Laser Interstitial Thermal Therapy

Policy Number: CS148.I
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Instructions for Use

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Application

This Medical Policy does not apply to the states listed below; refer to the state-specific policy/guideline, if noted:

State	Policy/Guideline
Indiana	None
Kentucky	Laser Interstitial Thermal Therapy (for Kentucky Only)
Louisiana	Laser Interstitial Thermal Therapy (for Louisiana Only)
Nebraska	Laser Interstitial Thermal Therapy (for Nebraska Only)
New Jersey	Laser Interstitial Thermal Therapy (for New Jersey Only)
Pennsylvania	Laser Interstitial Thermal Therapy (for Pennsylvania Only)
Tennessee	Laser Interstitial Thermal Therapy (for Tennessee Only)

Coverage Rationale

Laser interstitial thermal therapy is unproven and not medically necessary for treating any condition or diagnosis due to insufficient evidence of efficacy.

Applicable Codes

The following list(s) of procedure and/or diagnosis codes is provided for reference purposes only and may not be all inclusive. Listing of a code in this policy does not imply that the service described by the code is a covered or non-covered health service. Benefit coverage for health services is determined by federal, state, or contractual requirements and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claim payment. Other Policies and Guidelines may apply.

CPT Code	Description
19499	Unlisted procedure, breast

CPT Code	Description
20999	Unlisted procedure, musculoskeletal system, general
27599	Unlisted procedure, femur or knee
32999	Unlisted procedure, lungs and pleura
53899	Unlisted procedure, urinary system
55899	Unlisted procedure, male genital system
61736	Laser interstitial thermal therapy (LITT) of lesion, intracranial, including burr hole(s), with magnetic resonance imaging guidance, when performed; single trajectory for 1 simple lesion
61737	Laser interstitial thermal therapy (LITT) of lesion, intracranial, including burr hole(s), with magnetic resonance imaging guidance, when performed; multiple trajectories for multiple or complex lesion(s)
64999	Unlisted procedure, nervous system

Description of Services

Laser interstitial thermal therapy/thermotherapy (LITT) is an emerging treatment modality. The LITT treatment produces focal thermal ablation leading to lesion cytoreduction through tissue coagulation, necrosis, and cellular apoptosis. Historically, laser ablation techniques have been limited by an inability to assess ablation progress and parenchymal temperature during the course of treatment. Advances in magnetic resonance imaging (MRI) capabilities have overcome these limitations, leading to the use of this technology for select conditions.

Clinical Evidence

The evidence for laser interstitial thermal therapy/thermotherapy (LITT) appears to have some promise for the future, however, overall, the evidence is lacking, low quality and needs additional robust, randomized trials with long-term results.

The National Comprehensive Cancer Network (NCCN) Practice Guidelines do not address laser thermal therapy or laser ablation as treatment in tumors of the prostate, central nervous system, bone, lung or breast, or as treatment for radiation necrosis (2021).

Bone Tumors

Spinal LITT (sLITT) appears to be a promising modality for treatment of epidural metastatic spine disease in patients who are poor candidates for larger-scale procedures, and it works well with spinal stereotactic radiosurgery (SRS) to maximize local control and palliate pain. Utilizing intraoperative MRI guidance, sLITT was performed on 19 individuals with a variety of tumor types where metastatic vertebral disease was identified. The degree of epidural infiltration ranged from the tumor extending to the epidural space without displacement of the dura to epidural compression displacing the spinal cord with complete obliteration of the cerebrospinal fluid space. Median number of vertebral segments treated was 1 (range 1–3), with 80% of the involvement being the thoracic spine. Median hospital length of stay (LOS) was 2 days (range 1–14). One participant experienced post procedure transient L1 monoparesis, which resolved after 8 weeks. A second sLITT procedure was required at 16- and 33-weeks post procedure for two patients. One patient required salvage surgical intervention because of delayed progressive neurologic deterioration, and one patient developed a pathologic compression fracture 2 months post treatment requiring percutaneous stabilization. Mean preoperative Visual Analog Scale scores of 4.72 improved to 2.56 at 1 month and remained improved at 3 months postoperatively. Thirteen participants decreased their use of pain medication, whereas three increased medication usage (although only one of the three was a result of back pain). Preoperative mean quality of life index of 0.67, was unchanged at 1 month postoperatively, and improved to 0.83 at 3 months. MRI at 2 months post procedure showed a mean reduction in epidural tumor thickness of 22%, and the numeric scale of graded epidural compression showed an improvement from a preoperative mean of 3.8 to 2.9. The authors stated that the role of sLITT in the management of spinal metastasis needs to be compared with conventional surgery in a prospective randomized controlled trial (RCT), and that this initial evidence on the potential applicability of the technique will lay the foundation to pursue such a study (Thomas et al., 2017).

