN-2: Neurofibromatosis**

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PEDPN-2: Neurofibromatosis – General Information

This guideline section includes imaging indications for patients with neurofibromatosis and known benign lesions. For cancer screening guidelines, See PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2) in the Pediatric Oncology Imaging Guidelines. For guidelines related to known malignancies in patients with NF1, see the appropriate imaging guideline for the specific cancer type.

PEDPN-2.1: Neurofibromatosis 1

- Most cutaneous neurofibromas and deep plexiform neurofibromas do not cause symptoms, and routine surveillance imaging of these lesions has not been shown to improve outcomes.
  - The decision to obtain testing such as imaging studies depends upon the history and physical findings. Clinical evaluation appears to be more useful to detect complications than are screening investigations in asymptomatic patients.
  - The Genetics Committee of the American Academy of Pediatrics have published diagnostic and health supervision guidelines for children with NF1. Surveillance includes:
    - Annual physical examination
    - Annual ophthalmologic examination in children
    - Regular developmental assessment of children
    - MRI for follow-up of clinically suspected tumors

- MRI without and with contrast of a known body area containing a neurofibroma is indicated for any of the following:
  - Every 3 months for treatment response in patients receiving active treatment
  - New or worsening clinical symptoms suggesting progression
  - Preoperative planning

- NF1 patients are more susceptible to damaging effects of ionizing radiation. Studies of NF1 patients irradiated for optic pathway gliomas have reported increased risks for developing another cancer associated with radiotherapy. This risk is associated with radiotherapy, not diagnostic imaging.

- PET imaging is not supported for plexiform neurofibroma surveillance in asymptomatic patients at this time as the positive predictive value is only 60 to 65% even in symptomatic patients.

- MRI without and with contrast is appropriate for any clinical symptoms suggestive of change in a known plexiform neurofibroma in a patient with NF1.

- Although PET imaging has a positive predictive value of only 61 to 63% in NF1 patients with suspected transformation to MPNST, the negative predictive value is high (96 to 99%).
  - PET imaging is indicated for evaluating NF1 patients with clinical symptoms concerning for malignant transformation of a known plexiform neurofibromas when all of the following conditions exist:
    - Recent MRI is inconclusive regarding transformation or progression.
- Negative PET will result in a decision to avoid biopsy in a difficult or morbid location.
- Inconclusive PET findings should lead to biopsy of the concerning lesion.
- Repeat PET studies are not indicated due to the poor positive predictive value in this setting.
- CT or three-dimensional CT reconstructions may be necessary when surgical treatment of bony lesions is being planned.

**PEDPN-2.2: Neurofibromatosis 2**
- MRI Brain without and with contrast (CPT® 70553) is indicated for patients with known vestibular schwannomas in the following circumstances:
  - Annual imaging for progression in unresected tumors
  - New or worsening clinical symptoms, including hearing loss
  - Preoperative planning
- Patients with NF2 and known meningioma should be imaged according to guidelines in **ONC-2.8: Meningiomas (Intracranial and Intraspinal)** in the Oncology Imaging Guidelines.
- Patients with NF2 and known ependymoma should be imaged according to guidelines in **PEDONC-4.8: Ependymoma** in the Pediatric Oncology Imaging Guidelines.

**References**


PEDPN-3: Brachial Plexus

Disorders of the brachial plexus can generally be identified and distinguished from lesions in other locations by clinical, electromyography and nerve conduction (EMG/NCV) examination. If the diagnosis remains unclear, advanced imaging can be helpful as a preoperative study to evaluate the anatomy of brachial plexus lesions which should have already been defined by clinical examination.

- MRI is the preferred modality for imaging the brachial plexus. The goal of imaging is to visualize the entire course of the neural network from the preganglionic to the postganglionic segments.
  - CT is not often useful and should not be used as a substitute for MRI.
  - Unilateral brachial plexus studies should be ordered as MRI Upper Extremity Other Than Joint without contrast (CPT® 73218) or without and with contrast (CPT® 73220).
  - Bilateral brachial plexus studies should be ordered as MRI Chest without contrast (CPT® 71550) or without and with contrast (CPT® 71552). For upper trunk lesions, MRI Neck without contrast (CPT® 70540) is indicated.
  - It is rare for more than one CPT® code to be necessary to adequately image the brachial plexus area of interest. These requests should be forwarded for Medical Director Review.
  - MRI Shoulder without contrast (CPT® 73221) or without and with contrast (CPT® 73223) is indicated in infants with brachial plexopathy due to birth trauma if requested for preoperative planning. These patients often have glenohumeral dysplasia and require shoulder surgery.
  - Ultrasound also may be indicated in infants with brachial plexus injury to show the glenoid dysplasia and associated shoulder subluxation.
  - If there is clinical suspicion for cervical nerve root avulsion, MRI Cervical Spine without contrast (CPT® 72141) is indicated.
  - In patients with a known malignancy or post-treatment syndrome, PET/CT skull base to mid-thigh (CPT® 78815) may be approved if there is a contraindication to MRI.

References
PEDPN-4: Gaucher Disease

Gaucher disease is a group of autosomal recessive inborn errors of metabolism characterized by lack of the enzyme acid β-glucuronidase with destructive ceramide storage in various tissues. Gaucher disease is a treatable disorder (enzyme replacement) in which the liver, spleen, and bone marrow/bones are the most affected organs.

- Three types of Gaucher disease are recognized:
  - **Type I** (non-neuropathic form or adult form): progressive hepatomegaly, splenomegaly, anemia and thrombocytopenia, and marked skeletal involvement; lungs and kidneys may also be involved, but central nervous system is spared
  - **Type II** (acute neuropathic form or infantile form): severe progressive neurological involvement with death by 1 to 2 years of age; hepatomegaly, splenomegaly, is also present (usually evident by 6 months of age)
  - **Type III**: type I with neurological involvement

- MRI Lumbar Spine without contrast (CPT® 72148) and Bilateral Femurs (CPT® 73718) is indicated to evaluate bone marrow involvement at initial diagnosis.
  - Repeat imaging is indicated every 12 months, to assess treatment response for patients on enzyme replacement therapy or to assess disease progression for patients in surveillance.

- MRI Abdomen without contrast (CPT® 74181) is indicated to assess liver and spleen involvement at initial diagnosis.
  - Repeat imaging is indicated every 12 months, to assess treatment response for patients on enzyme replacement therapy or to assess disease progression for patients in surveillance.

- Pulmonary involvement is less common, but CT Chest without contrast (CPT® 71250) is indicated for patients with new or worsening pulmonary symptoms.
  - For patients with documented pulmonary involvement, repeat imaging is indicated every 12 months, to assess treatment response for patients on enzyme replacement therapy or to assess disease progression for patients in surveillance.

