

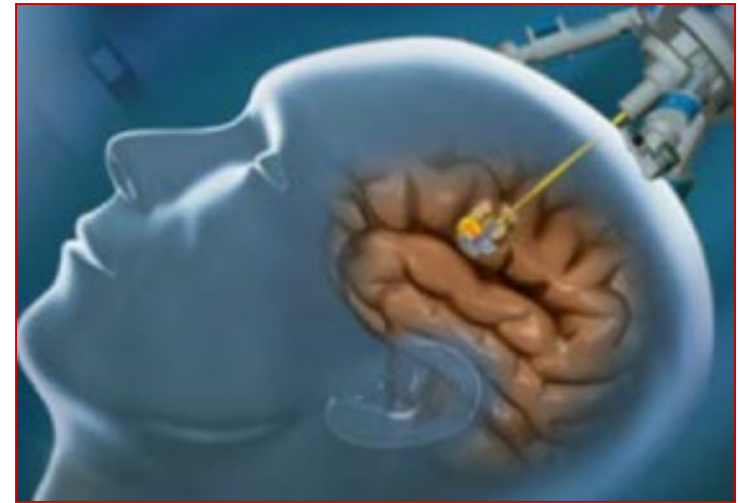
Laser Interstitial Thermal Therapy (LITT)

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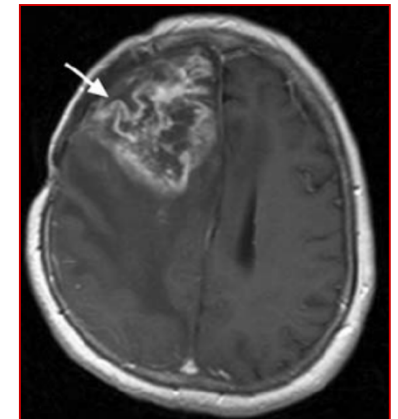
Brief History of LITT

- Laser Interstitial Thermal Therapy (LITT) has been FDA cleared and available in the US for about 15 years.
- In very early usage, LITT systems had general indications for ablation in multiple body systems.
- Over time, however, usage has been refined to focus on nervous system sites, specifically the brain.
- LITT procedures of the brain are performed as inpatient only.



Diagnoses

- LITT is currently used to ablate, necrotize, or coagulate intracranial soft tissue.
- The most common diagnoses for which LITT is used include:
 - ✓ Brain tumors, benign and malignant
 - ✓ Intractable epilepsy, due to cavernoma, hypothalamic hamartoma, focal cortical dysplasia, and other brain lesions
 - ✓ Radiation necrosis of the brain
- Uses for spinal cord are also anticipated.

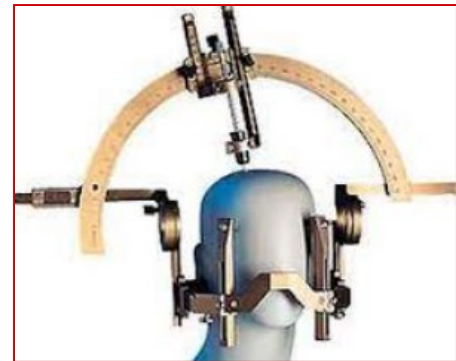


LITT Procedure

LITT can be summarized as minimally invasive stereotactic robotic neurosurgery with MRI-guided laser ablation of intracranial tissue under real-time monitoring.

Stereotaxis

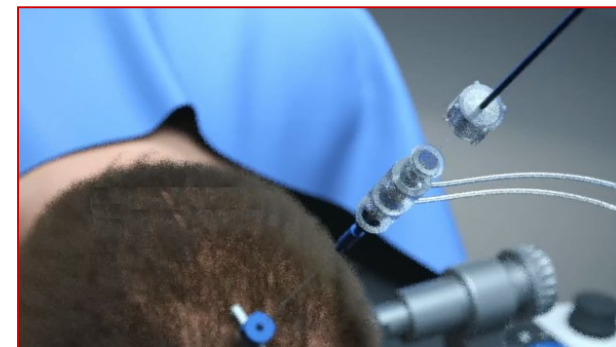
- Stereotactic procedures use reference points, such as a headframe, surface anatomic landmarks, or fiducial markers placed in the scalp or skull.
- The reference points enable surgeons to precisely locate the target, establish a trajectory, and use computer-guided navigation.



LITT Procedure

Minimally Invasive Neurosurgery

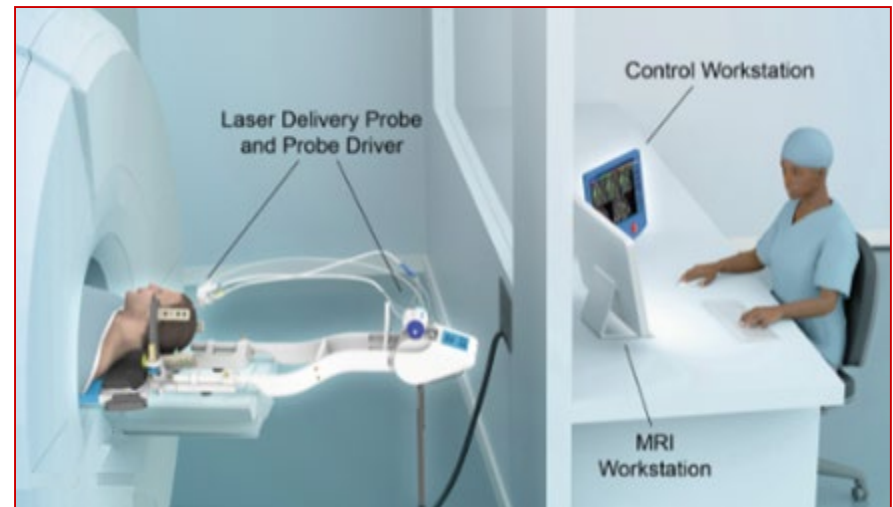
- Following a small scalp incision, a burr hole is drilled through the skull for access to the brain.
- The dura and pia are opened and the laser anchor bolt is placed through the burr hole and secured.
- The laser fiber is inserted through the anchor bolt into the brain and advanced to the target site.