Brain Tumors

A meta-analysis was completed by de Franca et al. (2020) which compared current stereotactic radiosurgery (SRS) therapy with LITT in brain tumors. A total of twenty-five articles were included. The total number of patients was significantly higher for the SRS studies compared with only 39 patients for LITT; despite this variable, the authors felt the studies were matched. The median overall survival (MOS) for patients receiving LITT for brain metastasis was 12.8% versus only 9.8% for SRS; the MOS for patients receiving LITT or SRS for recurrent glioblastoma multiforme (rGBM) were both at 10.5%. While the data appears to be positive for LITT, the authors could not conclude if LITT was an optimal alternative treatment choice for brain tumors when compared to SRS; further randomized trials are warranted to ascertain if LITT can play an appropriate role. Limitations included inability to validate if patients or clinicians were blinded, high heterogeneity between SRS studies and only moderate heterogeneity in serious adverse events for LITT patients and lack of consistency of data amongst articles.

Based on a Hayes systematic review, the quality of evidence is very low for the use of LITT for treatment of glioblastoma (GBM) in adults. No comparative studies were identified and none of the studies presented evidence regarding the impact of LITT on quality of life (QOL). Additional studies comparing LITT with standard treatment measures are needed (Hayes 2019).

Kuo and colleagues (2019) retrospectively reviewed their experience with magnetic resonance-guided laser interstitial thermal therapy (MRgLITT) as treatment for pediatric patients with intracranial lesions (mainly low-grade tumors) in eloquent cortex, evaluating neurologic function and clinical outcomes. Five patients received MRgLITT, one experienced complications secondary to treatment, but none were discharged with a neurologic deficit. The researchers concluded that MRgLITT provides a less invasive and potentially effective option for treatment in the management of pediatric epilepsy and tumors. A significantly larger study is required before attempting to draw any generalizable conclusions. Similarly, although all patients in this study recovered well without complication, long-term observation with more cases are necessary to adequately study MRgLITT as it becomes a more common approach for neurosurgical indications in both pediatric and adult populations.

Hong et al. (2019) conducted a retrospective review from a single institution comparing outcomes after LITT versus craniotomy in patients with recurrent lesions who were previously treated with SRS for brain metastases. Of 75 patients, 42 had recurrent tumor (56%) and 33 (44%) had RN. Of patients with tumor, 26 underwent craniotomy and 16 had LITT. For radiation necrosis (RN), 15 had craniotomy and 18 received LITT. There was no significant difference between LITT and craniotomy relative to neurological outcomes or in a patient's ability to taper off steroids. PFS and OS were similar for LITT versus craniotomy, respectively: PFS at 1-year = 72.2% versus 61.1%, PFS at 2-years = 60% versus 61.1%, OS at 1-year = 69% versus 69.3%, OS at 2-years = 56.6% versus 49.5%. Craniotomy resulted in higher rates of preoperative deficit improvement than LITT. On subgroup analysis, the single factor most significantly associated with OS and PFS was pathology of the lesion. About 40% of tumor lesions needed postoperative salvage with radiation after both craniotomy and LITT. The researchers concluded that LITT was as efficacious as craniotomy in achieving local control of recurrent irradiated brain metastases and facilitating steroid taper, regardless of pathology. Craniotomy appears to be more advantageous for providing symptom relief in those with preoperative symptoms.

Eichberg et al. (2018) performed a pilot study on four individuals with recurrent cerebellar metastases who were treated with MRgLITT. The extrapolated average time for the lesion to shrink to below the initial size was 294.5 days. There was a trend toward a decrease in average edema volume from the preoperative MRI of 17.8 cm to final postoperative follow-up MRI of 3.4 cm. No postoperative hydrocephalus or complications occurred. The authors concluded that MRgLITT appears to be a safe and promising treatment for recurrent posterior fossa metastatic lesions up to 7.2 cm. Further RCTs are needed to further study the long-term efficacy of this therapy.