- PET/CT imaging is considered investigational in the evaluation of Gaucher disease. ¹⁸F-FDG does not reliably detect Gaucher disease in the marrow, and other isotopes are not yet FDA-approved for clinical use.

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<td>Lower Extremity MRA</td>
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<tr>
<td><strong>CTA</strong></td>
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<tr>
<td>CTA Abdominal Aorta with Bilateral Iliofemoral Runoff</td>
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<td>Upper Extremity CTA</td>
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<td>Lower Extremity CTA</td>
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<td>Duplex scan of hemodialysis access (including arterial inflow, body of access, and venous outflow)</td>
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PEDPVD-1.1: Age Considerations

Many conditions affecting the peripheral vascular system in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are < 18 years old should be imaged according to the Pediatric peripheral vascular disease imaging guidelines, and patients who are ≥ 18 years old should be imaged according to the Adult peripheral vascular disease imaging guidelines, except where directed otherwise by a specific guideline section.

PEDPVD-1.2: Imaging Appropriate Clinical Evaluation

- A recent (within 60 days) face to face evaluation including a detailed history, physical examination, and appropriate laboratory studies should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the patient is undergoing guideline-supported scheduled imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the peripheral vascular system is not supported. Advanced imaging of the peripheral vascular system should only be approved in patients who have documented active clinical signs or symptoms of disease involving the peripheral vascular system.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the peripheral vascular system are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

PEDPVD-1.3: Modality General Considerations

- MRI
  - MRI is generally performed without and with contrast unless the patient has a documented contraindication to gadolinium or otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI imaging sessions should be planned with a goal of minimizing anesthesia exposure adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition-based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid
repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
  - Recent evidence-based literature demonstrates the potential for gadolinium deposition in various organs including the brain after the use of MRI contrast.
  - The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.
    - If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.
    - The presence of surgical hardware or implanted devices may preclude MRI.
    - The selection of best examination may require coordination between the provider and the imaging service.

CT
- CT or CTA may be appropriate for further evaluation of abnormalities suggested on prior US or MRI Procedures.
- CT may be appropriate without prior MR or US, especially in the following (non-exhaustive list of) settings:
  - Lymphatic malformations
  - Vascular abnormalities including vasculitis, thrombosis, narrowing, aneurysm, dissection, and varices.
  - For preoperative planning or assessment of post-operative complications.
- In some cases, especially in follow-up of a known finding, it may be appropriate to limit the exam to the region of concern to reduce radiation exposure.
- CT should not be used to replace MRI in an attempt to avoid sedation unless listed as a recommended study in a specific guideline section.
- The selection of best examination may require coordination between the provider and the imaging service.

Ultrasound
- Ultrasound can be helpful in evaluating arterial, venous, and lymphatic malformations.
- Ultrasound can be limited by the imaging window and the patient body type.
- CPT® codes vary by body area and presence or absence of Doppler imaging and are included in the table at the beginning of this guideline.

Nuclear Medicine
- Nuclear medicine studies are rarely used in the evaluation of peripheral vascular disorders, but are indicated in the following circumstances:
  - Lymphoscintigraphy (CPT® 78195) is indicated for evaluation of lower extremity lymphedema when a recent Doppler ultrasound is negative for valvular insufficiency.
- Vascular flow imaging (CPT® 78445) is an obsolete study that has been replaced by MRA, CTA, or Duplex ultrasonography, and is not supported for any indication at this time.
- Venous thrombosis imaging (CPT® 78456, CPT® 78457, and CPT® 75458) are obsolete studies that have been replaced by MRA, CTA, or Duplex ultrasonography, and are not supported for any indication at this time.
- Radiopharmaceutical nuclear medicine studies (CPT® 78800, CPT® 78801, CPT® 78802, or CPT® 78803 can be approved for evaluation of the following:
  - Mycotic aneurysms
  - Vascular graft infection
  - Infection of central venous catheter or other indwelling device

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

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PEDPVD-2.1: General Information

Vascular and lymphatic malformations encompass a broad variety of conditions and have very heterogeneous natural history and treatment approaches. Lesions can be divided into low flow lesions (lymphatic, capillary and venous malformations), and high flow lesions (arteriovenous malformations and fistulas).

▶ Patients with aggressive lesions being treated with systemic therapy can have imaging (see specific sections for details regarding modality and contrast level) approved for treatment response every 3 months during active treatment.

▶ Annual surveillance imaging of known vascular or lymphatic malformations can be approved for body areas where growth could cause significant organ dysfunction or functional impairment.

PEDPVD-2.2: Lymphatic Malformations

Lymphatic malformations are composed of dilated lymphatic channels filled with proteinaceous fluid and do not connect to normal lymphatic channels. They are typically soft, non-pulsatile masses with normal overlying skin.

▶ Ultrasound is indicated as an initial examination for superficial lesions.
  ♦ Large lesion characterization may be limited by ultrasound imaging window.
  ♦ Ultrasound is also limited in evaluating malformation relationship to airway or bony structures.

▶ MRI without contrast or without and with contrast of the affected body part is indicated for:
  ♦ Lymphatic malformations involving deep tissues
  ♦ Malformations too large to be completely imaged with ultrasound
  ♦ Inconclusive ultrasound findings
  ♦ Preoperative planning

▶ CT is of limited value in evaluating lymphatic malformations
  ♦ CT with contrast of the affected body part can be approved for lesions with acute enlargement and concerns for compression when MRI is contraindicated.
**PEDPVD-2.3: Venous Malformations**

Venous malformations are slow-flow lesions characterized by dilated venous spaces and a normal arterial component. They are soft, compressible, non-pulsatile lesions that are usually blue to deep purple in color. Lesions can range from very small to large infiltrating ones. Some may change size with Valsalva.

Venous malformations are usually isolated, but they may be seen in multiple syndromes including Klippel-Trenaunay (KT) syndrome, Blue Rubber Bleb Nevus syndrome (BRBN), Maffucci syndrome, Proteus syndrome, Bannayan-Riley-Ruvalcaba syndrome, Parkes-Weber syndrome and congenital lipomatous overgrowth, vascular malformations, epidermal nevi and scoliosis/skeletal/spinal anomalies (CLOVES) syndrome.

