Medical Coverage Policy

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Laser Interstitial Thermal Therapy

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benefit plans. Coverage Policies are not recommendations for treatment and should never be used as treatment guidelines. In certain markets, delegated vendor guidelines may be used to support medical necessity and other coverage determinations.

Overview

This Coverage Policy (CP) addresses brain laser interstitial thermal therapy, also known as magnetic resonance-guided laser interstitial thermal therapy.

For interstitial laser coagulation of the prostate, see CP 0159 Benign Prostatic Hyperplasia (BPH) Treatments.

Abbreviations:

- **Laser Interstitial Thermal Therapy:** LITT
- **Magnetic Resonance-Guided Laser Interstitial Thermal Therapy:** MRgLITT

Coverage Policy

Epilepsy

LITT is considered **medically necessary** in the treatment of refractory epilepsy when **ALL** of the following criteria are met:

1. there is documentation of disabling seizures despite use of two or more antiepileptic drug regimens (i.e., medically refractory epilepsy)
2. there is a well-defined epileptogenic focus in the temporal lobe or hypothalamus accessible by LITT
3. the treatment plan to use LITT has been agreed upon by a multidisciplinary team of physicians to include a neurosurgeon trained in LITT and, after considering all relevant possible treatment approaches, LITT is determined to be the best treatment option

Malignant Brain Neoplasms

LITT is considered **medically necessary** in the treatment of newly diagnosed (i.e., primary) glioblastoma or other glioma, any recurrent primary brain neoplasm, or metastatic malignant brain neoplasms when **ALL** of the following criteria are met:

1. the neoplasm measures up to 3 centimeters (cm) in diameter
2. the individual is considered a poor surgical candidate for resection via craniotomy
3. the treatment plan to use LITT has been agreed upon by a multidisciplinary team of physicians to include a neurosurgeon trained in LITT and, after considering all relevant possible treatment approaches, LITT is determined to be the best treatment option

Radiation Necrosis

LITT is considered **medically necessary** in the treatment of radiation necrosis in the brain when **ALL** of the following criteria are met:

1. the radiation necrosis measures up to 3 cm in diameter
2. the individual is considered a poor surgical candidate for resection via craniotomy
3. the treatment plan to use LITT has been agreed upon by a multidisciplinary team of physicians to include a neurosurgeon trained in LITT and, after considering all relevant possible treatment approaches, LITT is determined to be the best treatment option

Other

LITT is considered **not medically necessary** for **ALL** other indications.

Coding Information

Notes:

1. This list of codes may not be all-inclusive since the American Medical Association (AMA) and Centers for Medicare & Medicaid Services (CMS) code updates may occur more frequently than policy updates.
2. Deleted codes and codes which are not effective at the time the service is rendered may not be eligible for reimbursement.

Considered Medically Necessary when criteria in the applicable policy statements listed above are met:

CPT®* Codes	Description
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)

Background and Supporting Information

Laser interstitial thermal therapy uses thermal energy to induce cell death by damaging DNA and causing protein denaturation. LITT is also referred to as magnetic resonance-guided laser interstitial thermal therapy, laser induced thermal therapy/thermotherapy, interstitial laser photocoagulation/coagulation, interstitial laser ablation, MRI-guided laser surgery, and MRI-guided percutaneous laser ablation. LITT involves the creation of a small cranial bur hole, through which a thin laser fiber is introduced into the brain until the tip reaches the targeted location. In real time, laser-induced temperature change is monitored by MR thermometry and correlated with predicted cell death by computer models.

The goal of LITT is to achieve selective thermal injury of pathological tissue while maintaining a sharp thermal border between the tumor and normal brain tissues. LITT is also thought to work adjunctively with chemotherapy to allow better penetration of chemotherapy agents across the blood brain barrier (Pandey, et al., 2024). Alternate procedures that may be performed depend on the diagnosis/location. For example, alternate treatments for brain tumors may include, but are not limited to, craniotomy or stereotactic radiosurgery (SRS). Alternate treatment examples for intractable epilepsy may include anterior temporal lobectomy, considered the gold standard surgical treatment of drug-resistant epilepsy, or vagus nerve stimulation.

The clinical indications for LITT are currently being defined. Ablation of deep-seated, eloquently situated primary and metastatic brain tumors, epileptogenic foci, and radiation necrosis are the majority of indications described in the literature. The use of MR-guided LITT for treatment of epilepsy and brain tumors continues to expand in the US. Although most studies are small,

retrospective case series, numerous published studies and meta-analysis in the peer-reviewed literature demonstrate the safety and efficacy of MR-guided LITT in the treatment of:

- refractory epilepsy
- newly diagnosed glioblastoma or glioma
- recurrent metastatic malignant brain neoplasms
- radiation necrosis in the brain

Proposed benefits include providing a minimally invasive option for 1) treating surgically challenging tumors in locations that would otherwise have represented an intrinsic comorbidity by the approach itself, and 2) those with comorbidities that preclude open surgical procedures because of potentially high risks of morbidity and mortality. Surgical site infections, bleeding, anesthesia-related risks, and inpatient length of stay are considered lower in LITT than those in open craniotomy. Specific risks of LITT include damage to the cerebral vasculature by the laser probe which could result in hemorrhage or pseudoaneurysm that may require subsequent open or endovascular surgery. Although MR thermometry allows precise control of the ablated tissue, the risk of damage to the critical cortex areas and white matter tracts by the probe or thermal energy remains. Delayed transitory neurologic deficits due to increasing brain edema usually resolve after steroid therapy. Nonspecific adverse effects include balance disorder, dizziness, and headache. Brain abscess, seizures, and wound infection have also been reported. Risks and contraindications for MRI are also applicable to LITT. Other potential risks include variable skill level/technology learning curve. LITT should be performed by a neurosurgeon who has completed procedure-specific training in the use of a Food and Drug Administration (FDA)-approved LITT ablation system and who has been granted hospital privileges to perform LITT ablation procedures. The exact rates of complications vary among patient populations and facilities. Neurosurgeons considering LITT balance the potential benefits of surgical treatment with the risks of surgery in individuals with comorbidities (Belykh, et al., 2017; Lagman, et al., 2017; Shukla, et al., 2017; Riordan, et al., 2014).