LITT Procedure

MRI-Guided Ablation

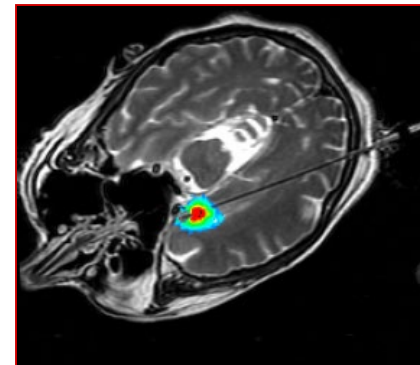
- The ablation takes place while the patient is in the MRI scanner.
- MRI scans are transferred to the workstation and safety set points are identified on the images to prevent damage to adjacent tissues.
- Via the robotic controlled probe drive, MRI-guided ablation of the target is performed.



LITT Procedure

Real-time Monitoring

- During the procedure, the surgeon interprets MRI images superimposed on thermal maps displaying distribution of heat from the laser.
- Based on imaging/thermal feedback, the surgeon repositions the laser probe within the lesion and repeats ablation as needed.



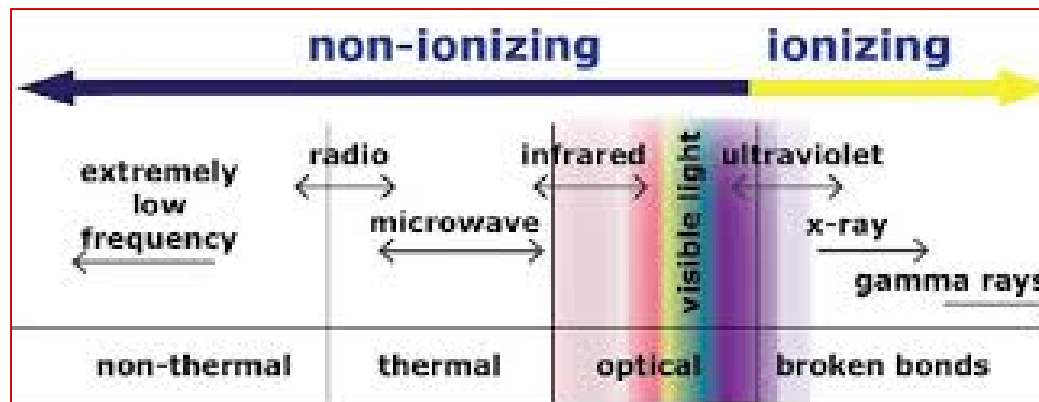
Ablation Energy Sources

- Clinical tissue destruction can be accomplished by various energy sources.
- Thermal sources use heat to destroy tissue and include:
 - ✓ Radiofrequency
 - ✓ Ultrasound
 - ✓ Microwave
 - ✓ Laser
- * *Cryoablation, a hypothermic source, uses extreme cold.*
- Brachytherapy and radiosurgery sources use ionizing radiation and include:
 - ✓ Radioactive isotopes
 - ✓ Photons
 - ✓ Gamma rays
 - ✓ Protons



Radiation: Non-Ionizing and Ionizing

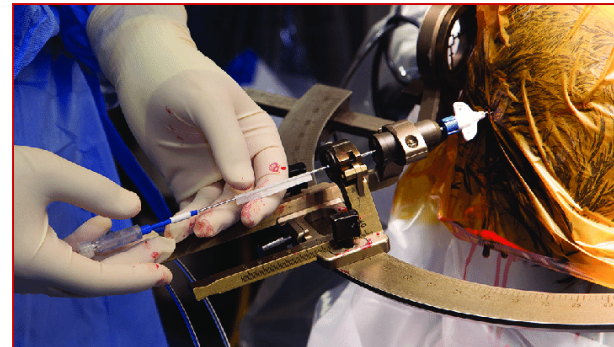
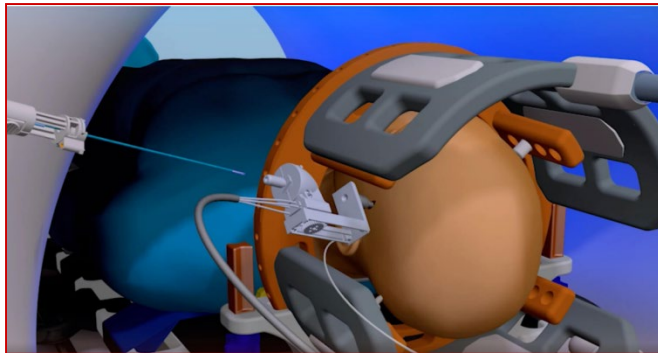
- Technically, all of these energy sources are forms of radiation.
- However, thermal sources are *non-ionizing* radiation and radiosurgery sources are *ionizing* radiation.



- Ionizing radiation removes electrons to cause cell death and, when delivered as stereotactic radiosurgery, is non-invasive.
- LITT uses laser heat, a non-ionizing thermal source, to destroy tissue and is surgically invasive.

Documentation

- The procedure report will document use of both the OR and the MRI suite, or an MRI-equipped OR.
- The LITT system is often documented by model name:
 - ✓ Visualase (Medtronic) ✓ NeuroBlate (Monteris)
- The procedure may also be abbreviated MRg-LITT for magnetic resonance guided laser interstitial thermal therapy.



Questions?