- Ultrasound with Doppler is indicated as an initial examination for superficial lesions.
  - Large lesion characterization may be limited by ultrasound imaging window.
  - Ultrasound is also limited in evaluating malformation relationship to airway or bony structures.
- MRI without contrast or without and with contrast of the affected body part can be approved for venous malformations for preoperative assessment to evaluate the extent of malformation and their relationship to normal structures.
- MRA or CTA has a limited role in evaluating most venous malformations, but may be approved (contrast as requested of the affected body part) if MRI or CT are equivocal and the results will impact acute management decisions.
- CT can also be used to characterize venous malformations and their relationship to normal structures but is generally not as accurate as MRI.
  - CT with contrast of the affected body part can be approved when MRI is inconclusive or contraindicated

**PEDPVD-2.4: Capillary Malformations**

- Capillary malformations also known as port wine stains are characterized by a collection of small vascular channels in the dermis and generally do not require advanced imaging because the diagnosis is made clinically. However, MR imaging (without contrast or without and with contrast) may be approved to evaluate occult underlying neurologic structures, since these malformations are associated with encephalocele, spinal dysraphism, or Sturge-Weber syndrome.
PEDPVD-2.5: Arteriovenous Malformations (AVMs) and Fistulas

Arteriovenous malformations are characterized by a network of multiple abnormal vascular channels interposed between enlarged feeding arteries and draining veins. The arteriovenous fistula has a single communication interposed between a feeding artery and a draining vein. The normal capillary bed is absent in both lesions. Both lesions may have an aggressive clinical course and are characterized by a reddish pulsatile mass which has a thrill or bruit. Though often recognized at birth, these lesions may grow and present near adolescence.

- Ultrasound with Doppler is indicated as an initial examination for superficial lesions.
  - Large lesion characterization may be limited by ultrasound imaging window.
  - Ultrasound is also limited in evaluating AVM relationship to airway or bony structures.
- MRI without contrast or without and with contrast of the affected body part is also indicated for evaluation of AVMs, and is useful in evaluating the extent of AVMs and their relationship to normal structures.
- MRA (contrast as requested) of the affected body part can be approved for evaluation and surveillance of known AVMs.
- It is unusual for both MRI and MRA to be necessary for routine treatment response or surveillance imaging of AVMs, but both may be approved for preoperative planning.
- CT and CTA can also be used to characterize AVMs and their relationship to normal structures, but is generally not better than MRI and has associated radiation risks.
  - CT with contrast and/or CTA (contrast as requested) of the affected body part can be approved when MRI and/or MRA is inconclusive or contraindicated.

PEDPVD-2.6: Vascular Tumors

Vascular tumors include a variety of benign, borderline, and malignant tumors, which have variable clinical courses, including but not limited to Epithelioid hemangioma, Kaposiform hemangioendothelioma, Kaposi sarcoma, Epithelioid hemangioendothelioma, and Angiosarcoma of soft tissue.

- Ultrasound with Doppler is indicated as an initial examination for vascular tumors.
  - Large lesion characterization may be limited by ultrasound imaging window.
  - Ultrasound is also limited in evaluating malformation relationship to airway or bony structures.
- MRI without contrast or without and with contrast of the affected body part is also indicated for evaluation of vascular tumors, and is useful in evaluating the extent of arteriovenous malformations and their relationship to normal structures, as well as response to therapy.
- MRA (contrast as requested) of the affected body part can be approved for evaluation and surveillance of known vascular tumors.
It is unusual for both MRI and MRA to be necessary for routine treatment response or surveillance imaging of vascular tumors, but both may be approved for preoperative planning.

CT and CTA can also be used to characterize vascular tumors and their relationship to normal structures, but is generally not better than MRI and has associated radiation risks.

CT with contrast and/or CTA (contrast as requested) of the affected body part can be approved when MRI and/or MRA is inconclusive or contraindicated.

References

# PEDPVD-3: Vasculitis

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**PEDPVD-3.1: General Information**

Systemic vasculitis is much less common in children than in adults, although the diagnostic pathways and treatment options are similar.

- PET/CT is considered investigational for management of pediatric vasculitis at this time.
  - There are limited data suggesting PET may have similar accuracy to MRA in the initial diagnosis of Takayasu arteritis but is not helpful in assessing treatment response and has not been shown to improve patient outcomes to date.

**PEDPVD-3.2: Large Vessel Vasculitis**

Takayasu arteritis is the predominant large vessel vasculitis occurring in children.

- Any of the following modalities may be indicated for evaluation of Takayasu arteritis:
  - MRA of the affected body area(s) (contrast as requested)
  - CTA of the affected body area(s) (contrast as requested)
  - Ultrasound with Doppler of the affected body area(s)

- Imaging is indicated at the following intervals:
  - Every 3 months for treatment response during active treatment in patients being treated with systemic therapy.
    - See specific sections for details regarding modality and contrast level.
  - Annually for surveillance of known involved body areas to detect progressive vascular damage that may require intervention.

**PEDPVD-3.3: Medium Vessel Vasculitis**

Polyarteritis nodosa and Kawasaki Disease are the primary medium vessel vasculitides occurring in children.

- Imaging guidelines for Kawasaki Disease are in the pediatric cardiac imaging guideline, see **PEDCD-6: Kawasaki Disease**

- For evaluation of polyarteritis nodosa:
  - Any of the following modalities may be indicated:
    - MRA of the affected body area(s) (contrast as requested)
    - CTA of the affected body area(s) (contrast as requested)
    - Ultrasound with Doppler of the affected body area(s)
  - Imaging is indicated at the following intervals:
    - Every 3 months during active treatment with systemic therapy for treatment response.
      - For details regarding modality and contrast level see **PEDPVD-1.3: Modality General Considerations**
      - Annually for surveillance of known involved body areas to detect progressive vascular damage that may require intervention.
**PEDPVD-3.4: Small Vessel Vasculitis**

- Advanced imaging is not sensitive enough to detect changes in small vessels, and is not indicated for primary assessment of any small vessel vasculitis.

- End-organ damage occurs with several of the small vessel vasculitides. Advanced imaging is indicated for the following:
  - **Granulomatosis with polyangiitis (GPA, formerly known as Wegener’s granulomatosis):**
    - CT Sinuses (CPT®70486) and/or CT Chest without contrast (CPT®71250) or with contrast (CPT®71260) is indicated for the following:
      - New or worsening clinical symptoms affecting the body area requested
      - To assess response to medical therapy when a change in treatment regimen is being considered
      - Annually-to evaluate the extent of disease
  - **Eosinophilic granulomatosis with polyangiitis (EGPA, formerly known as Churg-Strauss Syndrome):**
    - CT Chest without contrast (CPT®71250) or with contrast (CPT®71260) is indicated in the following circumstances:
      - New or worsening clinical symptoms affecting the body area requested
      - To assess response to medical therapy when a change in treatment regimen is being considered
      - Annually-to evaluate the extent of disease
  - **Immune complex associated small-vessel vasculitis [immunoglobulin A–associated vasculitis (IgAV)]:**
    - Doppler ultrasound of the affected body part (most commonly abdomen) is indicated in the following circumstances:
      - New or worsening clinical symptoms affecting the body area requested
      - To assess response to medical therapy when a change in treatment regimen is being considered
      - Annually-to evaluate the extent of disease
References
### PEDPVD-4: Disorders of the Aorta and Visceral Arteries

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PEDPVD-4.1: Thoracic Aortic Disease

