

# What is Epilepsy?

The brain is made up of billions of cells called neurons; these cells communicate by sending electrical messages to one another. During a seizure, groups of these cells send out bursts of energy in an uncoordinated manner. These discharges can cause seizures which may affect one's behaviour, perception, movement, consciousness, breathing, and/or other brain and body functions. A single attack is referred to as a seizure. A person who experiences repeated seizures is said to have a seizure disorder or epilepsy.

Most of the many different types of seizures are classified within 2 main categories: generalized and partial. Generalized seizures occur when the excessive electrical activity encompasses the entire brain. The most common forms are absence and tonic-clonic seizures. Partial seizures occur when the excessive electrical activity is limited to one area of the brain. The most common forms are simple partial and complex partial seizures.

Some people experience an aura — a partial seizure preceding a generalized seizure — which is often seen as a warning sign. An aura may be emotional (fear, anxiety), physical (dizziness, nausea), or sensory (tingling or crawling sensation on the skin, spots or colours before the eyes, strange taste or smell).

It is possible for anyone to have a seizure if the conditions are right. Everyone has a seizure threshold. The lower the seizure threshold, the more likely the brain cells are to fire at a lower level of stimulus, causing a seizure. Children tend to have a relatively low seizure threshold. This may help to explain why children often outgrow their epilepsy as their brain matures.

An individual's seizure threshold may be lowered by genetics, brain damage, sleep deprivation, missed medication, drug toxicity (too much medication), poor nutrition, caffeine, drug abuse, consumption of alcohol, full bladder, constipation, fever, colds, infections, menstrual cycle, heat, humidity, and emotional stress. In combination, some of these factors may lower one's seizure threshold even further.

## Causes of Epilepsy

Approximately 75% of all cases of epilepsy have no known cause. This is referred to as idiopathic epilepsy. The other 25% of cases may be due to trauma to the foetus during pregnancy or during birth, poisoning (lead poisoning, environmental contaminants), viral or bacterial infection (meningitis), alcohol or other drug abuse, head trauma (car accident or blow to the head), alteration in blood sugar levels, brain tumour, or stroke. In most cases, epilepsy is not inherited. However, a person may inherit a predisposition or tendency to have epilepsy if they are subjected to specific conditions. People who do not know the cause of their epilepsy often feel more anxiety about having the disorder. However, when the cause of epilepsy is unknown, the prognosis for epilepsy is not necessarily any worse.

## How to Identify a Seizure

Seizures may have many different appearances, which can be difficult to recognize. Some of the following *may* be indications that a seizure is occurring. Look for and make note of particular patterns of behaviour if they occur too often to be attributed to chance.

- ∩ daydreaming or short attention blackouts
- ∩ sudden falls for no reason
- ∩ lack of response for short periods of time
- ∩ unusual sleepiness and/or irritability when awakened from sleep
- ∩ rhythmic movements of the head (head nodding) or head dropping
- ∩ rapid blinking or upward eye rolling
- ∩ frequent unwarranted complaints from the child that things look, sound, taste, smell or feel "funny" or different than they actually are
- ∩ sudden bowing or bending movements by babies who are sitting down
- ∩ sudden stomach pain followed by sleepiness or confusion
- ∩ repeated movements or jerking movements that look out of place or unnatural
- ∩ memory gaps
- ∩ a blank stare followed by repetitive, meaningless movements
- ∩ dazed behaviour with the inability to communicate or talk for a brief period of time
- ∩ bed wetting or waking with a bitten tongue for no apparent reason
- ∩ lip smacking, chewing or swallowing

## Prevalence of Epilepsy

Approximately 1 to 2% of all people have epilepsy. 70 to 80% of those with epilepsy develop it before the age of 18 years. Of these, 44% develop epilepsy before age 5. There is a 10% lifetime risk of having at least 1 seizure. Depending on the type of seizure, 20 to 95% of individuals will go on to have more than 1 seizure, at which time they may be diagnosed as having epilepsy.

Seizures are seen very frequently in the first 10 years of life. This may be due in part to the low seizure threshold of some children. As the child's brain matures, the seizure threshold rises, making the child more resistant to seizures. As a result, most people who develop seizures during childhood or adolescence tend to experience a reduction in the intensity and frequency of seizures as they approach adulthood.