Kamath et al. (2017, included in the Hayes report cited above) conducted a retrospective case series of patients with challenging diagnoses who received interstitial laser ablation (ILA). The focus of the study was to evaluate safety, efficacy, and preliminary outcomes within a diverse and large series of ILA treatments, as well as report useful technical details and operative trends. A total of 133 intracranial lesions in 120 patients were treated with ILA, including GBM, other gliomas, metastases, epilepsy foci, and RN. The rate of complications or unexpected readmission was 6%, and the mortality rate was 2.2%. With high-grade tumors, tumor volumes > 3 cm in diameter trended toward a higher rate of complication ($p = 0.056$). Median progression-free survival (PFS) and overall survival (OS) for recurrent GBM were 7.4 and 11.6 months, respectively. As a frontline treatment for newly diagnosed GBM, median PFS and OS were 5.9 and 11.4 months, respectively. For metastases, median PFS was not yet reached, and OS was 17.2 months. The authors concluded that ILA is a safe and efficacious treatment for a variety of intracranial pathologies, can be tailored to treat difficult-to-access lesions, and may offer a novel alternative to open craniotomy in properly selected patients.

Tovar-Spinoza and Choi published the preliminary results of the first series of pediatric brain tumors treated with MRgLITT at a single pediatric center. Outcomes were evaluated retrospectively for 11 patients with 12 tumors of six different types, all treated with the Visualase thermal laser system (Medtronic) between February 2012 and August 2014. Medical records, radiological findings, surgical data, complications, and results of tumor volumetric analyses were reviewed. A single laser and multiple overlapping ablations were used for all procedures. The mean hospital LOS was 3.25 days, and the mean follow-up time was 24.5 months. Tumor volume in all patients decreased in the first 3 months after surgery and continued to decrease by the 4- to 6-month follow-up. Two patients experienced transient post-ablation complications. The authors concluded that MRgLITT is an effective first- or second-line treatment for select pediatric brain tumors. Larger multi-institutional clinical trials are necessary to evaluate its use for different types of lesions to further standardize practices (2016).

Ivan et al. (2016) conducted a meta-analysis on the use of MRgLITT in the treatment of newly diagnosed HGGs. Eighty-five articles were identified plus one that was pending publication. Four articles were accounted for in this review in which 25 adults underwent LITT treatments. On average, 83% of the pre-treatment lesion volume was ablated. The average tumor volume treated was 16.5 cm., and the mean follow-up time was 7.6 months. Median overall survival was 14.2 months (range 0.1-23 months). The median progression-free survival was 5.1 months (range 2.4-23 months); however, these data are limited by the relatively short follow-up of the patients reviewed and small sample size. Only one participant suffered a major perioperative complication (central nervous system infection). The researchers concluded that MRgLITT is a safe and promising technology for the treatment of small, yet difficult-to-treat newly diagnosed HGG, and that future randomized studies are needed to evaluate the role of this technology. The review is limited by lack of comparison group.

Lee et al. (2016) conducted a review of the peer-reviewed literature evaluating the role of LITT in the treatment of recurrent HGGs for which current treatments have limited efficacy, and to discuss the possible role of LITT in the disruption of the blood-brain barrier to increase delivery of chemotherapy locoregionally. Six of 17 articles were thought to be most appropriate for this review. Sixty-four lesions in 63 patients with recurrent HGGs were treated with LITT. Frontal (n = 34), temporal (n = 14), and parietal (n = 16) were the most common locations. Permanent neurological deficits, vascular injuries, and wound infection were seen in 7, 2, and 1 patients, respectively. Ablation coverage of the lesions ranged from 78% to 100%. The authors concluded that although experience using LITT for recurrent HGGs is growing, current evidence is insufficient to offer a recommendation about its role in the treatment paradigm for recurrent HGGs.

Barnett et al. conducted a systematic review and meta-analysis of the peer-reviewed literature to identify studies which examined extent of resection (EOR) or extent of ablation (EOA) and major complications (defined as neurocognitive or functional complications which last > 3 months post-surgery) associated with either brain LITT or open craniotomy in HGGs in or near areas of eloquence. Eight studies on brain LITT (n = 79) and 12 craniotomy studies (n = 1,036) were identified which examined either/both EOR/EOA and complications. Meta-analysis demonstrated an EOA/EOR of 85.4 ±10.6% with brain LITT versus 77.0 ±40% with craniotomy (mean difference 8%) and major complications of 5.7% and 13.8% for LITT and craniotomy, respectively. The authors concluded that in patients presenting with HGGs in or near areas of eloquence, early results demonstrate that brain LITT may be a viable surgical alternative (2016).