- MRA Chest (CPT® 71555) or CTA Chest (CPT® 71275) can be used in patients with Takayasu arteritis, William syndrome, and Ehlers Danlos syndrome for both:
  - Screening
  - Follow-up of thoracic aortic abnormalities

- MRAs (preferred) or CTAs from the head through the pelvis may be performed in patients diagnosed with Loeys-Dietz syndrome for:
  - Screening-one time
  - Follow-up imaging of discovered aneurysms-no more frequently than annually as requested by a specialist

- For other conditions please see discussions indicated elsewhere in the guidelines
  - Marfan Syndrome- See CH-29.3 Screening Guidelines for Familial Syndromes
  - Coarctation of the Aorta- See PEDCD-2.3 Congenital Heart Disease
  - Congenital rubella syndrome- See PEDCD-2.3 Congenital Heart Disease
  - Kawasaki Syndrome- See PEDCD-6 Kawasaki Disease
  - Neurofibromatosis- See PEDCD-1.2 Pediatric Cardiac Imaging Appropriate Clinical Evaluation

PEDPVD-4.2: Aortic Congenital Vascular Malformations

- Cardiac MRI without contrast (CPT® 75557) or without and with contrast (CPT® 75561), MRA Chest (CPT® 71555), CT Chest with contrast (CPT® 71260), or CTA Chest (CPT® 71275) may be indicated for evaluation.

- Vascular rings may impact both the esophagus and trachea. See PEDNECK-7: Esophagus and/or PEDNECK-8: Trachea for additional guidelines.

PEDPVD-4.3: Visceral Artery Aneurysms

- Visceral artery imaging indications in pediatric patients are identical to those for adult patients. See PVD-6: Aortic Disorders and Renal Vascular Disorders and Visceral Artery Aneurysms for imaging guidelines.
References


### Pediatric Spine Imaging Guidelines

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<td>Radiopharmaceutical localization of tumor, inflammatory process or distribution of radiopharmaceutical agent(s) (includes vascular flow and blood pool imaging, when performed); planar, single area (eg, head, neck, chest, pelvis), single day imaging</td>
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## PEDSP-1: General Guidelines

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PEDSP-1.1: Pediatric Spine Imaging Age Considerations
Many conditions affecting the spine in the pediatric population are different diagnoses than those occurring in the adult population. For those diseases which occur in both pediatric and adult populations, minor differences may exist in management due to patient age, comorbidities, and differences in disease natural history between children and adults.

- Patients who are <18 years old should be imaged according to the Pediatric Spine Imaging Guidelines, and patients who are ≥18 years old should be imaged according to the Adult Spine Imaging Guidelines, except where directed otherwise by a specific guideline section.

PEDSP-1.2: Pediatric Spine Imaging Appropriate Clinical Evaluation

- A recent (within 60 days) face-to-face evaluation including a detailed history, physical examination with a thorough neurologic examination, appropriate laboratory studies, and basic imaging such as plain radiography or ultrasound should be performed prior to considering advanced imaging (CT, MR, Nuclear Medicine), unless the patient is undergoing guideline-supported scheduled follow-up imaging evaluation.

- Unless otherwise stated in a specific guideline section, the use of advanced imaging to screen asymptomatic patients for disorders involving the spine is not supported. Advanced imaging of the spine should only be approved in patients who have documented active clinical signs or symptoms of disease involving the spine.

- Unless otherwise stated in a specific guideline section, repeat imaging studies of the spine are not necessary unless there is evidence for progression of disease, new onset of disease, and/or documentation of how repeat imaging will affect patient management or treatment decisions.

PEDSP-1.3: Pediatric Spine Imaging Modality General Considerations

- MRI
  - MRI is the preferred modality for imaging the pediatric spine unless otherwise stated in a specific guideline section.
  - Due to the length of time required for MRI acquisition and the need to minimize patient movement, anesthesia is usually required for almost all infants (except neonates) and young children (age <7 years), as well as older children with delays in development or maturity. This anesthesia may be administered via oral or intravenous routes. In this patient population, MRI sessions should be planned with a goal of minimizing anesthesia exposure by adhering to the following considerations:
    - MRI procedures can be performed without and/or with contrast use as supported by these condition based guidelines. If intravenous access will already be present for anesthesia administration and there is no contraindication for using contrast, imaging without and with contrast may be appropriate if requested. By doing so, the requesting provider may avoid repetitive anesthesia administration to perform an MRI with contrast if the initial study without contrast is inconclusive.
Recent evidence based literature demonstrates the potential for gadolinium deposition in various organs including the brain, after the use of MRI contrast. The U.S. Food and Drug Administration (FDA) has noted that there is currently no evidence to suggest that gadolinium retention in the brain is harmful and restricting gadolinium-based contrast agents (GBCAs) use is not warranted at this time. It has been recommended that GBCA use should be limited to circumstances in which additional information provided by the contrast agent is necessary and the necessity of repetitive MRIs with GBCAs should be assessed.

If multiple body areas are supported by eviCore guidelines for the clinical condition being evaluated, MRI of all necessary body areas should be obtained concurrently in the same anesthesia session.

**CT**
- CT is generally inferior to MRI for imaging the pediatric spine, but has specific indications in which it is the preferred modality listed in specific sections of these guidelines.
- CT should not be used to replace MRI in an attempt to avoid sedation unless it is listed as a recommended study in a specific guideline section.
- Myelogram with post-myelogram CT imaging is rarely indicated in children except in certain limited indications (usually requested after specialist consultation), including:
  - Evaluation of spine in patients with fixation hardware which limits utility of MRI.
  - Severe congenital scoliosis with inconclusive MRI.
  - Evaluation of nerve root avulsion in patients with a brachial plexus injury and inconclusive MRI.
  - Evaluation of paraspinal cyst to assess continuity with the subarachnoid space.
  - Coding note: CT of appropriate spinal level with or without contrast may be appropriate. If the radiologist performs the myelogram the exam should be coded with contrast. If a clinician performs the myelogram the exam should be coded without contrast.

**Ultrasound**
- Spinal canal ultrasound (CPT® 76800) describes the ultrasonic evaluation of the spinal cord (canal and contents) and should not be reported multiple times for imaging of different areas of the spinal canal.
- Do not use CPT® 76800 for intraoperative spinal canal ultrasound as CPT® 76998 (intraoperative ultrasonic guidance) is the appropriate code in this circumstance.
- Spinal canal ultrasound (CPT® 76800) is generally limited to infants up to 6 months of age because of the bone mass surrounding the spinal cord limits evaluation of the intraspinal contents in older infants.
  - **Exception:** the persisting acoustic window in children with posterior spinal defects of spinal dysraphism enables spinal canal ultrasound to be performed at any age (see: PEDSP-4: Spinal Dysraphism).
In general, additional imaging studies of the spine are not indicated in asymptomatic patients with normal spinal ultrasound findings.