U.S. Food and Drug Administration (FDA)

- Monteris NeuroBlate System (Monteris Medical) (April 2013, K120561): The NeuroBlate System is a collection of MRI-compatible laser devices and accessories that create an MRI guided delivery of precision thermal therapy in the practice of neurosurgery. Indications for use include:
  - to ablate, necrotize, or coagulate soft tissue through interstitial irradiation or thermal therapy in medicine and surgery in the discipline of neurosurgery with 1064 nm lasers
  - for planning and monitoring thermal therapies under MRI visualization. It provides MRI based trajectory planning assistance for the stereotaxic placement of MRI compatible (conditional) NeuroBlate™ Laser Delivery Probes. It also provides real time thermographic analysis of selected MRI images
  - When interpreted by a trained physician, this System provides information that may be useful in the determination or assessment of thermal therapy. Patient management decisions should not be made solely on the basis of the NeuroBlate System analysis

- Visualase™ Thermal Therapy System (August 2007, K071328) and Visualase™ V2 MRI-Guided Laser Ablation System (May 2025, K250307) (Medtronic, Inc.): The Visualase™ systems comprise four devices: a laser energy source, a cooled laser applicator, a pump for circulating coolant through the applicator, and a computer workstation with magnetic resonance imaging (MRI) analysis software for determination and visualization of relative changes in tissue temperature during therapy. Indications for use include:
  - to necrotize or coagulate soft tissue through interstitial irradiation or thermal therapy under magnetic resonance imaging (MRI) guidance in medicine and surgery in cardiovascular thoracic surgery (excluding the heart and the vessels in the pericardial

sac), dermatology, ear-nose-throat surgery, gastroenterology, general surgery, gynecology, head and neck surgery, neurosurgery, plastic surgery, orthopedics, pulmonology, radiology, and urology, for wavelengths 800nm through 1064nm
  - when therapy is performed under MRI guidance, and when data from compatible MRI sequences is available, the Visualase™ system can process images to determine relative changes in tissue temperature during therapy. The image data may be manipulated and viewed in a number of different ways and the values of data at certain selected points may be monitored and/or displayed over time.

- ClearPoint Prism™ Neuro Laser Therapy System: According to a ClearPoint Neuro Press release, ClearPoint Neuro, Inc. announced Sep 22, 2022 that its Swedish partner, Clinical Laserthermia Systems (CLS), has received 510(k) clearance for its laser which they plan to commercialize as the ClearPoint Prism™ Neuro Laser Therapy System. Indications for use include:
  - to necrotize or coagulate soft tissue through interstitial irradiation or thermal therapy under 3.0T magnetic resonance imaging (MRI) guidance. Specifically, under magnetic resonance imaging (MRI) guidance in medicine and surgery in neurosurgery, for a wavelength of 1064nm. When therapy is performed under MRI guidance, and when data from compatible MRI sequences is available, the ClearPoint Prism Neuro Laser Therapy System can process images using proton resonance frequency (PRF) shift analysis and image subtraction to relate changes in complex phase angle back to relative changes in tissue temperature during therapy. The image data may be manipulated and viewed in a number of different ways, and the values of data at certain selected points may be monitored and/or displayed over time.
  - The ClearPoint Prism Neuro Laser Therapy System is compatible with the following 3.0T MR scanner systems: Siemens MRI Magnetom and GE MRI Signa. When interpreted by a trained physician, this device provides information that may be useful in the determination or assessment of thermal therapy. Patient management decisions should not be made solely on the basis of analysis using the ClearPoint Prism Neuro Laser Therapy System.
  - On April 28, 2025, ClearPoint Neuro, Inc announced that its partner, Clinical Laserthermia Systems AB (publ) (CLS), completed the submission of its 510(k) application to the FDA, expanding the indication of the ClearPoint Prism Neuro Laser Therapy System to include 1.5 T MRI guidance.

Epilepsy

Literature Review: Multiple systematic reviews and meta-analyses have been performed on research addressing the use of LITT in the treatment of epilepsy. The Laser Ablation of Abnormal Neurological Tissue Using Robotic NeuroBlate System (LAANTERN) trial has also resulted in publication of several data sets on the use of LITT in epilepsy. Overall, data demonstrates that both LITT and traditional surgical techniques achieve seizure-free outcomes, with the data slightly favoring conventional surgical approaches. Data also indicates that LITT may have an advantage over traditional surgical techniques in some neuropsychological domains. Risk versus benefit consideration is key. As Ekman, et al., states, "It is essential to interpret the efficacy of MRgLITT and temporal lobe resection within the context of each patient's unique medical situation and in collaboration with the treating medical team." (Ekman, et al. 2024). Thus, careful selection of candidates by the appropriate team of treating specialists remains paramount.

Landazuri et al. (2020) reported on 60 individuals enrolled into LAANTERN specifically for epilepsy treatment, 42 reached one year follow up. individuals with MTLE comprised 56.7% of this cohort of multiple epilepsy types. Thirty-one out of 42 individuals were considered responders (Engel I or II outcome). Engel I outcome was achieved in 27/42 individuals (64.3%). At last follow-up,

median quality of life scores increased 14.1 points with 72.4% (21/29) reporting an improvement in quality of life; however, total score change was not statistically significant. More recently, Landazuri et al. (2025) published final outcomes of individuals with mesial temporal lobe epilepsy (MTLE) enrolled in LAANTERN. This analysis of the LAANTERN data included individuals with MTLE who had 6 or more months of follow-up. Excluded were individuals with epilepsy related to a malignant lesion. The primary outcome of interest was Engel or International League Against Epilespy (ILAE) class outcome. Secondary outcomes included anti-seizure medication use, adverse events, and quality of life. Data revealed 77 individuals reached 2-year follow up, 45 (58.4%) and 44 (57.2%) of whom had Engel 1 or ILAE 1/2 outcomes, respectively. At two-year follow-up, 34.9% of individuals treated with LITT had reduced or stopped anti-seizure medication (44 of 126 individuals). There were 26 adverse events reported in 24 individuals. 3 adverse events were severe (postoperative pulmonary embolisms and postoperative bilateral middle cerebral artery infarction). However, investigators felt that these events were not specific to the LITT procedure itself, but rather inherent risks of brain surgery. One probably and one possible sudden unexpected death in epilepsy (SUDEP) was reported, with an estimated incidence of 5.48 (95% CI, 1.38-21.8) per 1000 person-years. Most quality-of-life domains showed improvement (seizure worry, medication effects, and social functioning being the most notable). Limitations of this analysis include the lack of accompanying neuropsychological data. The authors concluded that LITT provides positive seizure outcomes for individuals with MTLE with Engel and ILAE outcomes comparable to anterior temporal lobectomy.