Evidence-based clinical practice guidelines endorsed by the Agency for Healthcare Research and Quality (AHRQ) do not address LITT in the management of patients with diffuse low-grade glioma (Ryken et al., 2015) or progressive GBM (Olson et al., 2014).

Clinical Practice Guidelines

American Society for Radiation Oncology (ASTRO)

ASTRO does not address LITT in an executive summary of its evidence-based clinical practice guidelines on treatment for GBM (Cabrera et al., 2016).

Congress of Neurologic Surgeons (CNS)

In its 2019 evidence-based guideline on the role of emerging and investigational therapies for treating adults with metastatic brain tumors, the CNS states there is insufficient evidence to make a recommendation regarding the routine use of LITT, aside from use as part of approved clinical trials (Elder et al).

Breast Tumors

An ECRI report found that available evidence on LITT for early-stage breast cancer consists of small case series, some of which are synthesized in systematic reviews. Findings are at high risk of bias and are of unclear significance because of low statistical precision and because most patients underwent sequential LITT and resection, so the contribution LITT made to the outcomes cannot be discerned. Prospective studies with a parallel control group are needed to validate LITT as an alternative to surgery and to compare LITT with other minimally invasive techniques (2019).

Kerbage et al. (2017) performed a systematic review to evaluate the scientific publications investigating the LITT approach in malignant and benign breast disease. Three pre-clinical studies and eight clinical studies (two including fibroadenomas and six including breast tumors) were reviewed. Although the feasibility and safety of LITT have been confirmed in a phase I trial, heterogeneous inclusion criteria and methods seem to be the main reason for LITT not being yet an extensively used treatment option. The authors concluded that further development is necessary before this technique can be used in daily practice.

Haraldsdóttir et al. (2015, included in the ECRI and Hayes reports above) reviewed the effect of immunological changes induced by interstitial laser thermotherapy (ILT) on long-term outcome of patients with breast tumors. Twenty-four patients with invasive breast tumors were treated with ILT followed by standard surgical excision. Immunohistological reactions on immunocompetent cells were performed on specimens obtained before and after ILT. Follow-up time ranged from 91-136 months. The authors concluded that ILT did not have any long-term adverse effects. The clinical impact should be examined in a larger patient population.

Clinical guidance from the National Institute for Health and Care Excellence (NICE) states current evidence on the safety and efficacy of ILT for breast cancer does not appear adequate to support the routine use of this procedure. It is suitable for use only within good-quality research studies (2012).

Clinical Practice Guidelines

American Society of Breast Surgeons (ASBrS)

The ASBrS guidelines suggest that LITT is still being investigated by the U.S. Food and Drug Administration (FDA) for breast cancer treatment and recommends additional research.

Epilepsy

Brotis et al. (2021) performed a meta-analysis on 575 patients to evaluate the efficacy of LITT for mesial temporal lobe epilepsy (MTLE). All sixteen studies were retrospective, and the ablation performed was done so with the Visualase MRI-guided laser ablation system. Of those patients receiving LITT, approximately 55% of the patients were seizure free, however the effectiveness of the procedure seemed to diminish over time thus questioning the overall effectiveness of the procedure. While it appeared LITT may provide a viable alternative for managing patients with MTLE, the authors found additional data was required to demonstrate its efficacy. Limitations included several studies of low-quality evidence, retrospective and limited follow-up; additional high-quality studies are needed to evaluate LITT in epilepsy surgery.

A Hayes health technology assessment (2020) provides investigation of LITT with MRI for the treatment of refractory temporal lobe epilepsy. Overall, a very-low-quality body of evidence is insufficient to draw conclusions regarding LITT for refractory mesial temporal lobe epilepsy (MTLE). The evidence primarily reflects individual study limitations such as observational rather than experimental design, a lack of comparison with control groups or baseline measures, loss to follow-up, and small sample size.

A systematic review and analysis conducted by Kerezoudis et al. (2020) examined seizure freedom for patients who received LITT for temporal lobe epilepsy (TLE). A total of thirteen studies were analyzed and seizure freedom was measured with the Engel Surgical Outcome Scale. While the findings illustrated a 58% seizure freedom rate for patients with TLE, the complication rate was 17% and it was concluded that the current evidence was insufficient to support a significant correlation between seizure freedom and LITT. Limitations included retrospective design type, small sample sizes and lack of long-term follow-up.