## Diagnosing a Seizure Disorder

Following a seizure, your child should visit a physician and/or paediatric neurologist for assessment. They will need a complete medical history, including:

- ∂ a description of the seizure(s) from those who observed it
- ∂ the child's description of what s/he experienced before, during and after the seizure
- ∂ a list of the events leading up to the seizure
- ∂ information about any other unusual events (focal twitching of a finger, toe, arm or leg; short periods of unresponsiveness; myoclonic jerks)
- ∂ general physical and neurological exams (blood tests, EEG, MRI scan, CT scan).

There are several conditions which may be mistaken for epilepsy because they may cause effects very similar to those seen in epilepsy. These conditions may include:

- ∂ reflex anoxic seizures (pallid syncopal attacks)
- ∂ fainting (syncope or vasovagal attacks)
- ∂ breath-holding attacks
- ∂ myoclonic jerks of sleep
- ∂ migraines
- ∂ hyperventilation
- ∂ non-epileptic attacks (NEAs, psuedoseizures, psychological seizures)
- ∂ febrile convulsions.

## For a current list of physicians of various specialties, contact:

College of Physicians and Surgeons of Ontario  
80 College Street  
Toronto, Ontario  
M5G 2E2

416-967-2603  
800-268-7096 toll free

<http://www.cpso.on.ca>

# Types of Seizures

**Partial seizures** affect only specific areas of the cortex of the brain. Consciousness is not lost during these types of seizures.

The two most common forms of partial seizures are ***simple partial*** and ***complex partial***.

## **Simple Partial Seizures** (formerly Focal Cortical Seizures)

A simple partial seizure originates in one area of the brain. The child will not lose consciousness during the seizure but will be unable to control various body movements. The child's senses may be distorted causing the child to see, hear, or smell things that are not real. S/he may also experience unusual feelings. The child will usually be able to talk and answer questions during the seizure and will likely remember what occurred during the seizure.

For some people, the first symptom of a seizure may be an aura. An aura is a form of simple partial seizure and is experienced as peculiar sensory or motor phenomenon. Auras have commonly been described as butterflies in the stomach, flashes of light, odd noises (buzzing in the ear), strange smells (burnt toast, rotten eggs), a powerful emotion or dizziness. When these occur, they are a good indication that a generalized seizure is about to occur. Children who experience auras can use them as a warning signal. Thus, it is helpful to teach the child about auras to help the child determine if s/he experiences them. When the child experiences an aura, s/he can take quick precautions to ensure safety and avoid potentially harmful situations.

**First Aid:** Comfort and reassure the child if s/he feels confused following the seizure.

**Duration:** Simple partial seizures usually last 2 to 10 seconds, although they may last longer.

## **Complex Partial Seizures** (formerly Psychomotor or Temporal Lobe Seizures)

A complex partial seizure is limited to one area of the brain. Children experience varying degrees of altered levels of consciousness. During the seizure, the child stops, stares and becomes unaware of the environment and may manifest any of a variety of "inappropriate" automatic behaviours (tapping the desk, picking at one's clothes, making chewing movements, wandering around). After the seizure, there is usually a period of confusion. These seizures are often misunderstood, and must be explained to others to allay misinformation, myth and prejudice.

**First Aid:** The child should be supervised and gently guided away from potential danger or to sit down. Do not restrain the child since s/he may instinctively lash out or become highly agitated. The child should be comforted both during and following the seizure.

**Duration:** Complex partial seizures usually last 2 to 4 minutes.

**Generalized seizures** affect the entire cortex of the brain and thus affect the entire body. Consciousness is lost during these types of seizures.

The two most common forms of generalized seizures are **absence** and **tonic-clonic**.

