# Epilepsy and Seizure Disorders - A Guide for Patients and Families

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Introduction

If you or someone you love has experienced a seizure, it can be frightening and overwhelming. However, remarkable advancements have been made in the world of neuroscience, and many adults can be treated successfully with a proper diagnosis. This guide was designed to help answer your questions and concerns about seizures and epilepsy and to provide you with the information, resources and support you need to better understand and manage your health while living with epilepsy.

About Us

The Texas Comprehensive Epilepsy Program at the Memorial Hermann Mischer Neuroscience Institute at the Texas Medical Center is a collaboration between Memorial Hermann-Texas Medical Center, Children’s Memorial Hermann Hospital, and McGovern Medical School at UTHealth. A Level 4 National Association of Epilepsy Centers-certified program, it is the leading program in the southwestern United States for the diagnosis and treatment of epilepsy in patients of all ages. We draw upon the combined expertise of board-certified neurologists and neurosurgeons with subspecialty training and experience in treating patients with epilepsy.

The Centers for Disease Control and Prevention estimates that more than 2.2 million people in the United States are affected by epilepsy, seizure disorders, or both.
What Is a Seizure?

A seizure can be a feeling or, more commonly, a set of behaviors, usually involving shaking of the body and loss of awareness, resulting from a sudden, uncontrolled surge in electrical activity in clusters of nerve cells in the brain. Some patients have behaviors that look like seizures but are not triggered by an abnormal surge in electrical activity in the brain. These events are called non-epileptic seizures. Diagnostic testing with continuous EEG is the best way to determine whether an action or behavior is due to epileptic seizure.

Epileptic seizures can be divided into two categories: those that are provoked by a reversible problem such as elevated blood sugar or acute renal failure, and those that are unprovoked.

What Is Epilepsy?

Sometimes referred to as a seizure disorder, epilepsy is the general term used to describe a condition that has caused two or more unprovoked seizures. It is a chronic neurological condition that results in repeated seizures. In addition to causing seizures, epilepsy affects a number of physical, mental and psychological functions. Although it is more common in the very young and the very old, epilepsy can develop at any age.

The frequency and severity of seizures vary from patient to patient. Some people have seizures every day, while others have them only once in a great while. Seizures come on suddenly, although some patients report some kind of feeling that may precede the seizure by hours. Some seizures cause a person’s muscles to stop moving completely or to tighten and relax very rapidly, and the person may appear to shake all over or slump over completely. Other seizures are much less dramatic, with the person appearing to stare into space or to experience spasms or twitches in only one part of the body. These obvious manifestations of seizures may be preceded by a purely subjective phase in which the person experiencing the seizure feels specific sensations related to the part of the brain involved in the triggering the seizure. These sensations, which are called auras, may include seeing flashing lights, feeling a sense of impending doom or feeling a tingling sensation in a limb. However severe the seizure, after it is over, the patient may feel very sleepy and may not remember the event.
Seizures vs. Epilepsy

Having a seizure does not necessarily mean a person has epilepsy. There are many reversible causes of seizures, including meningitis and other infections in the brain, hyperglycemia, hypoglycemia, hyponatremia (low salt levels in the blood), drug and alcohol withdrawal, and certain medications. If these problems are resolved, then the seizure does not recur and the person does not have epilepsy. Seizures triggered by these kinds of factors are called provoked seizures.

Unprovoked seizures cannot be explained by an obvious reversible problem. A person who experiences more than one unprovoked seizure is typically diagnosed with epilepsy.

Types of Epilepsy

Epilepsy can be divided into three main groups based on the underlying cause, or etiology.

Genetic Causes of Epilepsy
Epilepsy may result from a known or suspected genetic defect. It often manifests during childhood. In many cases, a family history exists. Dravet syndrome is one example of epilepsy caused by genetics.

Structural/Metabolic Causes of Epilepsy
Structural causes include acquired problems such as stroke or trauma, in which an abnormality can be seen on a patient’s brain scan. Genetic problems may also indicate a structural problem, such as brain tubers that develop in persons with tuberous sclerosis.

Unknown
Epilepsy where no etiology can be found is in this category.

What Causes Epilepsy?