Nuclear Medicine

Nuclear medicine studies are rarely used in the evaluation of the spine, but are indicated in the following circumstances:

- Bone scan (CPT® 78315) or Distribution Of Radiopharmaceutical Agent SPECT (CPT® 78803) is indicated for evaluation of suspected loosening of orthopedic prostheses when recent plain x-ray is nondiagnostic, for suspected spondylolysis, or if MRI for evaluation of back pain is inconclusive.

The guidelines listed in this section for certain specific indications are not intended to be all-inclusive; clinical judgment remains paramount and variance from these guidelines may be appropriate and warranted for specific clinical situations.

References

## PEDSP-2: Pediatric Back and Neck Pain and Trauma

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PEDSP-2.1: Introduction

Currently, only about 20% of back pain in children over age 5 is from a discoverable cause. Scoliosis, spondylitic disorders, Scheuermann disease, tumor, and trauma are the most common causes.

Back pain in children under age 5 is uncommon and often reflects underlying serious disease when present.

Disc herniations are rare in children, but become more frequent as activity increases during adolescence.

PEDSP-2.2: Back and Neck Pain in Children Age 5 and Under

A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.

Advanced imaging is appropriate in all patients in this age group except those with mild and transient back pain.

- MRI of the symptomatic spinal region should be approved
  - Patients in this age group will require sedation to complete MRI imaging. See PEDSP-1.3: Pediatric Spine Imaging Modality General Considerations for contrast and body area considerations.

- CT without contrast of the symptomatic spinal region may be approved when:
  - Plain x-rays suggest an isolated vertebral bone abnormality without any concern for spinal canal or cord abnormalities (which is rare in this age group).
  - A recent MRI does not provide sufficient detail of the bony anatomy to allow for acute patient care decision making.

- Bone scan is indicated for evaluation of suspected spinal fracture when x-ray is negative using any of the following CPT® code combinations:
  - CPT® 78300, CPT® 78305, or CPT® 78306 as a single study
  - CPT® 78315 or CPT® 78803 can be approved as a single study when stress fracture is suspected.

- Bone scan is indicated for evaluation of suspected spondylolysis, or if recent spine MRI is inconclusive using any of the following CPT code combinations: SPECT bone scans are especially sensitive for detecting spondylolysis, revealing areas of bone turnover; and the findings are generally positive for a prolonged period.
  - CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, CPT® 78315, or CPT® 78803 as a single study
  - CPT® 78305 and CPT® 78803 concurrently
  - CPT® 78306 and CPT® 78803 concurrently
Pediatric Spine Imaging

PEDSP-2.3: Back and Neck Pain in Children Age 6 and Over
Radicular back and neck pain is common in adult patients but is uncommon in adolescents and rare in children.

- A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, should be performed prior to considering advanced imaging.
- X-rays, while not required prior to conservative treatment, must be obtained before advanced imaging can be approved.
- Advanced imaging should be approved following a recent x-ray when one or more of the following pediatric “red flags” are present:
  - Accompanying systemic symptoms (fever, weight loss, etc.)
  - Functional disability (daily limitation in normal activities because of pain)
  - Pain which is extremely severe or worse at night
  - Early morning stiffness
  - Pain which worsens despite an attempt at symptomatic treatment
  - Neurological symptoms or abnormal neurological examination findings
  - An established diagnosis of cancer other than leukemia
  - Abnormal x-rays
  - Spinal imaging for patients having undergone spinal surgery
  - Associated bowel or bladder dysfunction
- In the absence of any “red flags”, a 4 week trial of provider-supervised conservative treatment should be attempted before advanced imaging can be approved.
  - It can be assumed that children who are being evaluated by a pediatric spine surgeon have failed a reasonable trial of conservative treatment under the care of the primary care provider as this is by far the most common reason for such referrals.
- X-rays of the involved regions should be obtained prior to advanced imaging in patients with “red flag” findings, or who remain symptomatic after a 4 week trial of provider-supervised conservative treatment.
- MRI without contrast of the symptomatic spinal region is the preferred study for the evaluation of pediatric spine pain, and should be approved unless one of the following conditions applies, in which case MRI without and with contrast should be approved:
  - Fever (100° F or higher)
  - Clinical suspicion of infection (discitis, osteomyelitis, paraspinal or epidural abscess)
  - Physical examination or plain x-ray suggests a mass lesion
  - New or worsening pain in a patient with an established diagnosis of cancer
- CT without contrast of the symptomatic spinal region may be approved when:
  - The request is for re-evaluation of a known vertebral bony disorder.
  - Plain x-rays show spondylotic changes or suggest an isolated vertebral bone abnormality without any concern for spinal canal or cord abnormalities (which is rare in this age group).
A recent MRI does not provide sufficient detail of the bony anatomy to allow for acute patient care decision making.

Bone scan is indicated for evaluation of suspected spinal fracture when x-ray is negative, or if recent MRI is inconclusive using any of the following CPT® code combinations:
- CPT® codes: CPT® 78300, CPT® 78305, or CPT® 78306 as a single study
- CPT® 78315 or CPT® 78803 can be approved as a single study when stress fracture is suspected.

**PEDSP-2.4: Spondylolysis**

Most cases of childhood spondylolysis are believed to be caused by repeated microtrauma, resulting in stress fracture of the pars interarticularis. Heredity is also believed to be a factor in some cases. It is the most common cause of low back pain in children older than age 10.

- Activity modification, NSAID treatment, physical therapy, and/or immobilization with various braces are the initial treatments for symptomatic patients.
- Surgical treatment is only recommended for patients with disabling symptoms that have not responded to non-surgical care.
- A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- Spondylolysis is best recognized on plain x-rays, and advanced imaging is generally not indicated.
  - If additional imaging is needed because of radiological uncertainty or associated spondylolisthesis, SPECT Radiopharmaceutical Localization Imaging (CPT® 78803) is indicated to identify stress reaction in early spondylolysis cases which are radiographically occult. Bone scan has been demonstrated to be superior to MRI in detecting active spondylolysis.
    - SPECT bone scans are especially sensitive for detecting spondylolysis, revealing areas of bone turnover; and the findings are generally positive for a prolonged period.
  - MRI without contrast of the symptomatic spinal level is indicated to evaluate for stress reaction in bone and visualizing nerve roots, if symptoms have continued despite a recent 4 week course of conservative care, or there is a documented need for preoperative planning.
  - CT without contrast of the symptomatic spinal level is indicated to provide detailed evaluation of bony anatomy, if there is a documented need for preoperative planning. CT scans have been considered the criterion standard for characterizing fractures and for detailing bone morphology and anatomy.
PEDSP-2.5: Spine Pain Due to Infectious Causes

Entities include discitis and vertebral osteomyelitis, and typically present with sudden onset of back pain, fever, and elevated white blood cell count, occurring most commonly in prepubescent children.

