
ALL *about* SEIZURES



What is Epilepsy?

Epilepsy is a neurological disorder – a physical condition – which causes sudden bursts of hyperactivity in the brain.

This hyperactivity produces “seizures” which vary from one person to another in frequency and form.

A seizure may appear as

- a brief stare
- a change of awareness
- a convulsion

A seizure may last a few seconds or a few minutes.

Epilepsy

- is not a disease
- is not a psychological disorder
- is not contagious

Causes

In approximately 60-75% of all cases, there is no known cause. Of the remaining cases, there are a number of frequently identified causes.

Identifiable Causes

- brain injury to the fetus during pregnancy
- birth trauma (lack of oxygen)
- aftermath of infection (meningitis)
- head trauma (car accident, sports injury, shaken baby syndrome)
- substance abuse
- alteration in blood sugar (hypoglycemia)
- other metabolic illness (hypocalcemia)
- brain tumor
- stroke

Is There a Cure?

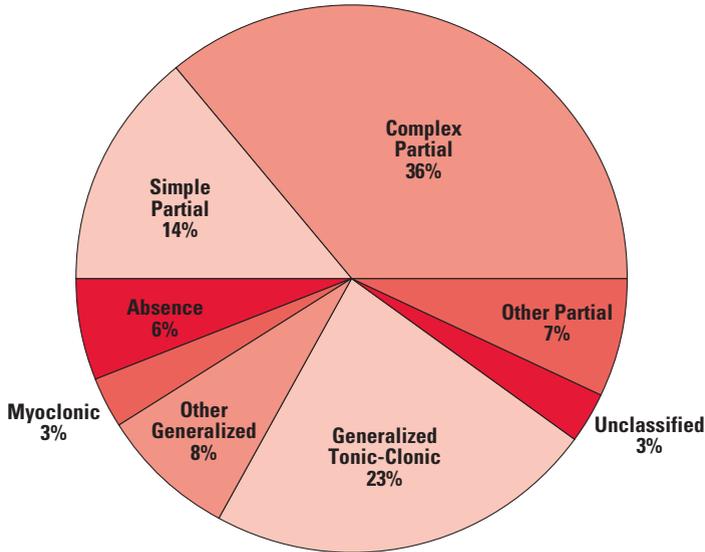
Although treatments are available to reduce the frequency and severity of seizures, there is no known cure for epilepsy.

Seizures

There are many different types of seizures.

Most are classified within 2 main categories: **partial seizures** and **generalized seizures**.

Incidence of Seizure Types



Based on information from:
Epilepsy — A Comprehensive Textbook, J Engel Jr & TA Pedley, editors
Lippincott-Raven, 1997.

Partial Seizures

Partial seizures occur when the excessive neural activity in the brain is limited to one area.

The 2 most common forms are:

- simple partial seizures and
- complex partial seizures.

Simple partial seizure: a person may experience a range of strange or unusual movements or sensations, such as sudden jerky movements of one body part, distortions in sight or smell, a sudden sense of fear or anxiety, stomach discomfort, or dizziness. These sensations may be described as an aura. An aura is a simple partial seizure which can occur alone, or can be followed by a generalized seizure.

Complex partial seizure: a person loses awareness as the seizure begins and appears dazed and confused. The person will exhibit meaningless behaviours such as random walking, mumbling, head turning, or pulling at clothing. These behaviours cannot be recalled by the person after the seizure.

Generalized Seizures

Generalized seizures occur when the excessive neural activity in the brain encompasses the entire brain. The 2 most common forms are generalized **absence seizures** and **tonic-clonic seizures**.

Absence seizure: during this type of seizure a person may appear to be staring into space and his/her eyes may roll upwards. This kind of seizure is characterized by 5 to 15 second lapses of consciousness and, when it has ended, the person will not recall this lapse of consciousness. Generalized absence seizures most often occur in childhood and disappear during adolescence. They are less prevalent in adulthood.

Tonic-clonic seizure: during this seizure a person will usually emit a short cry and fall to the floor. This cry does not indicate pain. The muscles will stiffen and the body extremities will jerk and twitch (convulse). Bladder control may be lost. Consciousness is lost and may be regained slowly.

Some medical conditions may cause seizures, these include: febrile seizures (caused by high fever in children), withdrawal seizures, and seizures caused by poisoning, allergic reaction, infection, or an imbalance of body fluids or chemicals (low blood sugar). These are not considered to be forms of epilepsy.