A 2019 ECRI reports shows LITT appears to be safe and effective as stereotactic radiosurgery for patients with epilepsy however low-quality evidence points to LITT only given up to two years of freedom from seizures in approximately 60% of the patients with refractory epilepsy; additional larger studies with relevant comparison groups are warranted.

Hoppe and Helmstaedter conducted a systematic review on the use of LITT in pediatric epilepsy, retrieving 25 uncontrolled case series reports that included a total of 179 pediatric patients as well as seven review papers that specifically referred to this surgical approach. Hypothalamic hamartoma (HH) represented the most frequent indication (64.2%), with therapeutic evidence for other more frequent etiologies underlying severe focal childhood epilepsies (e.g., focal cortical dysplasia, MTS) considered to be "scarce" (n < 20). For the published cases, the rate of severe complications was 3.4% and the overall complication rate was 23.5%. The seizure freedom rate (Engel class 1) was 57.5% (including patients with early follow-up and repeat thermoablation). None of the studies included the systematic evaluation of cognitive outcomes. The researchers found that, overall, the published evidence does not yet allow a scientific or clinical judgement on the utility of LITT for epilepsy surgery in the pediatric population. While it is a surgical option with regard to deep brain lesions (e.g., HH), any therapeutic superiority of LITT over open resection in cases that are equally accessible for both approaches remains to be demonstrated. Controlled, non-randomized outcome studies are recommended (2020).

Grewal et al. (2019) performed a systematic review and meta-analysis comparing MRgLITT and SRS in cases of medically intractable temporal lobe epilepsy (TLE). A total of 19 studies were included in the final analysis. Of those studies, nine were on MRgLITT (n = 250), and 10 were on SRS (n = 165). They identified that the overall seizure freedom rate was comparable between the two procedures (MRgLITT 50% vs. SRS 42%). Similarly, among patients with lesional pathologic conditions only, the seizure freedom rate between MRgLITT and SRS was also comparable at 62% and 50%, respectively. Compared with SRS, MRgLITT was associated with lower complication rates but similar reoperation rates. The authors concluded that outcomes and complications were similar between MRgLITT and SRS. Limitations of this review include a low level of evidence, as well as varying follow-up periods between the two procedures. More large-scale comparative studies are required to validate findings.

Tao et al. (2018, included in the Hayes report cited above) assessed outcomes of a combination therapy using both invasive electroencephalography–guided and stereotactic MRgLITT in the treatment of 19 individuals with drug-resistant MTLE. In all, 52% achieved freedom from disabling seizures at mean follow-up of 24 months. Further differentiating those with and without MTS, 73% and 30% of patients, respectively, were seizure-free at 2 years. The authors concluded that this technology can be a safe and effective alternative to traditional surgical approaches, particularly in patients with MTS, but larger-scale studies are likely needed.

A systematic review and analysis by Lagman et al. (2017) examined 2 commercially available MRgLITT systems used in neurosurgery: the Visualase® thermal therapy and NeuroBlate® Systems. Data extraction was performed in a blinded fashion. Twenty-two articles reflecting 223 patients were included in the analysis. The majority of patients (n = 154/69%) received treatment with Visualase with epilepsy being the most common indication (n = 8 studies/47%). Brain mass was the most common indication for NeuroBlate (n = 3 studies/60%). There were no significant differences, except in age, wherein the NeuroBlate group was nearly twice as old as the Visualase group (p < 0.001). Frame, total complications, and LOS were non-significant when adjusted for age and number of patients. Several limitations were cited in this analysis, including but not limited to inherent bias in selection and reporting and recognized issues of retrospective studies. The authors concluded that MRgLITT procedures have demonstrated effectiveness in the treatment of a variety of epilepsy etiologies and tumor pathologies. While laser neurosurgery has evolved over recent decades and clinical indications are currently being defined, long-term outcomes have yet to be fully elucidated. The findings are however limited by the lack of comparison group in the reviewed studies.