- A detailed history and physical examination with thorough neurologic examination and plain x-rays should be performed initially.

Initial Imaging Studies

- MRI without and with contrast of the symptomatic spinal level is very sensitive at detecting early changes and can be approved when discitis or osteomyelitis is suspected. Nuclear medicine imaging also can be positive as soon as 1 to 2 days after the onset of symptoms.

- Any of the following studies are indicated for initial evaluation of suspected osteomyelitis:
  - Bone scan (one of CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, or CPT® 78315)
  - Nuclear Bone Marrow imaging (one of CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104)
  - Radiopharmaceutical inflammatory imaging (one of CPT® codes: CPT® 78800, CPT® 78801, CPT® 78802, CPT® 78803, or CPT® 78804)

Follow-Up Imaging Studies

- Follow-up plain x-rays may show disc space narrowing and bony changes of osteomyelitis.

- MRI without and with contrast of the symptomatic spinal level or CT with contrast (including myelography) may be useful in follow-up for evaluating bony changes of osteomyelitis or concern for epidural abscess.

- Any of the following studies are indicated for evaluation of response to treatment in established osteomyelitis:
  - Bone scan (one of CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, or CPT® 78315)
  - Nuclear Bone Marrow imaging (one of CPT® codes: CPT® 78102, CPT® 78103, or CPT® 78104)
  - Radiopharmaceutical localization imaging (one of CPT® codes: CPT® 78800, CPT® 78801, CPT® 78803, CPT® 78830, CPT® 78831, or CPT® 78832)
PEDSP-2.6: Spine Pain Related to Trauma

Imaging evaluation of traumatic spine injury in children is generally directed based on clinical examination.

- A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, should be performed prior to considering advanced imaging.

- Children under 3 years of age should be approved for advanced imaging of the cervical spine following a recent x-ray when one or more of the following “red flags” are present:
  - Glasgow Coma Scale <14
  - Patient does not open eyes regardless of stimulus
  - Motor Vehicle Collision

- Older Children should be approved for advanced imaging of the cervical spine following a recent x-ray when one or more of the following “red flags” are present:
  - Altered Mental Status
  - Focal Neurologic Findings
  - Neck pain
  - Torticollis not present prior to trauma
  - Substantial torso injury
  - Diving injury
  - High speed motor vehicle collision

- Children older than 2 years of age SHOULD NOT be approved for advanced imaging of the cervical spine if they meet ALL of the following criteria:
  - Absence of posterior midline cervical pain
  - Absence of focal neurologic deficit
  - Normal level of alertness
  - No evidence of intoxication
  - Absence of other clinically apparent pain which could distract patient from the pain of a cervical injury

- Children should be approved for advanced imaging of the thoracolumbar spine following a recent x-ray when x-rays are inconclusive, or there is an abnormal neurological examination.

- When advanced imaging is appropriate, MRI without contrast or CT without contrast of the involved level may be approved as discussed in PEDSP-1.3: Pediatric Spine Imaging Modality General Considerations
  - If the initial imaging study in considered inconclusive, an exam of the other modality may be approved if needed to direct clinical management.
References
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The term “kyphosis” refers to a curve convex posteriorly. Kyphosis generally affects the thoracic spine.

The term “lordosis” refers to a curve convex anteriorly.

The term “scoliosis” refers to a lateral curvature.

**PEDSP-3.1: Juvenile Thoracic Kyphosis (Scheuermann Disease)**

- This condition is also known as Scheuermann Kyphosis, and these patients generally present with chronic and recurrent back pain.
- A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- X-rays will typically show anterior wedging in three or more adjacent vertebral bodies.
  - Lower thoracic kyphosis from developmental vertebral wedging with thoracic kyphosis totaling over 15° to 20° should be identified by plain x-rays before considering advanced imaging.
  - MRI is not an effective diagnostic modality for this condition since the incidence of false positive vertebral changes in normal patients is high.
- MRI without contrast of the thoracic spine (CPT® 72146) can be approved preoperatively to rule out any associated spinal cord problems.
- MRI without contrast of the lumbar spine CPT® 72148) can be approved preoperatively to rule out any associated spinal cord conditions when there is clinical or radiographic evidence of lumbar abnormalities.

**PEDSP-3.2: Scoliosis**

Scoliosis is an abnormal lateral curve of the thoracic or thoraco-lumbar spine in the frontal plane. A small lateral curve is not uncommon and generally does not require further investigation.

- Using the Cobb technique for measuring these curves, a curve of under 10° is normal, a curve from 10 to 20° is mildly abnormal, a curve over 20° is significantly abnormal, and a curve > 40° is severely abnormal.
- Most patients with significant scoliosis have some element of kyphosis as well.
  - There are many ways of classifying scoliosis. These guidelines will classify scoliosis as congenital, idiopathic, and neuromuscular scoliosis.
- A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, detailed examination of the spine in different body positions, and plain radiography should be performed prior to considering advanced imaging.
  - Standing posteroanterior (PA) and lateral x-rays of the spine are the initial imaging studies and are used for follow-up. If anteroposterior (AP) x-rays are to be performed, breast shields should be used to reduce breast radiation exposure.
Spine surgical specialists sometimes appropriately request both MRI and CT together for preoperative planning of scoliosis surgery.

- In addition, MR and CT are useful to identify an underlying cause of scoliosis, such as congenital and developmental anomalies.
- Concurrent requests for both MRI and CT will be forwarded for Medical Director Review.
- Postoperative spine MR or CT may be appropriate when recent postoperative x-rays are inconclusive for managing patient treatment.

Patients with severe scoliosis may have compromised lung development. Chest CT with contrast (CPT 71260) or without contrast (CPT 71250) may be obtained in the perioperative period as well as 2 and 5 years postoperatively to access lung growth.

**Congenital Scoliosis**
Cases are recognized in infancy or early childhood. Most cases arise from anomalies of vertebral development, and many are associated with anomalies of the genitourinary system or of other organs.

- In infants, spinal ultrasound (CPT® 76800) can be approved after initial imaging with plain x-rays.
- MRI of the cervical (CPT® 72156), thoracic (CPT® 72157), and lumbar (CPT® 72158) spine without and with contrast is indicated to search for underlying anomalies.
- Brain MRI without and with contrast can be approved if the clinical evaluation or preliminary imaging studies suggest an associated intracranial anomaly.
- Renal ultrasound (CPT® 76770 or CPT® 76775) should be performed, since nearly one-third of patients also have genitourinary anomalies.
- CT, MRI, or nuclear medicine studies of the genitourinary tract may be necessary if the ultrasound is abnormal. These requests should be forwarded for Medical Director Review.
**Idiopathic Scoliosis**

Idiopathic scoliosis is the most common form of pediatric scoliosis, and typically has its onset in late childhood or adolescence.