It is estimated that half of all epilepsy cases have no clear cause. Some people with epilepsy may have been born with a neurological defect of a genetic condition. Sometimes, previously diagnosed brain conditions such as tumors or strokes can cause epilepsy, as can certain infectious diseases or brain trauma caused by accidents. With recent advances in imaging technology and genetic testing, a cause can be found in more cases of epilepsy. The team at the Texas Comprehensive Epilepsy Program makes a dedicated effort to find a cause or an etiology.
What Causes Seizures?

It can be difficult for doctors to identify the exact cause of seizures. They can be classified as either provoked or unprovoked. Provoked seizures are caused by factors such as drug and alcohol use or withdrawal, a lack of sleep, an adverse reaction to medication, a brain tumor, elevated blood sugar or low sodium levels in the blood. In general, such seizures are readily remediable by medical or surgical therapies directed at the provoking factor.

Unprovoked seizures are caused by factors that are not easy to readily correct, such as a congenital brain malformation, scarring from a brain trauma or old stroke, or from a genetic problem. Non-epileptic events can be caused by syncope (fainting spells), movement disorders or psychiatric disorders such as psychogenic non-epileptic spells, conversion disorder or depression.

Types of Seizures

The first step in deciding whether someone has epilepsy is making sure that the seizures are an epileptic seizure and not a non-epileptic seizure, such as syncope (fainting) or a psychogenic process. The second step is ruling out a provoked seizure, which can be treated by fixing the underlying issue, such as correcting the amount of sodium in the blood. If the events are epileptic seizures, an effort is made to classify the seizures as generalized or focal.

**Generalized seizures** occur when electrical impulses spread in both halves of the brain. They include:

- Myoclonic seizures, which produce sporadic jerking on both sides of the body
- Absence seizures, which are marked by a short loss of consciousness that produces a “blank stare” and “lost time”
- Generalized tonic-clonic seizures (formerly called grand mal seizures), in which the person usually loses consciousness and collapses, followed by a stiffening of the body and violent jerking
- Atonic seizures, which are marked by sudden and general muscle tone loss, usually in the arms and legs
**Focal seizures** are caused by electrical impulses generated by, and limited to, one hemisphere (half) of the brain. They include:

- Aura seizures ("warnings" or very small events that occur in isolation or are precursors to larger seizures) – these are focal seizures without impairment in consciousness, involving only psychic phenomenon such as fear or smell.
- Simple focal seizures – patient retains consciousness and has altered sense of hearing, smelling, tasting, seeing and tactile perception. These are focal seizures without impairment of consciousness or awareness, with observable motor or autonomic components such as arm twitches, hyperventilation, sweating and increased heart rate.
- Complex focal seizures (impairment of awareness or responsiveness) – these are focal seizures with impairment of consciousness or awareness, or dyscognitive features.
- A fourth kind of focal seizure that evolves into a generalized seizure – these are focal seizures that evolve to bilateral, convulsive seizures.

Most patients with focal seizures have an abnormal brain region that is triggering the seizures. These seizures can be treated with drugs, but can often be treated successfully with surgery.

**Multiregional seizures** are focal seizures that come from more than one part of the brain.

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**Refractory Epilepsy**

Some seizures cannot be controlled with seizure medications. This condition is referred to as refractory epilepsy. It may also be called "uncontrolled," "intractable," "refractory," or "drug resistant." Seizures caused by refractory epilepsy are frequent and severe enough, or the required therapy for them is troublesome enough, to seriously interfere with a person’s quality of life. The Texas Comprehensive Epilepsy Program offers groundbreaking treatments and clinical trials to its patients, providing them with access to the latest innovations and treatment options.
What to Expect in the Initial Evaluation

During the initial evaluation, you will be seen by a highly trained physician affiliated with the Memorial Hermann Mischer Neuroscience Institute at the Texas Medical Center and McGovern Medical School at UTHealth. These affiliated board-certified neurologists and epileptologists – neurologists who have had one to three years of training beyond that required for neurology and who focus solely on epilepsy – will review your history and perform a physical exam to help diagnose you. If you have previous records, bring them with you. You will likely be asked to get an electroencephalogram (EEG), which is a painless and noninvasive recording of electrical activity in the brain, and brain imaging with an MRI to help with the diagnosis. Once a diagnosis is made, treatment may be initiated. Our epilepsy team will work to provide the best treatment that is individually tailored for you, even if your seizures are difficult to control.