Stavrogiani et al. (2026) performed a systematic review and meta-analysis to compare neuropsychological outcomes following traditional surgical approaches and MRgLITT in individuals with drug-resistant mesial temporal lobe epilepsy. The systematic review included 34 studies; 24 reported cognitive outcomes following open resection, seven following MRgLITT, and three reported on both procedures. Included were studies of adults aged 16 years or older with drug-resistant mesial temporal lobe epilepsy who underwent open resection or MRgLITT and reported laterality-specific proportions of decline or improvement in verbal memory, visual memory, or naming using validated methods for cognitive change, with a minimum postoperative follow-up of 6 months. Outcomes measured included neuropsychological change in verbal memory, visual memory, and naming, with subgroup comparisons and meta-regressions examining relationships between cognitive outcomes, laterality, procedure type, and seizure control. A minimum follow-up of 6 months was required, and for studies with multiple follow-up points, the 12-month assessment or the time point linked to seizure outcomes was prioritized; reported follow-up durations varied across included studies. Reported outcomes showed that for left-sided procedures, verbal memory decline occurred in 36% (95% confidence interval = 28%–45%) after open resection and 29% (95% confidence interval = 9%–62%) after MRgLITT, with no significant difference ($p = .5967$). For right-sided procedures, visual memory decline was 16% (95% confidence interval = 8%–29%) after open resection and 19% (95% confidence interval = 3%–61%) after MRgLITT, with no significant difference ($p = .8027$). For left-sided naming decline, pooled rates were 43% (95% confidence interval = 27%–61%) after open resection and 9% (95% confidence interval = 3%–22%) after MRgLITT, with a statistically significant difference favoring magnetic resonance-guided laser interstitial thermal therapy ($p < .0001$). Exploratory meta-regression suggested a borderline association between higher seizure freedom and greater naming decline ($p = .0508$), while MRgLITT remained independently associated with lower naming decline after adjustment for seizure outcomes ($\beta = -1.36$, 95% confidence interval = −2.20 to −.51; $p = .0016$). Study limitations included the limited number of MRgLITT studies, especially for right-sided procedures, variable follow-up durations, variation in neuropsychological tests and scoring methods, insufficient data for some selective approach comparisons, variability in seizure outcome definitions, and between-study heterogeneity across cognitive domains. The authors concluded that verbal memory outcomes showed a nonsignificant trend favoring MRgLITT, visual memory outcomes were comparable across approaches, and naming decline after left-sided surgery was significantly lower with MRgLITT.

Seaton et al. (2025) conducted a systematic review to evaluate the role of laser interstitial thermal therapy in several conditions, including the treatment of epilepsy. The systematic review included 39 studies comprising 1533 individuals overall, with 8 studies specifically evaluating epilepsy and involving 706 individuals. Studies meeting the following criteria were included in the systematic review: primary studies reporting outcomes following laser interstitial thermal therapy for intracranial pathologies within the past 5 years. Outcomes included seizure freedom rates (Engel classification), complication rates, functional outcomes, and follow-up duration, although primary and secondary outcomes were not explicitly delineated. Follow-up duration varied across studies, with reported follow-up values ranging from 22.8 to 50 months in individual studies. Across included studies, LITT demonstrated favorable seizure outcomes, with a mean of 56.13% (range 37.5%–62.5%) of individuals achieving Engel Class I seizure freedom and 72.9% (range 44.7%–88%) achieving Engel Class II or higher outcomes. Findings suggested that treatment location may be more important than ablation volume in determining seizure outcomes, with no consistent correlation between ablation volume and seizure freedom. Adverse events were variably reported, with a mean complication rate of 20.2% (range 7.7%–35%) across three studies reporting these data. Compared with standard surgical approaches such as anterior temporal lobectomy, laser interstitial thermal therapy was described as offering comparable seizure control with potential advantages in neuropsychiatric outcomes, reduced postoperative morbidity, and shorter recovery. Key limitations included small sample sizes, heterogeneity in outcome reporting, limited long-term durability data, and restricted ability to assess selection bias and patient heterogeneity. The authors concluded that laser interstitial thermal therapy represents a viable minimally invasive treatment option for selected individuals with drug-resistant epilepsy, particularly for deep or surgically challenging epileptogenic foci.

Mohsen et al. (2025) published results of a systematic review and meta-analysis comparing the efficacy and safety of LITT, radiofrequency ablation, and stereotactic radiosurgery for the treatment of intractable mesial temporal lobe epilepsy. The systematic review included 42 studies (seven case series, six prospective cohorts, 23 retrospective cohorts, three clinical trials, and three randomized controlled trials) comprising a total of 1675 individuals. Included studies were randomized or non-randomized, involving individuals with mesial temporal lobe epilepsy treated with one of the three techniques and reporting seizure outcomes, complications, or reoperations. The primary outcome was seizure freedom defined as Engel Class I, while secondary outcomes included major postoperative complications and reoperation rates. Follow-up duration varied, with studies categorized into ≤ 12 months and > 12 months. LITT demonstrated a seizure freedom rate of 55.0% (CI 51.5–58.5%, P=0.148), compared to 46.3% for radiofrequency ablation and 53.8% for stereotactic radiosurgery. Major complication rates were 2.3%, 3.9%, and 14.3%, respectively, and reoperation rates were 14.3%, 28.6%, and 15.4%. Adverse events included visual field defects (which were the most common), intracranial hemorrhage, infections, meningitis, and pulmonary embolism. Limitations included reliance on single-arm studies, small sample sizes, heterogeneity across protocols, and lack of standardized follow-up and complication assessment. The authors concluded that laser interstitial thermal therapy demonstrated favorable safety and efficacy profiles compared to other modalities. The authors also emphasized the importance of choosing the appropriate technique based on individual clinical differences and preferences.

Ahmed et al. (2024) conducted a systematic review and meta-analysis to systematically synthesize the available evidence and determine the effectiveness of magnetic resonance-guided laser interstitial thermal therapy in reducing seizures in individuals with hypothalamic hamartoma. The systematic review included 17 studies, specifically 10 cohort studies and 7 case series, and involved 374 individuals with hypothalamic hamartoma and medically refractory seizures. Studies meeting the following criteria were included in the systematic review: studies of individuals with hypothalamic hamartoma experiencing medically refractive seizures, treatment involving a

magnetic resonance-guided laser interstitial thermal therapy device, reporting seizure outcomes, and publication in English. Outcomes extracted included seizure outcome, reported as Engel class I-IV and where applicable ILAE classification, as well as follow-up time. The review also evaluated postsurgical complications and potential long-term adverse effects. Across all 17 selected studies, 290/374 participants achieved seizure-free status after magnetic resonance-guided laser interstitial thermal therapy, and the pooled analysis demonstrated a 77.1% seizure freedom rate (95% confidence interval 0.696-0.837, $p < 0.001$), with moderate heterogeneity ($I^2 = 49.46\%$). The authors reported a variety of adverse events ranging from mild to severe. Hemorrhage and neurological deficits due to damage to nearby brain tissue were the most commonly reported complications. Key limitations of this study included the small number of included studies and the scarcity of literature for inclusion. The authors concluded that MRgLITT might be effective in reducing seizures in most individuals with hypothalamic hamartoma, but the evidence base remains limited and further clinical trials comparing this approach with other minimally invasive treatments are needed, along with additional study of neuropsychiatric and cognitive effects.