Jermakowicz and colleagues (2017, included in the Hayes report cited above) conducted a prospective review of all patients undergoing LITT for treatment of mesial TLE (MTLE) with at least a 12-month follow-up at a single institution. The goal of the study was to identify features of ablations and trajectories that correlate with optimal seizure control and minimize the risk of neurocognitive deficits, Standard preoperative and postoperative evaluations, including contrast-enhanced MRI and neuropsychological testing, were performed in all patients. Laser trajectory and ablation volumes were computed both by manual tracing of mesiotemporal structures and by non-rigid registration of ablation cavities to a common reference system based on 7T MRI data. Among 23 patients with at least 1-year follow-up, 15 (65%) were free of disabling seizures since the time of their surgery. Sparing of the mesial hippocampal head was significantly correlated with persistent disabling seizures (p = 0.01). A lateral trajectory through the hippocampus showed a trend for poor seizure outcome (p = 0.08). A comparison of baseline and postoperative neurocognitive testing revealed areas of both improvement and worsening, which were not associated with ablation volume or trajectory. The researchers determined that at 1 year, LITT appeared to be a safe and effective tool for the treatment of MTLE, although a longer follow-up period is necessary to confirm these observations. Better understanding of the impact of ablation volume and location could potentially fine-tune this technique to improve seizure

freedom rates and associated neurologic and cognitive changes. The study is limited by lack of information on patients who did not have a 12-month follow-up, which could be a significant source of bias, as well as lack of comparison group.

Kang and Sperling (2018) conducted a review of laser interstitial thermal ablation and its use in treating drug-resistant epilepsy. They stated that the procedure is highly selective and targets small lesions responsible for seizures, is far less invasive than open surgery, requires a shorter hospitalization, results in less pain and allows for a rapid resumption of normal activities. Initial results in MTLE are promising, with perhaps 50% of patients becoming seizure-free after the procedure. Neuropsychological deficits appear to be reduced because of the smaller volume of ablated cortex in contrast to large resections. The authors concluded that more research with larger study groups is needed to establish optimal targeting of structures for ablation, surgical selection criteria, efficacy, and adverse effect rates.

McCracken et al. (2016, included in the Lagman et al. 2017 systematic review cited above) conducted a small prospective case series of five consecutive patients using real-time magnetic resonance thermography (MRT)-guided stereotactic laser ablation (SLA) to treat medically refractory epilepsy secondary to cerebral cavernous malformations (CCMs). Each underwent stereotactic placement of a saline-cooled cannula containing an optical fiber to deliver 980-nm diode laser energy via twist drill craniotomy; MRI was used to evaluate targeting prior to ablation, as well as evaluation of targeting and near real-time feedback regarding extent of tissue thermocoagulation. Remote imaging (6 to 21 months post-ablation) was obtained in all patients, revealing no evidence of acute hemorrhage following fiber placement and confirming the desired extent of ablation. No adverse effects or neurologic deficits were identified. Four of five patients achieved freedom from disabling seizures after SLA alone (Engel class 1 outcome), with follow-up ranging 12 to 28 months. The authors concluded that minimally invasive MRT-guided SLA of epileptogenic CCM is a potentially safe and effective alternative to open resection. Additional studies and longer follow up are needed. The findings are limited by lack of comparison group and small sample size.

In a review of selected cases reported in the published literature, Waseem et al. (2017, included in the Hayes report cited above) evaluated a number of outcome measures, including seizure freedom, neuropsychological performance, complications, and other considerations on 38 patients presenting exclusively with MTLE and no other lesions (including neoplasia), who underwent MRgLITT. Eighteen (53%) had an Engel class I outcome, 10 patients had repeat procedures/operations, and 12 post-procedural complications occurred. Follow-up time ranged from 6 to 38.5 months. There was a decreased length of procedure time, hospitalization time, and analgesic requirement when compared to open surgery. In cases of well-localized MTLE, MRgLITT may offer similar (albeit slightly lower) rates of seizure freedom versus traditional surgery. The authors concluded that MRgLITT may be an alternative treatment option for high-risk surgical patients and, more importantly, could increase referrals for surgery in patients with medically refractory MTLE. However, data is limited, and long-term outcomes have not been evaluated. Further investigation is required to understand the potential of this minimally invasive technique for MTLE. This review is limited by lack of systematic method to select the literature cited and lack of concurrent comparison group.