People who have lived with epilepsy for much of their lives may find that their seizures change as they age. The duration of their seizures may become longer or shorter; the intensity may worsen or improve and seizure episodes may occur more or less frequently. Seniors also demonstrate a high rate of newly-diagnosed cases of epilepsy.

While there is a 10% chance that a person will experience a seizure at some time during their lifetime, a single seizure is not considered to be epilepsy.

Postictal States

The “ictal” state is the time during which a seizure occurs. Postictal states commonly follow both tonic-clonic and complex partial seizures. As a person regains consciousness after a seizure, s/he may experience fatigue, confusion and disorientation lasting minutes, hours or even days (or, rarely, longer). S/he may fall asleep or gradually become less confused until full consciousness is regained.

For more information, please contact your local epilepsy association or visit www.epilepsyontario.org

Important

Status epilepticus, is a prolonged or continuous seizure state. It can be a life-threatening medical emergency.

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

If a seizure lasts 5 minutes or more, or occur one after another without full recovery between seizures – **immediate medical care is required.** Call 911

SUDEP

Sudden Unexpected Death in Epilepsy

The exact cause of this syndrome is unknown, and yet accounts for 12–15% of sudden deaths among people living with epilepsy. It most often strikes those between 20 and 40 years of age who have experienced seizures for more than a year.

Additional research and greater awareness about SUDEP is necessary. Autopsies reveal that 50% of affected patients had AED blood concentrations either below therapeutic levels or in completely undetectable amounts. It is unknown whether this is a result of poor compliance or metabolic issues.

Diagnosing Epilepsy

Diagnosis of a seizure disorder is based on the individual's medical history and diagnostic testing results.

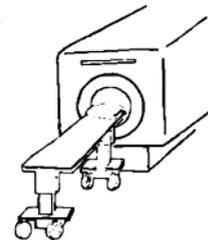
Medical History

A physician needs to know when the seizures started, and have a detailed description of an individual's seizures. The family's health history is also considered.

Diagnostic Tests

CAT Scan

Computerized Axial Tomography, also known as CT (Computed Tomography) imaging, is a safe and non-invasive procedure which uses low radiation X-rays to create a computer-generated, three-dimensional image of the brain. It provides detailed information about the structure of the brain by using a series of X-ray beams to scan the head to create cross-sectional images of the brain. These may reveal abnormalities (blood clots, cysts, tumours, scar tissue, etc.) in the brain which may be related to seizures. This allows physicians to examine this structure, section by section, as the test is being conducted. The CAT scan helps to point to where a person's seizures originate.



EEG



An **electroencephalogram** is a non-invasive test which detects and records electrical impulses on the surface of the brain. These impulses are transmitted from small metal discs, placed on the person's scalp, through wires which are connected to an electroencephalograph. This instrument is used to register this activity and

record it on graph paper or on a computer screen.

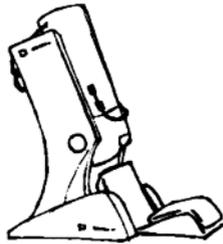
This is a safe and painless procedure.

An EEG is used by a neurologist to determine whether there is any irregular electrical activity occurring in the brain which may produce seizures. It can help identify the location, severity, and type of seizure disorder.

An abnormal EEG does not diagnose epilepsy nor does a normal EEG reading exclude it.

MEG/MSI

Magnetoencephalography, also called **Magnetic Source Imaging**, is a non-invasive scanning technique which provides information about the function of the brain. It is a safe and painless procedure that detects small biomagnetic signals produced by the brain, recording magnetic fields over the surface of the head. These signals provide information about the location of active brain areas. This technique allows doctors to investigate how different areas of the brain interact with one another.



MEG can help to identify brain zones which emit abnormal electric currents associated with epilepsy. It can “see” the magnetic fields associated with sensory areas of the brain by stimulating the senses during MEG recording sessions. It views the brain zones which control language by having the patient perform linguistic tasks during an MEG; and, identify the brain zones associated with learning and memory by having the patient perform cognitive tasks during an MEG. It is useful in planning surgical treatment of epilepsy and for pre-surgical functional mapping of the brain. It quickly provides high resolution images of the brain, used to compare function in relationship to behaviour.

MRI

Magnetic Resonance Imaging is a safe and non-invasive scanning technique that uses a magnetic field, radio waves, and a computer to produce two or three dimensional images of the brain. This detailed picture of brain structures helps physicians locate possible causes of seizures and identify

areas that may generate seizures. No X-rays or radioactive materials are used, therefore this procedure is not known to be harmful.