## **Absence Seizures** (formerly Petit Mal Seizures)

The entire brain is involved in an absence seizure. During the seizure, the child loses consciousness for a few seconds. It may look as if the child is daydreaming or the child may lose muscle control and make repetitive movements (eye blinking, slight movements or tugging at clothing). Because these seizures are brief and subtle, they may be difficult to recognize. Therefore, absence seizures are usually not diagnosed until many have occurred. They are likely to continue until the child is treated with medication. Parents often become very worried that they won't even know when their child is having a seizure. Others should be told of these seizures (especially teachers) so that they will be more tolerant of the child's apparent "daydreaming". Because these seizures may occur frequently, perhaps many times a day, they are likely to interfere with the child's functioning. The child will be unaware of these seizures when they occur and therefore needs to be told what has occurred, once s/he regains consciousness.

Generally, absence seizures are the most tolerated socially, as the attacks are brief and involve little physical change. Absence seizures usually respond well to medications.

**Tip:** To help determine whether the child is experiencing an absence seizure or daydreaming, touch the child on the shoulder. If the child responds, s/he is probably daydreaming.

**First Aid:** After the seizure, explain to the child that s/he just had a seizure and inform him or her of anything s/he missed.

**Duration:** These seizures may be frequent but each usually lasts only 2 to 10 seconds.

## **Tonic-Clonic Seizures** (formerly Grand Mal Seizures)

During a tonic-clonic seizure, electric discharges instantaneously involve the entire brain and consciousness is lost right from the beginning of the seizure. The child will suddenly become stiff (tonic phase), become unconscious, and fall to the floor. The child may let out a loud cry as the muscles in the chest contract and the air rushes between the vocal cords, making a sound. This cry does not indicate pain. Increased pressure in the bladder and bowel may cause wetting (urinary incontinence) or soiling (fecal incontinence). The child may bite the tongue which may cause bleeding. The extremities will then begin to jerk rhythmically (the clonic phase). Saliva that has not been swallowed during the attack may froth at the mouth. Breathing may be irregular as the respiratory muscles may be affected.

The period after the attack is referred to as the **post-ictal** state. During this time, the child will need to rest and it may be difficult to wake the child or get any response from the child during this time. The child may have a headache once s/he regains consciousness. There is no evidence that tonic-clonic seizures cause mental retardation or brain damage.

### **First Aid**

1. **Keep Calm.**
2. **Protect the child from further injury.**
3. **Do not restrain the child.**
4. **Do not insert anything in the mouth.**
5. **Roll the child on his/her side after the seizure subsides.**
6. **If a seizure lasts longer than 5 minutes, or repeats without full recovery — Seek Medical Assistance Immediately.**
7. **Talk gently to the child after the seizure.**

### **Duration**

A tonic-clonic seizure usually lasts 1 to 3 minutes but may last up to 5 minutes.

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If seizures last more than 5 minutes, or occur one after another without recovery between seizures, the individual may be experiencing *status epilepticus*. This continuous seizure state is a life-threatening medical emergency and requires immediate medical help.

# Status epilepticus

**Status epilepticus** is a seizure which lasts for a long time, or repeats without recovery. This prolonged or repeated seizure activity can result in death if it is not treated immediately.

Status epilepticus can be convulsive (tonic-clonic or myoclonic seizures) or non-convulsive (absence or complex partial seizures). A person in non-convulsive status epilepticus may appear confused or dazed.

Status epilepticus and its associated mortality are more common among seniors than in the rest of the population. (Mortality in status epilepticus is recognized as death within 30 days of the event.) The highest incidence of status epilepticus occurs during the first year of life and after age 60.

Status epilepticus may occur as the first manifestation of a seizure disorder, or it may occur in a person known to have seizures. Status epilepticus is usually treated in a hospital, where diazepam (Valium®) or lorazepam (Ativan®) is given intravenously. Phenobarbital is sometimes added intravenously. If your child is prone to status epilepticus, your doctor may teach you to administer diazepam or lorazepam suppositories at home. Although status epilepticus is not believed to cause brain damage, it should be stopped as soon as possible.

## Febrile Seizures

Febrile seizures are not a type of epilepsy. Febrile seizures can occur when a child has a high fever, most commonly above 38.3°C (101°F), and usually on the first day of a rapid rise in body temperature. A febrile seizure is usually seen in children between 6 months and 3 years of age; however, they can occur up to 5 years of age. Overall, the incidence of febrile seizures is higher in males than in females.