Larcipretti et al. (2024) conducted a systematic review and meta-analysis to compare magnetic resonance-guided laser interstitial thermal therapy with open surgical corpus callosotomy in pediatric individuals with refractory epilepsy, specifically evaluating hospitalization, operative characteristics, complications, and efficacy outcomes. The systematic review included five non-randomized controlled trials and involved 240 pediatric individuals, with 56 individuals who underwent MRgLITT and 184 individuals who underwent open surgery. Studies meeting the following criteria were included in the systematic review: randomized or non-randomized studies enrolling individuals less than age 18 with refractory epilepsy, comparing magnetic resonance-guided laser interstitial thermal therapy with open surgery, and reporting at least one endpoint of interest. The primary endpoint was favorable Engel outcome (Engel class I, II, and III) and the secondary endpoints were mean hospital length of stay, mean blood loss, and mean operative duration. There was no statistically significant difference between groups for favorable Engel outcome (RR 0.89; 95% CI 0.70–1.14; $p = 0.36$; $I^2 = 0\%$). Mean hospital length of stay was significantly shorter in the LITT group (MD 2.84 days; 95% CI [3.17]-[2.51] days; $p < 0.00001$; I2 = 90%), mean blood loss was significantly lower in the LITT group (MD -75.15 ml; 95% CI [-92.82]-[-57.48] ml; $p < 0.00001$; $I^2 = 0\%$), and mean operation duration was significantly longer in the LITT group (MD 1.38 h; 95% CI 0.64-2.12 h; $p = 0.00002$; $I^2 = 55\%$). Adverse events included postoperative infection and hydrocephalus, which were reported in some included studies and were described as more frequent in the open surgery cohort. The authors noted several limitations, including the non-randomized design of the included studies, substantial heterogeneity for certain endpoints, a limited body of comparative pediatric literature resulting in small sample size and restricted subgroup analysis, and inability to evaluate quality of life and drop attack frequency because of lack of data. The authors concluded that corpus callosotomy is a relatively safe and effective palliative treatment for pediatric refractory epilepsy, that magnetic resonance-guided laser interstitial thermal therapy is a promising alternative with reduced complication rates, and that no clear preference for one procedure over the other could be established; individualized decision-making was recommended.

Ekman et al. (2024) conducted a systematic review and meta-analysis comparing seizure outcomes following temporal lobe resection (TLR) and MRgLITT at follow-up durations exceeding 24 months. The analysis included prospective and retrospective cohort studies evaluating MRgLITT, anterior temporal lobectomy (ATL), or selective amygdalohippocampectomy (sAHE) in individuals with drug-resistant mesial temporal lobe epilepsy (total included studies, n = 55). The primary outcome was seizure freedom, assessed using Engel or ILAE classifications, while secondary outcomes included visual field deficits (VFDs), complication rates, and cognitive outcomes. TLR was associated with a higher rate of seizure freedom compared with MRgLITT (72.5% [65.6%–78.5%] vs 57.1% [51.2%–62.7%], respectively; $p < 0.01$). Rates of VFDs were higher following TLR (79.4% [59.5%–91.0%]) compared with MRgLITT (49.8% [23.6%–76.0%]),

although this difference did not reach statistical significance (p = 0.08). Overall complication rates were 11.4% (7.4%–17.2%) for TLR and 6.5% (3.3%–12.3%) for MRgLITT, with no statistically significant difference between groups (p = 0.15). The analysis was limited by substantial heterogeneity across included studies and limited sample sizes for certain outcomes.

Kohlase, et al. (2021) performed a systematic review and meta-analysis comparing MRgLITT, radiofrequency ablation (RFA), and conventional surgical approaches to the temporal lobe (i.e., ATL or sAHE). 43 studies (13 MRgLITT, 6 RFA, and 24 surgery studies) involved 554, 123, 1504, and 1326 individuals treated by MRgLITT, RFA, ATL, or sAHE, respectively. MRgLITT and RFA were both inferior relative to conventional surgical approaches (ATL and sAHE) in terms of seizure outcome (Engel Class I). Engel-I outcomes were achieved after:

- MRgLITT in 57% (315/554, range = 33.3%–67.4%)
- RFA in 44% (54/123, range = 0%–67.2%)
- ATL in 69% (1032/1504, range = 40%–92.9%)
- sAHE in 66% (887/1326, range = 21.4%–93.3%)

Meta-analysis revealed no significant difference in seizure outcome between MRgLITT and RFA (p = .098), whereas ATL and sAHE were both superior to MRgLITT (ATL: p = .002; sAHE: p = .037) and RFA (ATL: p = .0113; sAHE: p = .0247), with better outcome in individuals at follow up of 60 months or more. The rate of major complications was 3.8% for MRgLITT, 3.7% for RFA, 10.9% for ATL, and 7.4% for sAHE. These differences did not show statistical significance. Cognitive outcome might be more favorable after MRgLITT compared to ATL and sAHE, and lateral functions such as naming or object recognition may be more preserved in MRgLITT.

Wang, et al. (2021) published findings of a systematic review on the use of LITT and other modalities of surgical treatment for mesial temporal lobe epilepsy. The review encompassed a total of 19 studies with a total of 1094 individuals (LITT: 434, SRS: 81, radiofrequency thermocoagulation (RF-TC): 402, cortico-amygdalohippocampectomy (CAH): 153, and selective amygdalohippocampectomy (sAHE): 24). Seizure freedom was similar between all LITT studies and to rates achieved by CAH and sAHE. However, direct comparisons were lacking. Although ablation volume was not associated with seizure outcomes, targeting more of the mesial, anterior, and inferior temporal structures was associated with increased rates of Engel I seizure freedom. Common complications included transient post procedure headaches (LITT: 0.4%-27%, SRS: 15%-70%, and RF-TC: 23%) and VFDs (LITT: 3%-40%, SRS: 34%-50%, and RF-TC: 2%-5%) Cranial nerve palsies were unique to LITT with 7% of individuals experiencing this complication.

Barot, et al. (2021) published findings of a systematic review and met analysis (n = 559 individuals across 28 studies) demonstrating a seizure freedom rate of 67% in hypothalamic hamartomas, 56% in MTLE, and 50% in extratemporal epilepsy. Pooled prevalence of seizure freedom decreases from 60% with short follow-up duration (6–12 months) to 53% when mean follow-up duration was above 24 months. The MTLE cases with mesial temporal sclerosis (MTS) had better outcome vs non-lesional cases. The prevalence of postoperative adverse events was 19% and the most common adverse event was visual field deficits. The reoperation rate was 9%, which included repeat ablation and open resection.

Zeller, et al. (2021) performed a systematic review focused on the safety and use of LITT in the pediatric population. Included were 35 studies encompassing 303 pediatric LITT procedures. The mean age of included individuals was 10.5 years (range 0.5–21 years). Seizures (86%), followed by brain tumors (16%), were the most common indications for the procedure. Mean follow-up duration was 15.6 months. The overall complication rate was 15.8%, which comprised transient neurological deficits, cognitive and electrolyte disturbances, hemorrhage, edema, and hydrocephalus. No deaths were reported.

Kerezoudis, et al. (2020) conducted a systematic review and meta-analysis of LITT for temporal lobe epilepsy analyzing a total of 13 studies (n = 551 individuals). The mean follow-up ranged from 6 to 42.9 months. The pooled mean epilepsy duration was 24.4 years. A total of 384 individuals had MTS (70% of overall cohort). Overall seizure freedom rate was 58% and was not significantly associated with total ablation volume (p = 0.42). Pooled seizure freedom rate of 58% for all individuals with temporal lobe epilepsy and 66% for individuals with MTS (in contrast to 73% and 67% for open anterior temporal lobectomy and selective amygdalohippocampectomy, respectively). Total ablation volume as well as hippocampal or amygdala ablation were not significantly associated with seizure freedom. Overall complication rate was 17%. The permanent complication rate was 5%, the temporary complication rate was 10%.