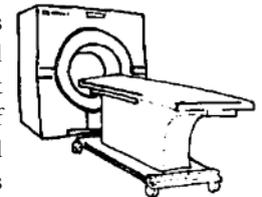
Because seizures can arise from scar tissue in the brain, an MRI offers doctors the best chance of finding the source of seizures. An MRI can show scar tissue and allow doctors to determine the nature of it. The images produced from the MRI are extremely precise. The information provided by MRI is valuable in the diagnosis and treatment of individuals with epilepsy and in determining whether surgery would be beneficial.

MSRI

Magnetic Resonance Spectroscopic Imaging is similar to MRI but while MRI looks at the signals detected from the protons of water in the body, MRSI looks at the signals detected from other proton-containing metabolites.

PET

Positron Emission Tomography is a scanning technique which detects chemical and physiological changes related to metabolism. It produces 3-dimensional images of blood flow, chemical reactions and muscular activity in the body as they occur. It measures the intensity of the use (metabolization) of glucose, oxygen or other substances in the brain.



This allows the neurologist to study the function of the brain. By measuring areas of blood flow and metabolism, the PET scan is used to locate the site where a seizure originates.

The PET scan provides information about metabolic activities, chemistry or blood flow by detecting how quickly tissues absorb radioactive isotopes. During a PET scan a small amount of radioactive substance is injected into the body. When this substance reaches the brain, a computer uses the recorded signals to create images of specific brain functions. A functional image of brain activity is important because

functional changes often appear before structural changes in tissues.

The information provided by a PET scan is valuable in the diagnosis of seizure type and in the evaluation of a potential candidate for surgery. PET images may therefore demonstrate pathological changes long before they would be made evident by other scanning techniques.

Functional MRI

Similar to PET, a functional MRI provides information about active brain tissue function and blood delivery. However, it is more precise in temporal and spatial resolution. It is an ideal tool in pre-operative planning because it can reveal the exact location of the seizure area.

SPECT

Single Photon Emission Computed Tomography is a functional imaging technique which creates 3-dimensional images of the brain on a computer, allowing physicians to visualize blood flow through different areas of the brain.

Individuals with epilepsy often have changes in blood flow to specific areas of the brain when a seizure begins. By measuring blood flow, the SPECT scan may help to identify where seizures originate. This test provides information about how well the various regions of the brain are functioning by measuring relative cerebral blood flow. This information helps a physician to more accurately diagnose the type of seizure, locate the site where a seizure originates, and evaluate a potential candidate for surgery.

The radiation exposure from a brain scan is minimal. It is in the range of 1 to 3 times your annual exposure to natural background radiation.

Testing equipment is constantly improving but is not available in all areas. For more information, consult your specialist, your local epilepsy association, or your provincial Ministry of Health.

Treating Epilepsy

Drug Therapy

Many seizures are controlled by anti-seizure medications, sometimes called anti-convulsants or anti-epileptic drugs [AEDs].

Monotherapy (using 1 drug), or polytherapy (using a combination of drugs) may be prescribed by your doctor. Different types of seizures require different medications. Some medications may produce numerous and unwanted side effects.

Response to Medication

On average, 70% of seizures are successfully controlled with one anti-epileptic medication. The remaining 30% of seizures are, thus far, resistant to medications.

History of Medications

For more than 100 years, various kinds of medications have been used to treat seizure disorders.

1861 – Bromides

The first medication used to control of seizures. Side effects were severe.

1912 – Phenobarbital

Effective, but sedating.

1936 – Phenytoin

Known as the "miracle drug" of its day.

Today – Many new medications are available, including a number approved since 1990.

The Future – Research continues to be done in an effort to find a safe, effective anti-convulsant.

Vagus Nerve Stimulation

Vagus Nerve Stimulation (VNS) involves periodic mild electrical stimulation of the vagus nerve in the neck by a surgically implanted device similar to a heart pacemaker.

VNS has been effective in controlling some epilepsies when anti-epileptic drugs have been inadequate or their side effects intolerable, and neurosurgery has not been an option.

Common side effects, which occur only during stimulation, may include a tingling sensation in the neck and/or mild hoarseness of the voice. Other possible side-effects may include coughing, voice alteration, shortness of breath, transient sensations of choking, throat pain, ear or tooth pain, and skin irritation or infection at the implant site. Unlike many medications, there seems to be no significant intellectual, cognitive, behavioural or emotional side effects to VNS therapy.

VNS is approved in more than 20 countries, and is now the second most common treatment for epilepsy in the USA.

