TEXAS COMPREHENSIVE EPILEPSY PROGRAM – A Guide for Patients & Families

TABLE OF CONTENTS

Introduction ........................................................................... 3
Specialized Tests .................................................................. 5
Innovative Technologies ......................................................... 6
Patient Volumes..................................................................... 8
Treating the Individual, Not Just the Condition ....................... 9
Meet the Epilepsy Team.......................................................... 10
Caring Professionals. Skilled Diagnosis. Comprehensive Treatment.

Nearly 3 million Americans suffer from epilepsy and other seizure disorders. At the Memorial Hermann Mischer Neuroscience Institute at the Texas Medical Center, our mission is to help patients gain control of their seizures and regain their quality of life by applying the most comprehensive – and least invasive – methods available.

The Texas Comprehensive Epilepsy Program at the Mischer Neuroscience Institute has a long history of innovation and excellence in the care of patients with epilepsy. This Level 4 National Association of Epilepsy Centers-certified program is the busiest and most comprehensive of its type in the region. A collaborative effort between Memorial Hermann-Texas Medical Center, Children’s Memorial Hermann Hospital, and McGovern Medical School at UTHealth, we are the leading program in the southwestern United States for the diagnosis and surgical treatment of epilepsy in patients of all ages. We draw upon the combined expertise of affiliated board-certified neurologists and neurosurgeons with subspecialty training and experience in treating both adult and pediatric patients with seizures and epilepsy. Patients of all ages come to us from across the nation for our innovative care and quality outcomes.

Some of the reasons patients develop epilepsy still defy explanation, but the onset of epilepsy may be associated with a number of known causes. Genetic predisposition, brain trauma, structural abnormalities during brain formation, strokes and brain tumors rank among the top etiological causes.
Determining the cause of each patient’s epilepsy and qualifying the nature of the disorder are both crucial to planning the most effective treatment options. At the heart of the Texas Comprehensive Epilepsy Program is our state-of-the-art Epilepsy Monitoring Unit (EMU) – the largest and most comprehensive unit of its kind in the region. Patients are referred to the EMU for one of three reasons:

- They are suspected of having seizures, but have never been diagnosed with epilepsy.
- They have seizures whose exact type and cause are still unknown.
- They have medically intractable seizures.
- They are being evaluated for possible surgical treatment for severe epilepsy.

Patients typically are admitted on an inpatient basis and stay with us for an average of three to seven days. During their stay, patients are monitored 24/7 for even the smallest sign of seizure activity. Continuous electroencephalography (EEG) and video recordings are carried out during this time. As one of the few inpatient units in the country with a comprehensive set of diagnostic technologies, we constantly gather and record data to help define and locate seizure activity within the brain.
Today, the Texas Comprehensive Epilepsy Program sees several thousand patients in a year, and over 400 that are seen are admitted to our EMUs for epilepsy diagnosis and treatment. Our multidisciplinary team of epileptologists, neurosurgeons, electro-neurodiagnostic technologists, neuropsychologists, pathologists and neuroradiologists are at the forefront of their fields and will create a personalized plan for each patient.

Specialized Tests

- Video EEG allows physicians to monitor patients, using video and audio while recording the electrical activity in their brains. EEG is the cornerstone study to diagnose and evaluate seizures and epilepsy. Video EEG consists of between 20 and 30 electrodes attached to the scalp with continuous recordings of brain activity and video.

- High-resolution magnetic resonance imaging (MRI): During the initial evaluation, all patients routinely undergo a 3-Tesla MRI with specific epilepsy protocols, which allows physicians to visualize the brain structure and look for abnormalities or lesions that may cause seizures. Routinely scans done at our center reveal abnormalities that were previously missed.

- Functional MRI (fMRI) and diffusion tensor imaging (DTI): Prior to surgery, patients may qualify for a clinical research trial that uses fMRI and DTI tractography to localize critical brain regions and pathways involved in motor function, vision and language.

- Radionuclide scans: Positron emission tomography (PET) and single-photon emission computed tomography (SPECT) scans are highly specialized tests that allow physicians to visualize brain function rather than structure. PET specifically examines metabolic activity, while SPECT identifies blood flow patterns. Each test may be helpful in identifying a brain region causing seizures, particularly in patients with normal CT or MRI scans.

- The Wada test is performed on patients being considered for surgery. It is used to identify the language and memory functions of the left and right brain.

- Neuropsychological testing is used to determine whether seizures have impacted areas of brain function such as memory, language, attention, math skills or personality. It also evaluates the impact of seizures on mood – such as depression or anxiety.