Wang, et al. (2020) conducted a systematic review and meta-analysis of 26 studies (n = 804 individuals) to elucidate the efficacy and safety of MRgLITT and stereoelectroencephalography-guided radiofrequency thermocoagulation (SEEG-RFTC). 16 studies examined MRgLITT (414 individuals). The minimum follow-up across included studies was 6 months. Overall complication rate across all samples was low in the two approaches (5%). In this analysis, authors included those who received repeated ablations and became seizure-free into the seizure-free group. The authors propose that the underlying mechanism of the significant difference in postoperative rates of seizure-free outcomes between MRgLITT and SEEG-RFTC (65% vs. 23% respectively, p=0.00) was most likely related to the sizes of the ablated lesions. MRgLITT in both the hypothalamic hamartoma group (99%) and the temporal lobe epilepsy group (59%) achieved efficacy and low heterogeneity; individuals with temporal lobe epilepsy and MTS did not achieve better seizure control than individuals without MTS (p = 0.142).

Professional Societies/Organizations

American Society for Stereotactic and Functional Neurosurgery (ASSFN): The ASSFN Position Statement on Laser Interstitial Thermal Therapy for the Treatment of Drug-Resistant Epilepsy (DRE) lists the following indications for the use of MRgLITT as a treatment option for patients with DRE:

1. Failure to respond to, or intolerance of, at least 2 appropriately chosen medications at appropriate doses for disabling, localization-related epilepsy AND
2. Well-defined epileptogenic foci or critical pathways of seizure propagation accessible by MRgLITT

Contraindication to Use of MRgLITT:

1. Inability to identify the epileptogenic focus (or foci) or critical pathways within epileptogenic networks.
2. Inability to undergo magnetic resonance imaging (MRI) because of medical reasons.
3. Medical contraindications to surgery, e.g., unstable cardiac or respiratory conditions, anticoagulants that cannot be stopped, and bleeding diatheses. (Wu, et al., 2022)

Brain Neoplasms and Radiation Necrosis

Literature Review: Multiple systematic reviews and meta-analyses have been performed on research addressing the use of LITT in the treatment of brain tumors and radiation necrosis. Studies available for these analyses are primarily cohort studies and retrospective studies. There is a paucity of randomized controlled trials on LITT. Overall, data demonstrates that LITT is a safe and effective alternative to resection via craniotomy for the treatment of these conditions, particularly in smaller lesions or individuals who are poor surgical candidates. The ideal brain tumor or radiation necrosis lesion for treatment with LITT is circumscribed, with a diameter of less than 3 cm. A single laser has a maximal diameter of 4 cm; thus, smaller lesions are more likely to

achieve better ablation (Chen, et al., 2021). Larger lesions are associated with poorer outcomes (e.g., recurrence, progression-free survival), and brain edema is a greater risk in LITT treatment of larger lesions (Beechar et al., 2018; Salehi, et al., 2018; Bastos, et al., 2019; Alattar, et al., 2019; Shao, et al., 2020; Chen, et al., 2021; Sanvito, et al., 2023). As with LITT use in epilepsy treatment, ideal patient selection is paramount and risks versus benefits must be weighed when considering LITT in the treatment plan.

Seaton et al. (2025) conducted a systematic review to evaluate the contemporary evidentiary base supporting LITT in various conditions, including in adults with brain tumors and radiation necrosis. The systematic review included 39 studies and involved 1533 individuals, with subsets including 19 glioma studies, 8 brain metastasis studies, and 7 radiation necrosis studies. Studies meeting the following criteria were included in the systematic review: primary studies reporting outcomes following laser interstitial thermal therapy for intracranial pathologies within the past 5 years. Outcomes measured included patient characteristics, procedural complications, overall survival, progression-free survival, functional outcomes such as Karnofsky Performance Score, and time to last follow-up, although primary versus secondary outcomes were not explicitly defined. Follow-up duration varied by pathology, including mean last follow-up of 26.5 months for newly diagnosed glioma and 53 months for recurrent glioblastoma, and 33.4 months across metastatic brain tumor studies. Reported findings demonstrated that laser interstitial thermal therapy was generally safe and effective across brain tumor and radiation necrosis indications, particularly in individuals who were not candidates for open surgical resection. In glioblastoma, overall survival was reported up to 26 months in some cohorts. For radiation necrosis, comparative data from included studies demonstrated that complete steroid cessation was 3 times more likely following laser interstitial thermal therapy compared with medical management ($p = 0.003$), and one study demonstrated significantly longer overall survival compared with bevacizumab (median 24.8 vs. 15.2 months, $P = 0.003$), although long-term progression-free survival differences were not statistically significant. Adverse events varied across indications, with no serious complications reported in aggregated glioma data, while complication rates ranged from 4% to 65% in metastatic brain tumors and from 5.6% to 35.3% in radiation necrosis cohorts. Key limitations included small sample sizes, restriction to recent literature (last 5 years), limited long-term outcome data, heterogeneity of included studies, and potential selection bias. The authors concluded that laser interstitial thermal therapy represents a safe, minimally invasive alternative to open craniotomy for selected individuals with brain tumors and radiation necrosis.

Mortezaei et al. (2025) published results of a systematic review, meta-analysis, and meta-regression exploring the safety and efficacy of LITT in the treatment of high-grade gliomas (HGG). The study included a total of 602 individuals (n = 21 studies). Outcomes measured included overall survival (OS), progression free survival (PFS), and postoperative permanent deficits. Mean OS following LITT was 11.74 months (95% CI 10.9–12.6 months), with 6-, 12-, and 24-month OS rates of 77.0% (95% CI 65.8%–86.6%), 48.9% (95% CI 40.5%–57.3%), and 16.1% (95% CI 10.7%–22.3%), respectively. Mean PFS was 5.3 months (95% CI 4.97–5.7 months), with 6-, 12-, and 24-month PFS rates of 37.1% (95% CI 24.3%–44.6%), 12.8% (95% CI 8.7%–17.5%), and 4.3% (95% CI 2.2%–6.9%), respectively. Postoperative permanent deficits occurred in 5.7% of individuals (95% CI 0.85%–13.1%). There was a significantly higher rate of permanent deficits in individuals with newly diagnosed HGG (4.15%, 95% CI 0.4%–10.2%) than in those with recurrent HGG (0.02%, 95% CI 0.0%–2.2%; $p = 0.023$) without any heterogeneity ($I^2 = 0.00\%$). The study was limited by the lack of available randomized controlled trials and heterogeneity of available studies. The authors conclude that the study demonstrates LITT as an effective modality for HGG with a low rate of postoperative deficits.