- The following clinical features are associated with an increased risk of underlying vertebral or spinal cord abnormality:
  - Associated back pain
  - Neurological abnormalities on examination or neurological symptoms.
  - Left sided curve (concave to right)
  - Double curves or high thoracic curves
  - Spinal x-ray abnormalities other than the curve itself (widened spinal canal, dysplastic changes in spine or ribs, etc.)
  - Midline spinal cutaneous markers (esp. sacral) such as dermal tracts, tufts of hair, skin tags, etc.
  - Abnormal number or size of café au lait spots (neurofibromatosis)—these requests should be forwarded for Medical Director Review.

- MRI without contrast of the symptomatic spinal region is the preferred study for the evaluation of scoliosis and should be approved when any of the above clinical features is present.

- There is uncertainty regarding the clinical value of MRI in the routine evaluation or preoperative work-up of patients with typical idiopathic scoliosis (with none of the above clinical features present).
  - Noncontrast MRI or CT of the cervical, thoracic, and/or lumbar spine can be approved in these patients when they are being actively evaluated for corrective surgery.

**Neuromuscular Scoliosis**

Scoliosis can result from many disorders of the nervous system. In some conditions, including (but not limited to) cerebral palsy, muscular dystrophy, and spinal muscular atrophy, associated scoliosis may develop over time.

The appropriate spinal level, modality, and contrast level of advanced imaging will depend on the nature of the underlying disease.

- MRI without contrast or without and with contrast or CT without contrast of the cervical, thoracic, and/or lumbar spine can be approved in these patients when they are actively being evaluated for spinal deformity corrective surgery.

- MRI without contrast or without and with contrast or CT without contrast of the symptomatic spinal region can be approved in patients with painful neuromuscular scoliosis.

- Bone scans (one of CPT® codes: CPT® 78300, CPT® 78305, CPT® 78306, or CPT® 78315) are useful to evaluate cases of painful scoliosis and to identify tumors or infections. They are more sensitive than plain radiography.
References
## PEDSP-4: Spinal Dysraphism

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PEDSP-4.1: Introduction

- The term spinal dysraphism refers to a group of disorders characterized by incomplete or absent fusion of posterior midline structures, including neural, mesenchymal and cutaneous structures. Based on clinical classification, dysraphic are grouped into two categories: (a) open dysraphism (spina bifida aperta) which are non-skin-covered, open neural tube defects (myelomeningocele) and (b) closed or occult spinal dysraphism. The latter group includes skin-covered defects associated with a subcutaneous mass.

- A complete abdominal ultrasound (CPT® 76700) or retroperitoneal ultrasound (CPT® 76770) can be approved as an initial evaluation for patients with newly diagnosed neurogenic bladder, myelomeningocele (open spinal dysraphism), hydronephrosis, or spina bifida.

- A complete retroperitoneal ultrasound (CPT® 76770) can be approved every 6 to 12 months for follow-up/surveillance for any of the above conditions.

PEDSP-4.2: Cutaneous Lesions of the Back

- The spinal cord arises from an infolding of the skin of the back, so certain lesions of the overlying skin are associated with an underlying spinal deformity, which include:

  - high risk dimples (greater than 5 mm in diameter and more than 2.5 cm above the anus)
  - skin tags or tails
  - hairy patches
  - sinus tracts

- Screening MRI or Ultrasound is not necessary in the following clinical conditions, which are not significantly associated with spinal dysraphism:

  - “Simple dimple” which is defined as a midline soft tissue depression ≤ 2.5 cm above the anus (regardless of size or depth).
  - Deviated gluteal fold which is defined as any abnormal gluteal fold (including bifid or split gluteal cleft) without an underlying mass.
  - Coccygeal pits and pilonidal cysts at or below the level of the intergluteal fold.
  - Strawberry nevi
  - Non-specific darkened areas of skin over the sacrum (such as dermal melanosis) unless there are associated midline cutaneous abnormalities.

- Screening with advanced imaging is recommended in the following clinical conditions which are associated with an increased risk of underlying spinal dysraphism:

  - Dermal sinuses overlying the lumbar, thoracic, or cervical spine, and sacral dermal sinuses.
    - Spinal ultrasound (CPT® 76800) may be approved for initial evaluation in infants up to 6 months of age.
    - MRI of the involved spinal level without and with contrast should be approved if the ultrasound shows abnormalities other than a cutaneous dermal cleft.
    - MRI of the involved spinal level without and with contrast may be approved for initial evaluation in patients older than 6 months of age.
    - Follow-up of a normal screening imaging study is not appropriate.
The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually requested after specialist consultation.

- Subcutaneous midline masses at any level, caudal extensions, midline skin tags, abnormal patches of hair over the spine, and complex midline birthmarks above the upper sacral region:
  - Spinal ultrasound (CPT® 76800) may be approved for initial evaluation in infants up to 6 months of age, but if a mass is present it is appropriate to proceed directly to MRI of the involved spinal level without and with contrast.
  - MRI of the involved spinal level without and with contrast may be approved for initial evaluation in patients older than 6 months of age.
  - Follow-up of a normal screening imaging study is not appropriate.

- The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually requested after specialist consultation.

- Congenital anorectal abnormalities are often associated with dysraphism
  - Lumbar spine MRI without and with contrast (CPT® 72158) should be approved when these are present.
  - Follow-up of a normal screening imaging study is not appropriate.
  - The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually requested after specialist consultation.

- Café au lait spots are a marker for type 1 neurofibromatosis
  - See imaging indications in PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2)

- Toe walking, when associated with upper motor neuron signs including hyperreflexia, spasticity, and positive Babinski sign

**PEDSP-4.3: Spina Bifida Occulta or Closed Spinal Dysraphism**

These guidelines apply to adult as well as pediatric patients.

- Unless additional abnormalities described above are present, routine advanced imaging is not indicated.
  - Cutaneous lesions below the gluteal crease are often pilonidal sinuses and need no further evaluation.
  - Tracts, pits, or lesions above the gluteal fold should be evaluated further for underlying spinal pathology using MRI of the involved spinal level without contrast or with and with contrast.
**PEDSP-4.4: Open Dysraphism**

- Clinically significant dysraphism includes findings ranging from complex vertebral anomalies to meningomyelecele.
  - MRI of the involved spinal level without contrast or without and with contrast is appropriate.
  - MRI of the cervical, thoracic, and lumbar spine without contrast or without and with contrast may be approved in patients with open neural tube defects, or when ordered for preoperative planning.
  - MRI Brain or CT Head without contrast of the brain may be approved in cases with associated hydrocephalus, signs of cerebral involvement, or the presence of multiple hydromyelia (which suggests hydrocephalus).
  - MRI of the pelvis without contrast or without and with contrast may be approved if there are clinical signs of pelvic malformation or anorectal anomaly.
  - The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually requested after specialist consultation.