Kang et al. (2016, included in the Hayes report cited above) prospectively tracked seizure outcome from a single center study which included 20 patients with drug-resistant MTLE who underwent MRgLITT from December 2011 to December 2014. Surgical outcome was assessed at 6 months, 1 year, 2 years, and at the most recent visit. Volume-based analysis of ablated mesial temporal structures was conducted in 17 patients with MTS and results were compared between the seizure-free and not seizure-free groups. Following LITT, proportions of patients who were free of seizures impairing consciousness (including those with auras only) are as follows: 8 of 15 patients after 6 months (53%), four of 11 patients after 1 year (36.4%), and three of five patients at 2-year follow up (60%). Median follow-up was 13.4 months post- LITT. Seizure outcome after LITT suggests an “all or none” response. Four patients had anterior temporal lobectomy after LITT; three are seizure-free. There were no differences in total ablated volume of the amygdala hippocampus complex or individual volumes of hippocampus, amygdala, entorhinal cortex, parahippocampal gyrus, and fusiform gyrus between seizure-free and non-seizure-free patients. Contextual verbal memory performance was preserved after LITT, although decline in non-contextual memory task scores were noted. The authors concluded that stereotactic MRgLITT is a safe alternative to anterior temporal lobectomy in patients with medically intractable MTLE. Individualized assessment is warranted to determine whether the reduced odds of seizure freedom are worth the reduction in risk, discomfort, and recovery time. Larger prospective studies are needed to confirm preliminary findings, and to define optimal ablation volume and ideal structures for ablation. Limitations to this review include a prospective review in a single center, lack of comparison group, as well as small sample size.

To report the feasibility, safety, and clinical outcomes of an exploratory study of MRgLITT as a minimally invasive surgical procedure for the ablation of epileptogenic foci in children with drug-resistant, lesional epilepsy, Lewis et al. (2015, included in the Hayes report and the Lagman et al. 2017 systematic review cited above) performed a retrospective chart review of all

MRgLITT procedures at a single tertiary care center. All procedures were performed using a U.S. FDA-cleared surgical laser ablation system (Visualase Thermal Therapy System). Predefined clinical and surgical variables were extracted from archived medical records. From May 2011 to January 2014, 17 patients underwent 19 MRgLITT procedures. Mean age at seizure onset was 7.1 years, and mean age at surgery was 15.3 years. Surgical substrates were mixed but mainly composed of focal cortical dysplasia (n = 11). Complications occurred in four patients. Average postoperative hospital LOS was 1.56 days. Mean follow-up was 16.1 months (n = 16; range 3.5-35.9 months). Engel class I outcome was achieved in seven patients (7/17; 41%), Engel class II in one patient (1/17; 6%), Engel class III in three patients (3/17; 18%), and Engel class IV in six patients (6/17; 35%). Three patients (3/8; 38%) with class I and II outcomes and five patients (5/9; 56%) with class III and IV outcomes had at least one prior resection. Fisher's test was not statistically significant for the association between Engel class outcome and previous resection. The authors concluded that the study provided descriptive results regarding the use of MRgLITT in a mixed population of pediatric, lesional, drug-resistant epilepsy cases. Further multicenter, prospective studies are required to delineate optimal candidates for MRgLITT, and larger cohorts are needed to more accurately define outcome and complication rates.

Clinical Practice Guidelines

American Association of Neurological Surgeons (AANS)

The AANS has not taken a position on LITT for treating patients with refractory epilepsy.

American Academy of Neurology (AAN)

The AAN policies and guidelines do not address LITT for treating patients with epilepsy.

Prostate Tumors

A systematic review & meta-analysis by Valerio et al. (2017) summarized the evidence regarding sources of energy employed in focal therapy for treatment of prostate tumor. Thirty-seven articles reporting on 3,230 patients undergoing focal therapy were selected, with one of the focal therapies being LITT. Four prospective Stage 1 to 2a studies evaluating LITT in 50 patients have been reported in literature. One study only included men with low-risk disease, whereas the other studies also included Gleason ≤ 4 + 3, although risk stratification was not clearly reported. The median age was 63.5 yrs.; median PSA was 5.4 ng/ml; median follow-up was 4.5 months with all series including mandatory sampling after treatment. In the Stage 1 study, participants underwent radical prostatectomy, whereas in the other three studies participants underwent MR-transrectal ultrasound (TRUS) standard and/or targeted biopsy. Overall, the presence of significant and insignificant tumor was 4.8% and 22.2%, respectively. The probability of transition to secondary local treatment was 0%; overall and disease-specific survival, pad-free continence and potency preservation were 100% and 100%, respectively. No adverse events were reported in any study. The authors concluded that focal therapy seems safe and appears to offer good preservation of genitourinary function. Tumor control in studies with intention to treat is encouraging, although this needs to be verified against standard of care in high quality comparative effectiveness trials.