Sharma et al. (2025) conducted a systematic review and meta-analysis to investigate the effectiveness and safety of combining laser interstitial thermal therapy with immunotherapy for recurrent brain metastases and recurrent glioblastoma. The systematic review included 4 studies

and involved 162 individuals from 1 randomized controlled trial and 3 non-randomized cohort studies; 81 (50%) individuals received laser interstitial thermal therapy plus immunotherapy and 81 (50%) received immunotherapy alone. Study-level regimens included prior or concurrent immunotherapy with laser interstitial thermal therapy, laser interstitial thermal therapy plus avelumab, laser interstitial thermal therapy plus avelumab plus bevacizumab, immune checkpoint blockade with laser interstitial thermal therapy, and pembrolizumab plus laser interstitial thermal therapy. Studies meeting the following criteria were included in the systematic review: case-control studies, cohort studies, or randomized controlled trials involving adults with recurrent gliomas or brain metastases, with data available based on immunotherapy exposure, and reporting at least one outcome of interest. Outcomes measured included overall survival after laser interstitial thermal therapy, progression-free survival, and adverse events. Follow-up was variably reported. The pooled analysis showed 12.81 months of overall survival (95% confidence interval = 8.31–17.31, $p < 0.01$, $I^2 = 0.00\%$) and approximately 6% adverse effects (95% confidence interval = 0.01–0.11, $p = 0.03$, $I^2 = 0.02\%$) for the combined treatment. In the recurrent glioblastoma subgroup, pooled overall survival was 11.81 months (95% confidence interval = 7.13–16.62, $p < 0.01$, $I^2 = 0\%$) and adverse events were observed in 4% of individuals (confidence interval = -0.02–0.10, $p = 0.21$, $I^2 = 0\%$). Reported adverse events included hypothyroidism, respiratory infection, seizures, right-sided weakness, and progressive aphasia, although one study did not explain the observed adverse event in detail. The authors noted limitations including incorporation of observational studies, variation in study quality, incomplete accounting for potentially confounding comorbid and disease-related factors, inability to perform subgroup analyses by immunotherapy type, and a relatively small sample size with inclusion of non-randomized studies requiring cautious interpretation. The authors concluded that the combined approach showed promising overall survival and a low occurrence of adverse events.

Sanvito et al. (2024) conducted a retrospective cohort study to identify favorable prognostic factors in brain metastases treated with LITT. The study included 42 individuals with a total of 47 brain metastases. Key inclusion criteria were confirmed brain metastasis, treatment with LITT for either a new or recurrent lesion, and available pre- and post-LITT MRI scans. The primary outcome was lesion-specific progression-free survival (PFS-L) after LITT, and the study evaluated how various clinical and radiologic factors affected PFS-L. Immediately after LITT, 37 of 47 lesions (78.7%) exhibited transient enlargement consistent with pseudoprogression. Lesion-specific PFS rates for the entire cohort were 88.0% at 3 months, 70.6% at 6 months, 67.4% at 1 year (staying the same at 2 years), and 62.2% at 3 years. Among the 13 lesions that eventually progressed, the median time to progression was 3.9 months (range 0.8–27.9). Notably, 11 of these progressed within 6 months (early progression), whereas only 2 progressed after 6 months. For the 17 lesions that responded to LITT, the median time to achieve response was 12.1 months (range 2.8–22.5). All 17 responding lesions remained in response at last follow-up, and roughly half of them (8 lesions) had follow-up for at least 3 years. Smaller baseline tumor size (measured by contrast-enhancing volume) was significantly associated with longer PFS-L ($p = 0.003$). Lesions below the identified size cutoffs showed higher progression-free survival rates (approximately 86–87% PFS-L for tumors < 2.5 cm^3 in volume and similarly 86.5% for tumors < 2 cm in diameter). Each 1 cm^3 increase in enhancing tumor volume was associated with about a 40% higher risk of progression (HR 1.4). Having a contrast-enhancing lesion volume ≥ 2.5 cm^3 was associated with a roughly 7-fold higher risk of progression (HR 7.3). Greater lesion sphericity (i.e. a more spherical tumor shape) was associated with significantly longer PFS-L ($p = 0.024$; very low hazard ratio ~0.02). Conversely, lesions with a sphericity < 0.705 had a ~5.7-fold higher risk of progression (adjusted $p = 0.019$, HR 5.7). The authors acknowledge the study's retrospective design and small sample size as key limitations. The authors concluded that brain metastases with smaller size and a more spherical shape are the most suitable candidates for LITT.

Gecici et al. (2024) performed meta-analysis comparing the efficacy of bevacizumab and LITT in treating radiation necrosis in individuals with previously radiated CNS neoplasms. 24 studies were

included with 210 individuals in the bevacizumab group and 337 individuals in the LITT group. The data demonstrated statistically significant differences favoring bevacizumab in symptomatic improvement/stability (p = 0.02), while no significant differences were observed in radiological improvement/stability (p = 0.27) or steroid wean-off (p = 0.90). The rates of adverse reactions were 11.2% for bevacizumab and 14.9% for LITT (p = 0.66), with the majority being grade 2 or lower (72.2% for bevacizumab and 62.5% for LITT).

Pandey et al. (2024) conducted a meta-analysis of 22 retrospective and prospective studies evaluating primary CNS neoplasms without prior treatment. Among included individuals, LITT was used for IDH-wildtype glioblastoma in 185 cases (90%), while 6 studies reported LITT for IDH-mutant astrocytoma (n = 21, 10%). The primary outcomes were progression-free survival and overall survival, and secondary outcomes included extent of ablation, postoperative complications, and use of adjuvant therapies with LITT. The average extent of ablation in the IDH-mutant astrocytoma subgroup was 84.6%, consistent with previously reported values. The pooled overall survival for IDH-wildtype glioblastoma was 10 months, and the pooled progression-free survival was 5 months; these outcomes were comparable to previously reported results. In IDH-wildtype glioblastoma, neurologic and non-neurologic complication rates were 10.3% and 4.8%, respectively. In the IDH-mutant astrocytoma cohort, neurologic and non-neurologic complication rates were 33% and 8.3%, respectively. The analysis suggested that use of adjuvant therapies after LITT was associated with improved survival outcomes. Key limitations included heterogeneity across studies and small overall sample size. The authors concluded that LITT achieves an acceptable extent of ablation with acceptable complication rates.

Alkazemi et al. (2023) published a meta-analysis of 45 studies (prospective case series, retrospective case series, and one retrospective matched cohort). A total of 121 pediatric individuals (< 18 years) were included with a total of 829 treated lesions. 361 lesions were classified as high-grade gliomas, 116 as low-grade gliomas, 337 as metastatic brain tumors, and 15 as non-glial tumors. Reported indications for LITT included deep-seated or surgically inaccessible tumor location, use as salvage therapy following radiosurgery, use in pediatric individuals for whom surgery was considered less favorable, and failure of ≥ 2 prior treatment modalities. One-year progression-free survival was 19.6% (95% CI, 11.3%–29.0%; I 2 = 0%; P heterogeneity = 0.89; 8 studies) in high-grade gliomas, 16.9% (95% CI, 11.6%–24.0%; I 2 = 0%; P heterogeneity = 0.99; 6 studies) in Grade 4 astrocytomas, and 51.2% (95% CI, 36.7%–65.5%; I 2 = 66.1%; P heterogeneity = 0.01; 7 studies) in brain metastases. One-year overall survival of high-grade glioma was 43.0% (95% CI, 36.0%–50.0%; I^2 = 7.6%; *P* heterogeneity = 0.37; 12 studies). For metastatic brain tumors, it was 56.3% (95% CI, 47.0%–65.3%; I^2, not applicable; *P* heterogeneity = 0.70; 5 studies). The authors noted that the most common AEs after LITT were new neurologic deficits, with an estimate pooled incidence of 16.2%, although most of these (57%) subsequently resolved. The meta-analysis was limited by the design of the included studies themselves (case series). The authors conclude that the progression-free survival and overall survival were not found to be inferior to outcomes reported in the literature.