- Magnetoencephalography (MEG) maps neurological function by measuring the magnetic fields produced by the brain’s natural electrical activity. It provides physicians with clear data to help
We use high definition magnetoencephalography (MEG) to identify seizure foci noninvasively, and are national leaders in the adoption and development of this technology. Today, we combine MEG with high-density EEG to enhance the precision with which we localize seizure foci.

locate the source of seizures and minimize operative risk in patients with epilepsy or brain lesions by clearly defining what regions of the brain are critical to speech and motor function. Mischer Neuroscience Institute is a national leader in combining the use of MEG and functional MRI to fully map the brain and brain activity. We were the first in Texas to offer this service, bringing the first MEG scanner to Houston in 1997. Each year, Mischer Neuroscience Institute performs up to 200 of these noninvasive, pain-free MEG procedures on pediatric and adult patients. While anesthesia is available for pediatric patients who require it, MEG testing does not necessitate the use of an anesthetic. And with shortened measurement preparation and collection times, a path of treatment may be determined as quickly and safely as possible – ensuring our patients get the treatment they need, when they need it.

• For some epilepsy patients, the monitoring study uses special intracranial electrodes that are temporarily implanted on or in the brain by a neurosurgeon. This may take the form of subdural electrodes that are implanted on the surface of the brain via a craniotomy, or by the placement of small depth electrodes, using the technique of stereoelectroencephalography (SEEG).

Innovative Technologies

Patients in the Texas Comprehensive Epilepsy Program have access to a full suite of diagnostic tools and treatment, including laser ablation and stereo EEG. These revolutionary procedures, combined with the knowledge and experience of the dedicated epilepsy team, offer hope for even the most severe, drug-resistant cases of epilepsy, while protecting the safety and the comfort of patients.

Laser Ablation: Using real-time, MRI-guided thermal imagery, surgeons are able to target and destroy brain lesions that cause epilepsy and other seizures, with minimal destruction to the surrounding tissue.

Advantages of this technology include:

• Minimally invasive – 3 mm hole versus large craniotomy
• Minimizes damage to surrounding brain tissue and may enable better functional preservation
• Very short hospital stay – typically just one day
• Minimal pain or discomfort using this approach
Stereo EEG: This remarkable tool allows for simultaneous exploration of electrical activity on the surface of the brain and deep within it—all while a patient is experiencing a seizure. This technique has several advantages:

- Enables precise location of epileptic focus
- No craniotomy is required; very thin recording electrodes are inserted via tiny openings in the skull so the procedure is better tolerated
- Especially useful in cases where the epilepsy is difficult to localize
- Allows for longer monitoring periods than conventional subdural electrodes—up to four weeks

Responsive Neural Stimulation (NeuroPace™): Our program is a regional leader in the use of technology that allows for recording the termination of seizures with electrical stimulation by an implanted device.

Vagus Nerve Stimulation (VNS): Once a diagnosis is made, we offer the most advanced treatment options available. For more than a decade, our team has been involved in research related to every epilepsy treatment approved in the United States, including a number of drug and intravenous therapies, and vagus nerve stimulation (VNS) therapy.

Mischer Neuroscience Institute was the first in the region to perform VNS implantation and is the leading program in the United States, performing the largest number of epilepsy surgeries on pediatric and adult patients in Houston.
Laser Brain Surgery

We routinely use laser ablation techniques to destroy seizure foci located deep in the brain. Such techniques target hippocampal and amygdalar seizure foci, deep-seated cortical dysplasias, periventricular nodular heterotopias and tumors causing seizures.

Because every case is different, we use a variety of approaches and specifically apply them to a given situation. These include:

- Drug therapy, including trials of the most recently discovered drugs
- Ketogenic diet
- Focal surgical resections
  - Amygdalo-hippocampectomy
  - Lobectomy
  - Lesionectomy
- Hemispherectomy
- Corpus callosotomy
- Laser ablation
- Vagus nerve stimulation (VNS)
- NeuroPace RNS® System stimulation
Treating the Individual, Not Just the Condition

Treating the condition is just one piece of the puzzle. At Mischer Neuroscience Institute and Children’s Memorial Hermann Hospital, we go beyond the diagnosis and treatment of epilepsy by helping patients cope with their diagnosis. Specialized counselors are on staff to ensure that recently diagnosed patients have the emotional support they need. Music therapists help with the rehabilitation process, and Child Life Specialists address the specific needs of the pediatric patients and their families.

For more information about the Texas Comprehensive Epilepsy Program at Mischer Neuroscience Institute, or to schedule a consultation with one of the physicians, please call 832.325.6546 for medical evaluations and 713.500.5443 for surgical referrals.
Meet the Epilepsy Team

The team, all faculty members at McGovern Medical School at UTHealth, includes top specialists from all areas relating to the diagnosis, care and treatment of adult and pediatric epilepsy patients.

Nitin Tandon, M.D.
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Meet the Epilepsy Team (continued)

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For more information about the Texas Comprehensive Epilepsy Program, visit neuro.memorialhermann.org/epilepsy.

To view physician webinars on epilepsy diagnosis and treatments, visit neuro.memorialhermann.org/epilepsy-webinars.