**References**

**PEDSP-5: Tethered Cord**

**Normal position of spinal cord**
The conus medullaris in newborns should terminate at L2-3 or higher. After 3 months of age, the conus should lie at or above the L2 level. The spinal cord normally ends in the conus medullaris, which is positioned at L1-2 in normal infants and children.

**Tethered cord**
If the conus terminates below L2-3, the cord may be tethered by an abnormal structure. Abnormalities can be found in both lumbosacral and thoracic regions and are often associated with spinal lipomas in either region. Tethering is certain when the cord terminates at or below L4 and there is other supporting evidence of tethering such as limited spinal cord pulsatility, posterior positioning in the spinal canal, thick filum terminale, intraspinous mass, or lipoma.

Clinical findings which can be associated with tethered cord include low back or leg pain, decreased or absent lower extremity reflexes, urinary urgency and incontinence.

**Imaging Studies to Evaluate Tethered Cord**
- Spinal ultrasound (CPT® 76800) may be approved for initial evaluation in infants up to 6 months of age.
  - If the conus terminates below the L2-L3 disk space in a term infant the diagnosis of tethered cord is likely. Of note, however, in premature infants, the conus medullaris may be located at the mid L3-level if there is uncertainty as to whether cord termination is low, repeat spinal ultrasound can be performed in 4 to 6 weeks, since a normal cord will have “moved” higher within the spinal canal by this time.
- MRI of the lumbar spine without or without and with contrast may be approved for initial evaluation in patients older than 6 months of age.
  - If a tethered cord is found, follow-up MRI studies to complete imaging of the entire spine (cervical, thoracic, and lumbar) without and with contrast should be approved to rule out associated spinal cord deformities such as syringomyelia. See **PEDSP-4: Spinal Dysrhythmia** for additional information.
  - For patients requiring general anesthesia to complete MRI, MRI without and with contrast of the cervical (CPT® 72156), thoracic (CPT® 72157), and lumbar (CPT® 72158) spine can be approved for initial evaluation.
  - The appropriate spinal level, modality, and contrast level of follow-up advanced imaging will depend on the nature of the underlying disease, usually requested after specialist consultation.
References
PEDSP-6: Myelopathy

- Myelopathy imaging indications in pediatric patients are similar to those for adult patients. See SP-7: Myelopathy for imaging guidelines.
### PEDSP-7: Other Congenital and Pediatric Spine Disorders

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PEDSP-7.1: Achondroplasia
The diagnosis of achondroplasia is made clinically. Achondroplasia patients are at risk for hydrocephalus as well as myelopathy from spinal stenosis with increasing age.

- A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.
- MRI without contrast of the symptomatic spinal region can be approved when new or worsening clinical symptoms suggest achondroplasia-related spinal stenosis.
- Brain MRI without contrast (CPT® 70551) or Head CT without contrast (CPT® 70450) can be approved when new or worsening clinical symptoms suggest hydrocephalus.

PEDSP-7.2: Inflammatory Spondylitis
Except as listed below, imaging considerations in pediatric and adult patients are identical for this condition, and these patients should be imaged according to SP-10.2: Inflammatory Spondylitis.

For pediatric patients with juvenile idiopathic arthritis:
- MRI without and with contrast of the involved levels is appropriate.
- An initial x-ray is not necessary prior to MRI in these patients.
- SPECT Radiopharmaceutical imaging (CPT® 78803) is indicated for evaluation of facet arthropathy in patients with ankylosing spondylitis, osteoarthritis, or rheumatoid arthritis.

PEDSP-7.3: Atlantoaxial Instability in trisomy 21 (Down Syndrome)
The diagnosis of atlantoaxial instability is a recognized complication of trisomy 21, and patients are routinely screened with lateral x-rays of the cervical spine.

- MRI of the cervical spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) can be approved in patients where the lateral cervical spine x-ray demonstrates a pre dens interval of ≥ 4.5 mm, and a neural canal width of ≤ 14 mm.
- MRI of the cervical spine without contrast (CPT® 72141) or without and with contrast (CPT® 72156) can also be approved when new or worsening clinical symptoms suggest myelopathy in a trisomy 21 patient.

PEDSP-7.4: Basilar Impression
See PEDHD-9.4: Basilar Impression for imaging guidelines.

PEDSP-7.5: Chiari Malformation
See PEDHD-9: Chiari and Skull Base Malformations
PEDSP-7.6: Klippel-Feil Anomaly (congenital fusion of cervical vertebrae)
This is generally an incidental finding. A detailed history and physical examination with thorough neurologic examination, and plain x-rays should be performed initially. Klippel-Feil can occur in conjunction with platybasia and/or Chiari malformation.

▶ Plain x-rays of the cervical spine are sufficient to establish the diagnosis. Advanced imaging is indicated if there are acute or worsening neurologic symptoms (including pain), or if multiple levels are involved.

▶ Either MRI cervical spine without contrast (CPT® 72141) or CT cervical spine without contrast (CPT® 72125) can be approved for these indications.

PEDSP-7.7: Marfan Syndrome
Marfan syndrome patients are at risk for scoliosis (See PEDSP-3.2) and dural ectasias. Dural ectasias are usually asymptomatic but can be associated with other spinal lesions.

▶ A recent (within 60 days) evaluation including a detailed history, physical examination with thorough neurologic examination and documentation of any specific radicular features, and plain radiography should be performed prior to considering advanced imaging.

▶ MRI without contrast of the symptomatic spinal region can be approved when:
  ♦ New or worsening clinical symptoms suggest a complicated dural ectasia
  ♦ The patient is under active consideration for surgery

PEDSP-7.8: Neurofibromatosis
See PEDONC-2.3: Neurofibromatosis 1 and 2 (NF1 and NF2) in the Pediatric Oncology Imaging Guidelines for screening recommendations in neurofibromatosis

See PEDPN-2: Neurofibromatosis for imaging considerations in neurofibromatosis patients with known plexiform neurofibromas

See PEDONC-8.3: Non-Rhabdomyosarcoma Soft Tissue Sarcomas for imaging in patients with neurofibromatosis and malignant peripheral nerve sheath tumors.

PEDSP-7.9: Von Hippel-Lindau Syndrome (VHL)
See: PEDONC-2.10: Von Hippel-Lindau Syndrome (VHL) in the Pediatric Oncology Imaging Guidelines for screening recommendations in VHL patients.

▶ MRI without and with contrast of the affected spinal level can be approved for patients with known spinal hemangioblastomas in the following conditions:
  ♦ Annually for asymptomatic patients with unresected spinal hemangioblastoma(s)
  ♦ Preoperative planning for resection of a hemangioblastoma
  ♦ New or worsening symptoms suggesting progression of a known hemangioblastoma
References