Ketogenic Diet

This strictly supervised diet is prescribed for children. The diet is high in fat and low in carbohydrates. In many of the children who stick with the diet, seizures are brought under control and are eliminated - sometimes permanently.

Surgery

Surgery may be an option for the 30% of epilepsy cases that do not respond to medication. Surgery is used when the injured brain tissue causing the seizures can be identified and safely removed without damaging psychological or major body functions. This applies only to a small percentage of persons living with epilepsy.

Different types of operations may be performed, and generally fall into 2 main groups:

- removal of the area of the brain that produces the seizures;
- interruption of the nerve pathways along which seizure impulses spread.



Facts about Epilepsy

Age

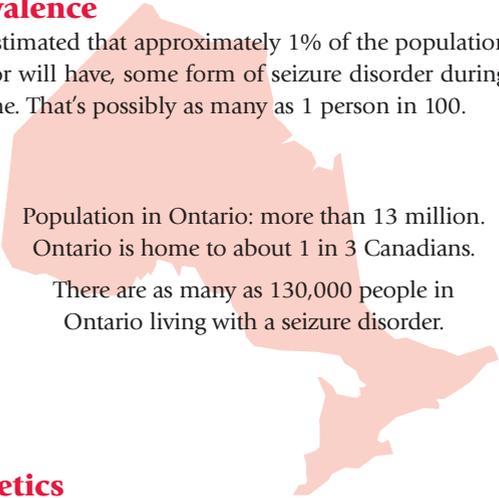
Epilepsy can develop at any age.

About 50% of new cases of epilepsy begin in childhood and adolescence, with the highest incidence during the first few months of life. Many people who develop seizures during their childhood or adolescence tend to experience a reduction in the intensity and frequency of seizures as they approach adulthood.

There is also a sharp increase in incidence later in life, with some studies showing almost 25% of new cases of seizures occurring after age 60, perhaps as a result of small strokes.

Prevalence

It is estimated that approximately 1% of the population have had, or will have, some form of seizure disorder during their lifetime. That's possibly as many as 1 person in 100.



Population in Ontario: more than 13 million.

Ontario is home to about 1 in 3 Canadians.

There are as many as 130,000 people in Ontario living with a seizure disorder.

Genetics

About 30% of seizures relate to a clear-cut abnormality in the brain. In the other 70% of cases the brain appears normal. In these cases, genetic causes are suspected. Multiple genes are involved, however, and inheritance does not follow simple Mendelian rules.

Medical Assistance

If you think that you or any member of your family might have a seizure disorder, contact your family physician. You or a family member may be referred to a neurologist, depending on individual circumstances.

Living with Epilepsy

Epilepsy can carry with it a host of social and psychological problems. Friends' and family's lack of understanding about seizure disorders is often due to ignorance and/or fear. This can sometimes lead to overprotectiveness or imposition of unnecessary restrictions on the individual.

Other personal issues may include insecurity, anger, frustration and depression.

Obstacles to Employment

Individuals with a seizure disorder who are physically able to work are often unemployed or under-employed. Of those with jobs, many have to accept positions well below their levels of education and ability.

The primary reasons for this are:

- employer apprehension
- discrimination against people with seizure disorders.

Public Awareness

For many, it is not the seizure disorder itself, but negative public attitudes which create a greater disability. Public information and education are vitally important to eliminate societal prejudice.

Driving

In Ontario, the Ministry of Transportation - www.mto.gov.on.ca makes all decisions about drivers' licences.

Who May Not Drive

- any person with uncontrollable seizures
- any person who has had seizures in the past 12 months
- any person who is presently taking anti-seizure medication which causes drowsiness or poor muscle control
- any person who requires medication to prevent seizures but persistently drinks alcohol to excess, or who does not comply with a physician's anti-seizure medication recommendations.

If any of the following conditions are met, a person with a seizure disorder may drive.

- febrile convulsions are limited to early childhood
- seizures were the result of a toxic illness which is now completely cured
- seizures appear to be prevented by medication
- the person has been free of seizures for 12 months and medication does not cause drowsiness or poor co-ordination
- the person has had a solitary seizure that cannot be related to a toxic illness, and has provided a full neurological examination revealing no epileptiform activity
- the person has had seizures only during sleep or immediately upon awakening for at least 5 years
- the person has been seizure free on medication for 1 year, and seizures recur because of the cessation of medication following a physician's instructions.