Treatment Options

A variety of medications and treatments can help those diagnosed with epilepsy. While most patients can control their seizures with medication, others may need a special diet, such as the ketogenic diet or the modified Atkins diet, or brain surgery to remove the abnormal brain tissue triggering the seizures. There are also treatments such as vagus nerve stimulation (VNS), which transmits electrical impulses to the vagus nerve in the patient’s neck, and the NeuroPace RNS® System, which transmits electrical impulses to the part of the brain that triggers the seizures. A new kind of laser treatment is also available and can be used in certain special situations. Many patients can also be enrolled in clinical trials of new medications.

The renowned epilepsy team at Mischer Neuroscience Institute is committed to helping patients lead the most normal and productive life possible by providing an accurate diagnosis through advanced technology, leading-edge comprehensive treatment plans, and the highest-quality care in a supportive and compassionate environment.
Medication
Although there is no known cure for epilepsy, medications can successfully control seizures in most people. After epilepsy is diagnosed, the first treatment is almost always an antiepileptic drug (AED). Your doctor will discuss with you the risks and benefits of the different medicines that are available to treat your epilepsy.

Ketogenic Diet
If your medications are not effective, or if they cause negative side effects, a ketogenic diet may be recommended. This is a special high-fat diet that severely restricts carbohydrates. It causes a metabolic change in the body’s brain chemistry and can be effective in reducing or eliminating seizures in patients who are candidates. This medical diet is closely supervised and requires a hospital stay of up to four days for introduction.

Vagus Nerve Stimulation
Another treatment option is vagus nerve stimulation (VNS), in which doctors implant a small device similar to a pacemaker near your collarbone. The device sends electrical signals to the brain and can reduce seizures by up to 40 percent.

Surgery
You may be a candidate for surgery if you have seizures that are extremely difficult to control, if your medications have proven ineffective or intolerable, and if you have seizures that occur in only one area of the brain. The epilepsy team will closely monitor you in our state-of-the-art Epilepsy Monitoring Unit before recommending any type of surgery.
Epilepsy Monitoring Unit

Many patients will require additional evaluation in our Epilepsy Monitoring Unit (EMU), which is the largest and most comprehensive unit of its kind in the region. Patients are referred to the EMU for:

• Diagnosis of recurrent spells to determine if the spells are epileptic seizures or recurrent non-epileptic, seizure-like events
• Optimization of seizure medications
• Evaluation for surgery

During their stay, patients are monitored 24/7 for even the smallest sign of seizure activity. The EMU is one of the only inpatient units in the country with a comprehensive set of diagnostic technologies, and the caregiver team constantly gathers and records data to help define and locate seizure activity within the brain.

During an **EMU Phase 1 Evaluation**, you will be admitted for a three- to five-day stay, during which you will undergo the following:

• **Continuous video EEG monitoring** to confirm seizure activity, type and location
• **Routine lab work** to establish a baseline for all anticonvulsant drug levels
• **Epilepsy protocol MRI** to provide precise brain structure details and identify any abnormalities or lesions that may be causing seizures
• **Neuropsychological testing** to help determine if seizures have altered any brain function such as memory, language, math skills and personality

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 our dedicated epilepsy team, offer hope for even the most severe drug-resistant cases of epilepsy while protecting the safety of patients.
After this initial evaluation, your case will be reviewed by our team of neurologists and neurosurgeons to determine whether further testing is needed to evaluate your surgical candidacy. Some of these tests may include the following:

- **Wada test** – combines neuroimaging and neuropsychological methods to examine the language and memory functions of the left and right brain separately and helps determine the best types of surgery for treatment
- **Magnetoencephalography (MEG)** – a neuroimaging technique that maps brain activity by recording magnetic fields produced by electrical currents in the brain
- **Positron emission tomography (PET) and single-photon emission computed tomography (SPECT) scans** – nuclear imaging techniques that study brain function and blood flow
- **Computerized tomography (CT) scan** – a neuroimaging tool that can help identify brain abnormalities
- **Functional MRI (fMRI)** – a neuroimaging procedure that uses MRI technology to measure brain activity by detecting associated changes in blood flow