Eggener et al. (2016) conducted a phase II study evaluating MRI-guided focal laser ablation in 27 men with stage T1c-T2a prostate cancer. Inclusion criteria included prostate specific antigen (PSA) < 15 ng/ml or PSA density < 0.15 ng/ml3, Gleason score of 7 or less in 25% or less of biopsies, and MRI with 1 or 2 lesions concordant with biopsy-detected cancer. At 3 months, all patients underwent MRI with biopsy of ablation zone(s). At 12 months, all underwent MRI and systematic biopsy. I-PSS (International Prostate Symptom Score) and SHIM (Sexual Health Inventory for Men) scores were collected pre-treatment, and at 1, 3 and 12 months. The primary end point was no cancer on the 3-month ablation zone biopsy. Secondary end points were safety, 12-month biopsy, and urinary and sexual function. At 3 months 26 patients (96%) had no evidence of cancer on MRI-guided biopsy of the ablation zone. No significant I-PSS changes were observed. SHIM was lower at 1 month ($p = 0.03$), marginally lower at 3 months ($p = 0.05$) and without a significant difference at 12 months ($p = 0.38$). At 12-month biopsy, cancer was identified in 10 patients (37%) (inside the ablation zone(s) in three cases (11%) and outside the ablation zone(s) in 8 (30%)). Cancer was identified both in and outside the ablation zone in one participant. The authors concluded that in select individuals with localized prostate cancer and visible MRI lesions, focal laser ablation has an acceptable morbidity profile and is associated with encouraging short-term oncologic outcomes. Significantly longer follow-up is mandatory to fully assess this treatment. Furthermore, the study was limited by lack of comparison group.

In a 2020 comparative effectiveness review for therapies for clinically localized prostate cancer, the Agency for Healthcare Research and Quality (AHRQ) found insufficient evidence to address laser ablation for prostate cancer.

There are multiple clinical trials studying LITT for various conditions which are in different phases of activity. Additional information is available at www.clinicaltrials.gov. (Accessed May 13, 2021)

Clinical Practice Guidelines

American Society of Clinical Oncology (ASCO)

ASCO clinical guidelines do not address laser thermal therapy as treatment in tumors of the genitourinary system, head and neck, breast, bone, or in neurooncology.

U.S. Food and Drug Administration (FDA)

This section is to be used for informational purposes only. FDA approval alone is not a basis for coverage.

LITT is a procedure and, therefore, not subject to FDA regulation.

The NeuroBlate® System (Monteris Medical, MN) enables MRI-guided neurosurgical ablation, monitoring 3-D and providing real time imaging to support a surgeon's clinical decision matrix. The device was FDA approved on October 26, 2016. Additional information is available at: http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfpmn/pmn.cfm?ID=K162762. (Accessed May 14, 2021)

The Visualase® Thermal Therapy System (Medtronic, MN) provides advanced MRI-guided laser ablation technology for thermal ablation markets, including neurosurgery. Delivery of laser energy results in rising temperatures in the target area, destroying the unwanted tissue. The device was FDA approved on September 10, 2008. Additional information is available at: http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMN/pmn.cfm?ID=K081656. (Accessed May 14, 2021)

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Policy History/Revision Information

Date	Summary of Changes
06/01/2022	Application *Mississippi and North Carolina* • Updated language to indicate this Medical Policy applies to the states of Mississippi and North Carolina (retired state-specific policy versions) Supporting Information • Archived previous policy version CS148.H

Instructions for Use

This Medical Policy provides assistance in interpreting UnitedHealthcare standard benefit plans. When deciding coverage, the federal, state, or contractual requirements for benefit plan coverage must be referenced as the terms of the federal, state, or contractual requirements for benefit plan coverage may differ from the standard benefit plan. In the event of a conflict, the federal, state, or contractual requirements for benefit plan coverage govern. Before using this policy, please check the federal,

state, or contractual requirements for benefit plan coverage. UnitedHealthcare reserves the right to modify its Policies and Guidelines as necessary. This Medical Policy is provided for informational purposes. It does not constitute medical advice.

UnitedHealthcare may also use tools developed by third parties, such as the InterQual® criteria, to assist us in administering health benefits. The UnitedHealthcare Medical Policies are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.