de Groot et al. (2022) conducted an analysis of participants enrolled in the LAANTERN trial with newly diagnosed and recurrent Isocitrate dehydrogenase 1 (IDH1) wild-type glioblastoma. Glioblastoma *IDH* wild type WHO grade 4 (N = 89) participants were subdivided into groups of 29 newly diagnosed and 60 recurrent adult individuals. Median overall survival (OS) was 9.73 months for newly diagnosed patients and median post-procedure survival was 8.97 months for recurrent individuals. Factors associated with improved survival were MGMT promoter methylation, adjuvant chemotherapy within 12 weeks, and tumor volume < 3 cc. The authors concluded that LITT offers an effective cytoreductive approach for individuals with newly diagnosed and recurrent *IDH* wild-type glioblastoma. The authors state its use in newly diagnosed individuals who are followed by post-LITT chemoradiotherapy produces a median OS similar to that of individuals treated with

conventional surgical resection, thus making LITT a viable alternative in individuals with inoperable tumors or those not amenable to resection.

Chen et al. (2021) performed a systematic review and meta-analysis of 14 studies to determine the efficacy of LITT for brain metastases patients experiencing in-field recurrence following SRS. Inclusion criteria were studies that evaluated the efficacy of LITT for IFR, using laser ablation, including intracranial brain metastases recurrence or radiation necrosis (not spinal lesions, and data for local control rate or overall survival available. The primary outcomes of interest were local control and overall survival. The 6-month (LC-6) and 12-month (LC-12) local control rates were 78.5% and 69.0%, separately. Pooled median OS was 17.15 months (13.27-24.8). The overall OS-6 and OS-12 rates were 76.0% (71.4-80.0%) and 63.4% (52.9-72.7%), separately. LITT provided more favorable local control efficacy in RN than BM recurrence (LC-6: 87.4% vs. 67.9%, p = 0.009; LC-12: 76.3% vs. 59.9%, p = 0.041). The researchers also reported pre-operative lesion volume as a predictive factor correlated with local control efficiency. Sub-group analysis demonstrated a higher local control rate in studies with mean pre-operative lesion volume of less than 4.6 cm^3 (LC-6, 81.8% vs 74.3%). Limitations of the study include the retrospective nature of the included studies and heterogeneity of the included studies. The authors conclude that LITT is an effective salvage treatment option.

Viozzi et al. (2021) published a systematic review of studies investigating supratentorial newly diagnosed glioblastoma (included studies n = 11). All papers suffered from serious or critical risk of bias, and the quality of evidence was graded as very low according to the GRADE criteria. None of the studies was randomized and reporting of confounders and other parameters was poor. Median overall survival (OS) ranged from 3.3 and 32.3 months and between 2 and 31.9 for PFS months for progression free survival (PFS). The mean complication rate was 33.7%. This systematic review was limited by small sample sizes, high heterogeneity between studies, and low overall quality of the included evidence. The authors note that the addition of LITT to treatment of newly diagnosed glioblastoma could be promising in circumstances where surgery is not feasible.

Shao et al. (2020) published a retrospective case series (n = 238) reporting data from individuals who underwent LITT at a single academic institution between 2011 and 2018. Individuals were grouped by date of treatment; the early cohort included those treated between 2011 and 2014 (n = 100), and the recent cohort included those treated between 2015 and 2018 (n = 138). The primary endpoints were differences in demographics, tumor characteristics, surgical approach, and outcomes between the early and recent cohorts. Among individuals with high grade glioma (HGG), those who underwent LITT for large tumors (volume > 4 cm^3) had significantly worse overall survival (OS) compared with those treated for smaller tumors (volume < 4 cm^3; p < 0.001). This effect was observed at the 12-, 18-, and 24-month postoperative time points. Individuals with HGG and large tumors also demonstrated significantly worse progression-free survival (PFS) compared with those with smaller tumors (p = 0.015). Lesion size did not significantly affect OS or PFS for low-grade gliomas, metastatic lesions, or radiation necrosis. Median follow-up was 8.4 months, and 52% of individuals experienced progression during follow-up. Temporary complications occurred in 30.2% of individuals, and permanent deficits occurred in 10.8% of individuals. The rate of permanent motor deficits decreased over time (15.5% vs. 4.4%; p = 0.005). Thirty-day mortality decreased from 4.1% to 1.5% in the recent cohort; however, this difference was not statistically significant. Poor preoperative Karnofsky Performance Status (≤ 70) was significantly associated with increased permanent deficits (p = 0.001) and decreased overall survival (p < 0.001 for all time points). Limitations of this study included the retrospective nature of the data collected. The authors noted that there was a clear correlation between tumor size and survival in HGG and that this data, along with prior studies, suggest that favorable laser coverage in smaller tumors may be a factor. They recommended against the use of LITT as the sole treatment for large tumors with significant mass effect because of associated postoperative

complications. They also emphasized appropriate use and patient selection importance for optimization of outcomes.

Kim et al. (2020) reported 12-month outcomes from 223 subjects enrolled at 14 US centers with 231 ablated tumors. The cohort included 10 pediatric individuals (< 18 yr of age). The median age was 54.3 years. In total, 73.6% of individuals had baseline neurological symptoms. The median baseline Karnofsky Performance Score (KPS) was 90. LITT indications included primary brain tumor (131; 58.7%) or metastatic brain tumor (92; 41.3%). Nearly all metastatic lesions (92.4%) were previously treated, and the LITT procedure was indicated for tumor recurrence (50.6%), radiation necrosis (40%), or unknown (9.4%). The median length of follow-up was 223 days. Results reported a 1 year estimated survival rate of 73%, with no significant difference observed between individuals with metastatic or primary tumors in overall survival. A total of 50.5% had stabilized/improved KPS at six months. There were no significant differences in KPS or QoL between individuals with metastatic vs primary tumors. The authors concluded that data in this first outcome analysis of the LAANTERN registry show that the overall survival in this population of individuals with brain tumors reflects similar if not improved outcomes to those previously reported for a population of individuals with mostly recurrent disease. Patient-reported QoL outcomes were also stabilized and better than expected in a population with malignant brain tumors. Further sub-analyses of these data are planned and are likely to yield additional learning regarding patient selection and management.