Many of these tests will be performed on an outpatient basis. Our caregiver team will help you schedule any tests your physician recommends.
Meet Our Team

**Jeremy Slater, M.D.**
Neurologist
Director, Texas Comprehensive Epilepsy Program
Professor, Department of Neurology

**Nitin Tandon, M.D.**
Neurosurgeon
Chief, Epilepsy Surgery Program
Professor, Vivian L. Smith Department of Neurosurgery

**Meenakshi Bhattacharjee, M.B.B.S., M.D., F.R.C.Path.**
Neuropathologist
Professor of Pathology and Laboratory Medicine

**Jessica Johnson, RN**
Epilepsy Surgery Program Coordinator

**Joshua Breier, Ph.D.**
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Nuclear Medicine Specialist
Assistant Professor, Department of Neurology

**Omotola Hope, M.D.**
Neurologist
Assistant Professor, Department of Neurology
The multidisciplinary team of specialized caregivers at Mischer Neuroscience Institute is extensively experienced in the physical, psychological and social aspects of treating epilepsy. Although some patients will not need the services of each of these team members, our comprehensive program typically involves the care of a number of clinicians.

An **attending or primary physician** provides supervision and care for epilepsy patients’ medical problems and coordinates their treatment plans. He or she likely will be an epileptologist.

A **neurosurgeon** is a specially trained physician with expertise in treating conditions of the nerves, spine and brain. He or she may work with your neurologist to determine whether you are a candidate for surgical intervention to treat your epilepsy.

Our **nursing team** is skilled in providing the unique care required for patients with epilepsy, and they will care for you in an environment dedicated to your complete comfort and recovery. Registered nurses will direct your care with the support of other nursing professionals, including licensed vocational nurses, patient care assistants, advanced practice practitioners, clinical nurse specialists and nurse anesthetists.

The **epilepsy program coordinator** helps patients and family members understand clinical terms and manage treatment and post-treatment expectations. He or she also communicates with other team members and coordinates teaching needs.

A **social worker** assists patients and family members in planning ways to deal with social, emotional or financial problems that may arise during hospitalization. He or she may also assist in discharge planning.

A **case manager** helps coordinate admission and discharge plans based on each patient’s individual needs. He or she collaborates with other healthcare team members to educate patients and family members.

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**Support Groups at Mischer Neuroscience Institute**

At Mischer Neuroscience Institute, we go beyond the diagnosis and treatment of epilepsy by helping patients cope with their diagnosis.

Our Epilepsy Support Group meets on the first Thursday of each month at 6 p.m. in the Memorial Hermann Medical Plaza, 27th Floor, Suite 2730, across from Memorial Hermann-Texas Medical Center. A light dinner and parking validation for the Medical Plaza is provided to attendees.

To register or learn more, call 713.222.CARE.
Living with Epilepsy

Once you have been diagnosed with epilepsy, it’s important to remember to take medications daily exactly as prescribed and to discuss any questions or concerns with your neurologist. Anticonvulsant medications should never be stopped without seeking advice from your doctor.

- Always keep your scheduled follow-up appointments with your neurologist.
- Keep a seizure log to document the frequency and intensity of your seizures.
- Remember that you should never swim alone. Climbing heights is discouraged, as is operating heavy machinery. Driving in Texas is against the law for epilepsy patients unless their seizures are controlled by medications and they have been seizure-free for six months.

Know when to call your doctor or 911. A seizure that doesn’t stop after several minutes is a medical emergency that requires hospital treatment. Have someone call your doctor or 911, or head to the nearest emergency center right away if you experience any of the following:

- A seizure that lasts longer than five minutes
- Another seizure that starts as soon as the first one ends
- Difficulty in breathing
- Severe pain
- Difficulty returning to normal behavior following a seizure

Although living with epilepsy is not always easy, most people with epilepsy can lead a normal life. They can go to work, have friends, socialize, and do the same things as anyone else. However, learning to live with epilepsy takes a commitment from the whole family to learn as much as possible about your particular type of epilepsy and how it affects you specifically. It’s also imperative to know your rights and responsibilities, how to find support and resources for you and your family, and how to keep yourself safe while living the fullest life possible.

For more information about the Texas Comprehensive Epilepsy Program, call 713.704.7100.