There are 2 types of febrile seizures: simple and complex. Simple febrile seizures are more common and relatively harmless. They usually last less than 15 minutes and have no after-effects. A neurological examination following a simple seizure will yield no abnormalities. Complex febrile seizures may be more threatening. They can occur at body temperatures lower than 38.3°C and can last longer than 15 minutes. Only 1 side of the body is affected during a complex febrile seizure and neurological reports may indicate abnormalities. In both cases, febrile seizures pose no threat of mental retardation, cerebral palsy, learning disabilities, or death.

The incidence of febrile seizures does not indicate a possibility of developing epilepsy. Less than 2% of children who experience febrile seizures will develop epilepsy later in life. Febrile seizures are classed as incidents rather than as a condition.

There are a number of possible causes of febrile seizures. A fundamental cause for all febrile seizures is a vulnerability of the brain to an oncoming seizure. Children have a higher susceptibility to seizure activity in the brain — a lower seizure threshold — because of their age and the immaturity of their body's immune system. Complicated by a rapidly rising fever and possibly the general condition of health, a febrile seizure may occur. Several other factors may increase the risk of febrile seizures: a family history of seizures, chronic maternal ill health, parental fertility problems, breech birth, Caesarean birth, small birth weight, developmental delay, and cerebral problems may increase the incidence of febrile seizures. Smoking and drug intake (including anti-epileptic drugs) during pregnancy can further increase the risk.

Febrile seizures are experienced by only 3-4% of children and only with a fever. With no family history of seizures, chances are very low for your child to have a febrile seizure. Certain precautions, including the use of medication, will reduce this chance. Reducing the child's body temperature will lower the seizure risk. To do this, cover the child's exposed body with wet (not ice

cold) cloths, since evaporating water lowers temperature. Fanning will speed up the cooling process. After drying the child's body, an analgesic is often prescribed to help stabilize the child's body temperature. Such drugs should be kept to the minimum amount prescribed by the child's physician.

Medications specific to febrile seizures, such as phenobarbital, offer another option. Phenobarbital is the most effective medication to prevent febrile seizures. Remember that it takes several days to accumulate an effective level of the drug in the blood and in the brain. Taking phenobarbital daily to maintain a specific amount in the blood may reduce the occurrence of febrile seizures. Because phenobarbital may cause hyperactivity, behavioral problems, sleep disturbances, hindered development of intelligence, learning disabilities, and dependence, it is usually prescribed only after many febrile seizures have occurred.

Although a seizure can be terrifying to a parent, stay calm and try to accurately assess the situation. A febrile seizure is usually mild and brief, often manifesting no more than a slight slumping and loss of consciousness, or a rolling of the eyes back in the head. Sometimes there may be convulsive stiffening and jerking, but there is no need to panic. Protect the child from sharp, hot, or otherwise dangerous objects. Loosen tight clothing. Do not put anything in the child's mouth. Do not restrict his/her movements. Roll the child on his/her side and try to keep everyone relaxed.

A febrile seizure produces no lasting effects. Only 25-30% of children who experience one will ever have another. Only when a seizure occurs within the child's first year **and** there is a family history of febrile seizures or epilepsy **and** if it was a complex seizure will the chances of another incident increase to 80% or above. Otherwise, the chances of another incident are reduced to as low as 10%. Febrile seizures are rare; recurrence even rarer. Febrile seizures have no lasting effects and children usually outgrow them after 5 years of age.

# Treatment of Epilepsy

Epilepsy may be treated with the use of drugs, surgery, behaviour modification and/or special diets.

Drug therapy is most common and is usually tried first. Up to 60% of people with epilepsy can control their seizures using medications. Different medications are prescribed for different seizure types. In order to be effective, a constant level of the prescribed medication must be in the blood. The dosage depends on the frequency of seizures, type of seizures, individual tolerance and other factors. Drugs do not cure epilepsy, they only control it.

The great majority of children with epilepsy maintain seizure control through daily medication. It may take a long time before the right medication and dosage are

determined. Frequent adjustments in dosage are also needed as the child grows. Be sure to advise teachers and other caregivers of all changes in dosage or drug type when they are adjusted by the physician. You should also discuss the possible side effects of each drug the child is taking.

