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Epilepsy

What is epilepsy?

Epilepsy is a disease of the nerves that lasts a long time. It may even last a lifetime. People who have epilepsy are prone to seizures. They are caused by a sudden surge in electrical signals in the brain. But not all people who have had a seizure have epilepsy. A person has epilepsy if they have¹:

- ≥ 2 *unprovoked seizures* more than 24 hours apart
- 1 unprovoked seizure and a high risk ($\geq 60\%$) of having another one over the next 10 years
- An *epilepsy syndrome*

How common is epilepsy?

More than 2 million people in the U.S. have epilepsy.² As diseases affecting the nerves go, it is fairly common. In fact, it's the 4th most common one.² It's behind only migraine, stroke, and Alzheimer disease.

Any person, of any age, can have epilepsy. Seizures commonly first happen either in childhood or in old age.

What causes epilepsy?

These things can cause seizures:

- Alzheimer disease
- Brain tumor
- Chemical imbalance (low blood sugar, calcium, or magnesium; abnormal electrolytes)
- Problems during birth (eg, lack of oxygen)
- Certain conditions a baby is born with (eg, tuberous sclerosis, neurofibromatosis)
- Genetics (mutations/changes in a gene)
- Head trauma
- *Inborn errors of metabolism*
- Infections that scar the brain (eg, *meningitis*, *encephalitis*, *cysticercosis*, or *brain abscess*),
- Maternal drug use
- Stroke

Often, a cause cannot be found.



Definition of terms

- *Unprovoked seizure*: seizure that occurs "out of the blue"; there is no immediate cause connected to it
- *Epilepsy syndrome*: a group of epilepsy-related things that occur together; may include age at which seizures start, type and cause of seizure, gene change(s), triggers, etc.
- *Inborn errors of metabolism*: rare genetic disorders; baby is born with a defect in a single enzyme
- *Meningitis*: inflammation (swelling) of the covering of the brain; most often caused by an infection
- *Encephalitis*: inflammation (swelling) of the brain
- *Cysticercosis*: tapeworm infection in the brain
- *Brain abscess*: pus, swelling, and irritation of the brain caused by an infection

How do doctors diagnose epilepsy?

When a person has a seizure, doctors try to find out exactly what's going on. They start by learning everything they can about the seizure. They ask the person exactly what happened before, during, and after the seizure. Then they do a physical exam to look for conditions that might have caused the seizure. They might order blood tests to help with this. Next is a neurologic exam that may include tests for:

- The 5 senses (seeing, smelling, hearing, tasting, touching)
- Reflexes and muscle activity
- Walking and coordination
- Ability to remember words, do arithmetic, and name objects

That is followed by an electroencephalogram (EEG) to look at the brain's electrical activity. Finally, imaging studies may be done to look for too much spinal fluid, scar tissue, or tangles of blood vessels. Magnetic resonance imaging (MRI) is preferred. Computed tomography (CT) scans are also used.

How do doctors treat epilepsy?

Doctors first try to treat the cause of the seizures. If that is not possible, they may give the patient an antiepileptic drug. These drugs help prevent the seizures. They work for about 70% of patients.³ When drugs don't work, surgery or some type of nerve stimulation can be tried.

Some patients (ie, children with a certain mutation) can be successfully treated with a high fat, low carbohydrate diet.

How can the laboratory help?

Some seizures are caused by conditions that can be cured. Lab tests can help find out if that is the case in an individual patient. Tests that are used for this purpose include:

- CBC (complete blood count)
- Electrolytes (particularly sodium)
- Glucose (blood sugar)
- Spinal tap (to rule out infection in patients with a fever)
- Drug screen

Doctors sometimes order genetic testing that looks for changes (mutations) in a gene. Such testing can detect mutations that cause the epilepsy.

Doctors also use laboratory tests to monitor patients taking antiepileptic drugs. Doctors use these tests to look for side effects. They also use these tests to make treatment decisions. They include:

- CBC (complete blood count)
- Electrolytes (particularly sodium)
- Liver and kidney function tests
- Blood levels of the antiepileptic drug

Not all seizures look the same

All of these things can be a sign of a seizure:

- Staring spell
- Temporary loss of vision
- Experiencing an unusual taste or smell
- Tingling or numb feeling
- Feeling of being electrically shocked
- Forgetful, confused, or experiencing a memory lapse
- Loss of awareness of time
- Tremors, twitching, jerking, uncontrolled shaking
- Rigid, tense muscles
- Tongue biting
- Drooling
- Loss of control over urine or stool
- Trouble breathing
- Loss of consciousness

Partial seizures affect just one part of the brain. Generalized seizures affect both sides of it.

References

1. Fisher RS, Acevedo C, Arzimnoglou A, et al. ILAE official report: a practical clinical definition of epilepsy. *Epilepsia*. 2014;55:475-482.
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3. Schachter SC, Shafer PO, Sirven JI. Seizure and epilepsy medicines. Epilepsy Foundation Web site. <http://www.epilepsy.com/learn/treating-seizures-and-epilepsy/seizure-and-epilepsy-medicines>. Accessed June 27, 2014.