

MRI-Guided Laser Ablation Surgery for Epilepsy



In August 2010, Texas Children's Hospital became the first hospital in the world to use real-time MRI-guided thermal imaging and laser technology to destroy epilepsy-causing lesions in the brain that are too deep inside the brain to safely access with usual neurosurgical methods.

To date, our team has performed more than 100 of these procedures on patients who have traveled to Houston and Texas Children's from around the globe. This technology has become a standard of care and is now being used in many adult and pediatric centers across the United States.



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The advantages of the MRI-guided laser surgery procedure include:

- A safer, significantly less-invasive alternative to open brain surgery with a craniotomy, which is the traditional technique used for the surgical treatment of epilepsy.
- No hair is removed from the patient's head.
- Only a 3 mm opening is needed for the laser. It is closed with a single suture resulting in less scarring and pain for the patient.
- A reduced risk of complications and a faster recovery time for the patient. Most patients are discharged the day after surgery.

MRI-guided laser surgery is changing the face of epilepsy treatment and provides a life-altering option for many epilepsy surgery candidates. The benefits of this new approach in reducing risk and invasiveness may open the door for more epilepsy patients to see surgery as a viable treatment option.

Epilepsy today

- Approximately 1 in 10 people will have at least one seizure during their lifetime.
- 1 in 26 people have an underlying tendency to have recurrent seizures (epilepsy).
- Seizures can take many different forms and can impact all aspects of life including education, employment, independence and the ability to lead a normal, healthy life.
- Anti-epileptic medications will only control seizures for 60% of all people with epilepsy. The remaining 40% will continue to have seizures, often despite multiple medications. This is called medically intractable or medically refractory epilepsy.
- There are approximately 3 million patients with epilepsy in the United States and close to 1 million patients with medically intractable epilepsy.



The Comprehensive Epilepsy Program

The Neuroscience Center at Texas Children's Hospital provides expert evaluation, diagnosis, treatment and potential surgical interventions for a wide range of neurological disorders.

The Comprehensive Epilepsy Program at Texas Children's Hospital is one of the largest and most prestigious in the country. Our Neurology and Neurosurgery program is ranked #2 in the nation, according to *U.S. News & World Report*.

Therapies include anti-epileptic medications (current and investigational), vagus nerve stimulation, stereotactic radiosurgery, state-of-the art resective surgical procedures, MRI-guided laser surgery as well as ketogenic and related diets.

The multidisciplinary team includes pediatric epileptologists, neurosurgeons, clinical neurophysiologists, specialized pediatric nurse practitioners, a clinical pharmacist, neuropsychologists, neuroradiologists, neuropathologists, dietitians and social workers.

About the procedure

MRI-guided laser surgery is used to successfully treat a variety of brain abnormalities including hypothalamic hamartoma, tuberous sclerosis, mesial temporal lobe epilepsy and cortical dysplasia. It can also be used to perform corpus callosotomy. This technology can target tissue at the speed of light with extraordinary precision. The basic steps of the procedure include:

- After being placed under general anesthesia, a head frame is placed around the patient's skull with a set of markers to best guide the surgeon on a safe path.
- A CT scan is then taken in order to orient the brain to the frame in three dimensions. MR and CT images are studied by the neurosurgeon to determine the location of the targeted tissue. With the help of computer software, a safe path through the brain is calculated.
- The neurosurgeon then makes an incision and drills a small hole through the skull only 3.2 millimeters wide. The laser applicator, a tube about the width of a strand of spaghetti, is inserted and guided through the brain into the diseased area. Once inserted into the brain, the head frame is removed and the patient is transported to the MRI scanner.
- After confirming proper placement of the laser applicator, the surgeon performs a small test firing. Once confirmed everything is accurate, the laser is heated to destroy the diseased tissue. Once completed, the applicator is taken out and the scalp is closed with a single stitch.
- The patient is brought to recovery for one night and typically goes home the next day.

Results

Approximately 75% of patients can expect immediate seizure freedom. Recovery time is minimal and most children return to school within a few days.

Resources

There are many resources available for patients and families with epilepsy and other associated conditions. These groups provide information, fellowship, support, events and educational opportunities. Some of these groups include:

- Hope for Hypothalamic Hamartomas (hopeforhh.org)
- Rare Epilepsy Network (epilepsy.com/ren)
- TS Alliance (tsalliance.org)
- Epilepsy Foundation (epilepsy.com)

Studies and professional papers written about this procedure by Texas Children's Hospital physicians are available upon request. Please call the Neurosurgery office at 832-822-3950 to request this information.

Contact us

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To talk to someone specifically MRI-guided laser ablation surgery for epilepsy or to schedule an appointment, please call the Neurosurgery office at 832-822-3950.



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