Common drug side effects may include: drowsiness, lethargy, hyperactivity, loss of muscular coordination, double vision, confusion, slurred speech, nausea, increased body hair, tremors, anemia, sleep disturbances, loss of appetite, stomach aches, and gum swelling.

## Possible Seizure Triggers

- ∂ Not taking one's anti-seizure medication.
- ∂ Stress, excitement and emotional upset.

These may lower your child's resistance to seizures by affecting sleeping or eating habits.

- ∂ Boredom.

Research has shown that individuals who are happily occupied are less likely to have a seizure.

- ∂ Lack of sleep can change the brain's patterns of electrical activity and can trigger seizures.
- ∂ Fevers may make some children more likely to have a seizure.
- ∂ Alcohol can affect the rate at which the liver breaks down anti-seizure medication.

This may decrease the blood levels of anti-seizure medications, affecting an individual's seizure control.

- ∂ Poor diet.

- Many seizures take place when blood sugar is low.

Stimulants such as tea, coffee, chocolate, sugar, sweets, soft drinks, excess salt, spices and animal proteins may trigger seizures by suddenly changing the body's metabolism.

- Some parents have reported that allergic reactions to certain foods, such as white flour, also seem to trigger seizures in their children.
- Certain nutrient shortages, such as a lack of calcium, have also been found to trigger seizures.

- ∂ Menstrual cycle.

Many females find that their seizures increase around the time of their period.

This is referred to as catamenial epilepsy and is due to changes in hormone levels, increased fluid retention and changes in anti-seizure drug levels in the blood.

- ∂ Very warm weather, hot baths or showers.

These are possible seizure triggers, especially when there is a sudden change in temperature.

- ∂ Other medications that are taken in addition to anti-seizure medication.

- ∂ Television, videos, and flashing lights.

The 'strobe effect' from fast scene changes on a white screen, rapidly changing colours or fast-moving shadows on the TV, can all trigger seizures.

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# Safety Issues

## Bathing

Water is especially dangerous for children with epilepsy, so children should bath in low levels of water. The bathroom door should not be locked when the child bathes. As little water as possible should be used. However, if the child falls unconscious without making a sound, drowning is a possibility. Children with frequent seizures should take showers while sitting on a stool. Taking showers is safer than taking baths, but be aware that injuries may still occur. Even older children struggling to gain independence should ensure that someone else is home when they bathe or shower. They should not be permitted to bathe when there is no one else in the house. Children should be taught about the risks that they face, should they experience a seizure in the bath or shower when no one is else is home.

## Swimming

Children with epilepsy should swim under the watchful eye of lifeguards and/or responsible adults who are trained in lifesaving and ready to act in case of an emergency. Inform supervisors that the child has epilepsy so that they are ready to deal with a seizure, should one occur. While swimming, children with epilepsy should have a "buddy" who swims with them. Diving should be avoided because of the pressure it places in the head, but swimming is possible for many children with epilepsy.

## Head Protection

When a child has tonic (drop) seizures, the loss of posture may be so rapid that the child crashes violently to the ground. Because these types of seizures are difficult to control, the individual often is exposed to physical injury. Hence, helmets are often a necessity. Children with epilepsy should also wear a helmet whenever they will be participating in sports where there is a risk of head injury.

## Frequently Asked Questions about Epilepsy

### Can a person swallow their tongue during a seizure?

No, this is physically impossible since the tongue is attached to the bottom of the mouth.

### Can children "outgrow epilepsy"?

Approximately 30-40% of all children who develop epilepsy before the age of 16 years will outgrow their epilepsy before adulthood. Epilepsy is more likely to disappear on its own (spontaneous remission) in children than in adults.

### Can epilepsy be cured?

There is no cure for epilepsy.

However, seizures can be controlled using medication in approximately 60-80% of cases.

### Does epilepsy cause brain damage?

No, epilepsy causes no effect on intelligence, creativity or ability.

### Is epilepsy contagious?

No. You cannot "catch" epilepsy.