Bastos et al. (2019) conducted a retrospective cohort study to identify predictors of local recurrence following LITT. The study included 61 individuals with 82 lesions treated with LITT, regardless of prior therapy. Lesions were categorized as recurrent (n = 46), radiation necrosis (n = 31), or newly diagnosed (n = 5). The primary outcome was time to local recurrence, defined as the interval from LITT to either recurrence or last follow-up, and was analyzed on a per-lesion basis. The secondary outcome was overall survival. Freedom from local recurrence was 69.6% at 6 months, 59.4% at 12 months, and 54.7% at both 18 and 24 months. Among lesions that recurred, the median time to local recurrence was 4 months (95% CI 3–6). Incompletely ablated lesions had a shorter time to local recurrence (median 6 months, 95% CI 1.7–10.2; 75th percentile at 3 months) compared with completely ablated lesions (median not reached; 75th percentile at 12 months) ($P < .001$), corresponding to a hazard ratio (HR) of 5.014 (95% CI 2.279–11.031). Lesions > 6 cc had a shorter time to local recurrence (median 9 months, 95% CI 1.160–16.840; 75th percentile at 2 months) compared with smaller lesions (median not reached; 75th percentile at 6 months) ($P = .034$), with an HR of 2.206 (95% CI 1.024–4.753). Tumor volume > 6 cc and dural-based location were both significantly correlated with ablation status ($r = −0.533$, $P < .001$; $r = −0.243$, $P = .028$, respectively). The authors concluded that LITT is safe and effective for brain metastases and radiation necrosis, and that lesions > 6 cc are more likely to be incompletely ablated.

Professional Societies/Organizations

National Comprehensive Cancer Network: The National Comprehensive Cancer Network® (NCCN) Clinical Guidelines in Oncology™ Central Nervous System (CNS) cancers V1.2026 provided the following recommendations for LITT:

- The treatment algorithm for limited brain metastases offered LITT as a treatment strategy option for recurrent disease at the local site after radiation, stating this option is for individuals who are not considered surgical candidates.
- Principles of surgery noted that the recommendation for MRI-guided LITT is a 2B recommendation. Also noted were the potential indications including relapsed brain metastasis, radiation necrosis, glioblastomas, and other gliomas.

- Principles of radiation therapy for brain and spinal cord stated that in cases where radiation necrosis versus tumor recurrence is equivocal, LITT with biopsy or surgical resection may be considered.
- Principles of brain and spine tumor management stated that LITT can be considered on a case-by-case basis for treatment of radiation necrosis in patients with a history of radiation therapy for primary brain tumor or metastatic disease.
  - Consultation with neurosurgeons trained in LITT should be done when the procedure is considered.
- In the discussion of principles of management, the panel strongly recommended brain tumor board for multidisciplinary review of each patient's case.
- In the discussion of treatment overview, the guideline stated, "for patients with recurrent brain metastases or radiation necrosis who are poor surgical candidates, laser interstitial thermal ablation may represent a reasonable less invasive treatment option. Advantages of laser thermal ablation include rapid discharge from the hospital (within 24-48 hours) and avoidance of stay in the intensive care unit (ICU), rehabilitation facility, or other extended care facility".

The Congress of Neurological Surgeons/American Association of Neurological Surgeons (CNS/AANS):

The Congress of Neurological Surgeons published a Systematic Review and Evidence-Based Guidelines Update for the Role of Emerging Therapies in the Management of Patients With Metastatic Brain Tumors (Huntoon, et al., 2025). LITT was discussed as follows:

Question 7
In patients with parenchymal or leptomeningeal brain metastases, does the use of laser interstitial thermal therapy (LITT) provide benefit regarding local control, OS, PFS, performance status, or reduction in CNS side effects compared with standard management with chemotherapy, immune modulators and molecular targeted agents, SRS, WBRT, and surgical resection?

New Recommendations

- Level III: For adults who have undergone SRS for brain metastases with subsequent imaging progression due to tumor progression, it is suggested that LITT be considered as equivalent to craniotomy in terms of PFS and OS and the choice of management should be individualized based on the unique characteristics of the tumor location and the patient's clinical status.

- Level III: For adults who have undergone SRS for brain metastases with subsequent imaging progression due to radiation necrosis, it is suggested that LITT be considered as equivalent to medical management for radiation necrosis and the choice of management should be individualized based on the unique characteristics of the tumor location and the patient's clinical status.

(Level III (or C) Recommendation = Evidence from case series, comparative studies with historical controls, case reports, and expert opinion, as well as significantly flawed randomized controlled trials.)

Key Issues for Future Investigation
Truly prospective and comparative studies of LITT, beyond simple registries, looking at its value in relation with localized forms of radiation, and medical/targeted therapies will clarify its value in the management of brain metastases. Until that is accomplished, increasing volumes of class III data are unlikely to increase acceptance and use of the technology (Huntoon, et al., 2025).

The CNS Systematic review and Evidence-based guidelines update on the role of cytoreductive surgery in the management of progressive glioblastoma in adults (Patrick, et al., 2022) stated: "the emergence of techniques such as laser interstitial thermal therapy and photodynamic therapy present further options for cytoreductive surgery in recurrent malignant gliomas. These minimally invasive techniques can provide cytoreduction with low operative morbidity, and with further investigation can widen the population considered for repeat surgery, when open surgery is otherwise not amenable due to poor surgical candidacy."

A CNS/AANS Position Statement on MR-guided Laser Interstitial Thermal Therapy (LITT) for Brain Tumors and Radiation Necrosis (September 2021) stated the following indications for use:

> "LITT is a neurosurgical tool FDA indicated for use to ablate, necrotize, or coagulate intracranial soft tissue, including brain structures (e.g., brain tumor, radiation necrosis and epileptogenic foci as identified by non-invasive and invasive neurodiagnostic testing, including imaging), through interstitial irradiation or thermal therapy in the discipline of neurosurgery with laser technology."
>
> The CNS/AANS notes "there is consensus that intracranial LITT should be considered as a potential option for patients with recurrent or progressive malignant tumor (primary or metastatic), lesion(s) inaccessible to surgical resection, or when the patient is unable to tolerate surgical resection due to medical comorbidities" (Barnett, et al., 2021).

American Society of Clinical Oncology (ASCO): The ASCO guideline on Treatment for Brain Metastases (Vogelbaum, et al., 2022) noted that 'No recommendation can be made for or against LITT' (Type: informal consensus; Evidence quality: low; Strength of recommendation: none). The ASCO noted that 'No studies were identified to inform recommendations on this issue'.

Health Equity Considerations

Health equity is the highest level of health for all people; health inequity is the avoidable difference in health status or distribution of health resources due to the social conditions in which people are born, grow, live, work, and age.

Social determinants of health are the conditions in the environment that affect a wide range of health, functioning, and quality of life outcomes and risks. Examples include safe housing, transportation, and neighborhoods; racism, discrimination and violence; education, job opportunities and income; access to nutritious foods and physical activity opportunities; access to clean air and water; and language and literacy skills.

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Revision Details

Effective 11/15/2026

Type of Revision	Summary of Changes	Date
Annual Review	• Revised policy statements for LITT in epilepsy, malignant brain neoplasms, and radiation necrosis.	11/15/2026
Annual Review	• No clinical policy statement changes.	8/15/2025
Annual Review	• No clinical policy statement changes.	8/15/2024