More Information

Contact your nearest Drive Test Centre - www.drivetest.ca - or Ontario's Ministry of Transportation for more information about:

- applying for a beginner driver's licence
- applying for a commercial licence
- suspension of a driver's licence
- appealing a licence suspension
- any other driving-related issue.

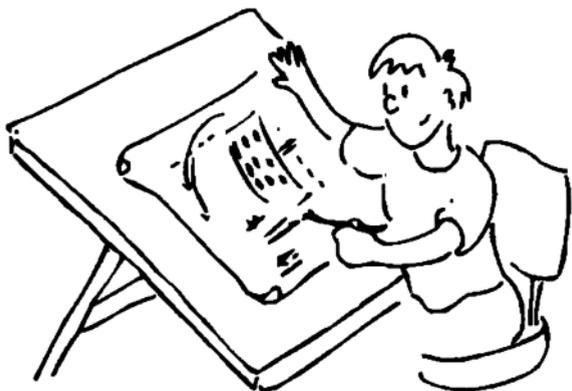
School

General Guidelines

Students with seizure disorders can progress normally through growth and developmental stages. They are active and are interested in the same activities as their peers. They should be encouraged to take part in all regular school activities, including sports.

Problems at School

If a student with a seizure disorder is experiencing academic or social problems at school, assistance is available. For academic problems, ask to see the Special Education Consultant for your area, or contact your local epilepsy association agency.



Employment

Career Goals

The majority of individuals with seizure disorders are able to enjoy meaningful employment. In fact, it has been demonstrated that people with epilepsy are often more productive, with less absenteeism, than their peers.

It is important for young adults with seizure disorders to work with their school's guidance department to establish meaningful and appropriate career goals. There are programs designed to assist in training and employment. These change regularly. Contact your local epilepsy association agency for the most current information.

Financial Assistance

Canada Pension Plan (CPP)

The Canada Pension Plan provides for the payment of disability pensions to eligible CPP contributors and for the payment of benefits to their dependent children.

Eligibility

To be eligible for a disability pension from the CPP, an applicant must:

- be disabled according to the terms of the CPP legislation
- have made sufficient contributions to the plan
- be less than 65 years of age

Disability Conditions

The disability must be a physical or psychological impairment that is both severe and prolonged. That is, the disability must seriously affect the contributor's ability to earn an income, and must be likely to do so for more than a temporary period.

Contributory Requirements

Generally, according to the web site of Human Resources Development Canada, contributions must have been made in 4 of the last 6 years of the contributory period. During that period, you must have earned at least 10 per cent of each Year's Maximum Pensionable Earnings (YMPE). Visit Service Canada. www.servicecanada.gc.ca

Applications

Applications should be made as soon as the disability condition seriously affects an individual's ability to earn and if it will last more than a temporary period.

Information

More information about CPP Disability Pensions can be obtained from an Income Security Programs Client Service Centre. Telephone numbers and addresses are listed in all telephone directories under "Human Resources and Skills Development Canada, Income Security Programs". www.hrsdc.gc.ca

Ontario Disability Support Program

Persons with seizure disorders who are unable to work may apply for income or employment support through the

Ontario Disability Support Program of the Ontario Ministry of Community and Social Services. Contact your nearest regional office for more information. www.mcass.gov.on.ca

Emergency Assistance

Emergency short-term financial assistance may be available from Ontario Works. Contact your local municipal Ontario Works office for current information. Visit the Ministry of Community and Social Services. www.mcass.gov.on.ca

Drug Benefit Program

Special assistance is available for anyone who has extraordinary drug costs, such as high prescription medication costs. A special needs assessment is completed for each applicant. Eligibility is based on monthly income.

Apply through the Ontario Drug Benefit Program, Ontario Ministry of Health and Long-Term Care, or your local municipal Community Services department.

Trillium Drug Plan

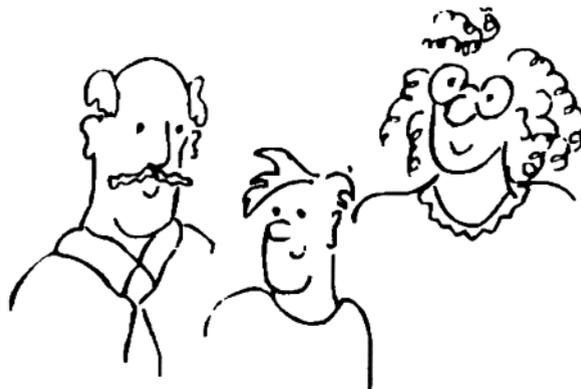
The Trillium Drug Plan is a supplementary insurance program offered by the provincial government. It is for people whose drug costs are not fully covered by a private insurance plan and who spend a large part of their income on prescription medications. Coverage is based on family income and expenses. It covers the costs of drugs listed in the **Ontario Drug Benefit Formulary**. Medications not listed in the Formulary may be covered if your prescribing physician submits a request under the "Section 8 Mechanism".

www.health.gov.on.ca

Travel Grants

Travel grants are available for persons who must travel distances of more than 200 kilometres each way for medical attention. A doctor's referral is required. Grant applications are available through a family physician and may be submitted after each trip.

When reserving tickets for travel, check with the carrier's customer service department: many modes of transportation offer special fare discounts for those with a doctor's certificate. Many offer free transportation to a medically-required attendant.



Support Services

A broad range of support services are available through Epilepsy Ontario and our network of affiliated local epilepsy association agencies.

Some of the many programs and services which improve the quality of life for people living with epilepsy include:

- information and education services
- toll free information phone line
- literature/videos/multimedia
- Resource Centre and lending library
- **Kids on the Block™** puppet troupes for children in kindergarten through Grade 7
- "Perfection" interactive play for youth and children
- speakers bureau
- provincial and local newsletters
- medical forums and conferences
- workshops about employment, etc.
- children's camp and Summerfest
- counselling and referral services
- advocacy and human rights support
- support groups
- OBCL Scholarships
- tips about living with epilepsy
- service dogs, trained to assist those with severe seizure disorders
- agency/contact development

* Please note: Services vary from region to region. Not all of these programs and services are available in every region of Ontario.

First Aid for Seizures

Tonic-Clonic (Convulsive) Seizures

Keep Calm.

- Seizures may appear frightening to the onlooker.
- Seizures usually last only a few minutes and generally do not require medical attention.
- Remember that the person having a seizure may be unaware of their actions and may or may not hear you.

Protect from further injury.

- If necessary, ease the person to the floor.
- Move any hard, sharp or hot objects well away.
- Protect the person's head and body from injury.
- Loosen any tight neckwear.
- Do not restrain the person.
- If danger is imminent, gently guide the person away.
- Agitation during seizure episodes is common.
- Trying to restrain or grabbing hold of someone having a seizure is likely to make the agitation worse and may trigger an instinctive aggressive response.

Do not insert anything in the mouth.

- A person will not swallow their tongue.
- Attempting to force open the mouth may break the teeth or cause other oral injuries.
- If a person starts to bleed from the mouth, do not panic. They probably have bitten their tongue and are not bleeding internally.

Roll the person on their side after the seizure subsides.

- This enables saliva to flow from the mouth, helping to ensure an open air passage.
- If there is vomit, keep the person on their side and clear out their mouth with your finger.

If a seizure lasts longer than 5 minutes, or repeats without full recovery – SEEK MEDICAL ASSISTANCE IMMEDIATELY. CALL 911.

- Although this rarely occurs, status epilepticus is life-threatening and is a serious medical emergency.

Talk gently to the person.

- After any type of seizure, comfort and reassure the person to assist them to reorient themselves.
- The person may need to rest or sleep.
- If the person wanders, stay with them and talk gently to them.

Check for a MedicAlert™ bracelet or other medical ID

- The bracelet or necklet may indicate the seizure type and any medication the person is taking. If you call the MedicAlert hotline, an operator can direct you in first aid procedures and may direct you to call emergency contacts and physicians listed in the member's file.

If a child experiences a seizure, notify the parents or guardians

Complex Partial Seizures

- Do not restrain the person.
- Protect the person from injury by moving sharp objects away.
- If wandering occurs, stay with the person and talk quietly.

Absence Seizures & Simple Partial Seizures

- No first aid is required.
- Reassure the person.

Seizures - Things to Remember

When you see someone having a seizure, do not be frightened. Remain calm and remember:

- Once a seizure has started, you cannot stop it – just let it run its course.
- During a seizure, a person often stops breathing for only a few seconds.
- If a person starts to bleed from the mouth, s/he has probably bitten their tongue and is most likely not bleeding for any other reason. This can be taken care of after the seizure ends.
- Most seizures last only 1-2 minutes, although the person may be confused for some time afterward.
- The brain almost always stops the seizures safely and naturally.
- Only in emergencies, doctors use drugs to bring a non-stop seizure to an end.
- People don't feel pain during a seizure, although muscles might be sore afterward.
- Seizures are usually not life threatening, but the risk is increased in seniors by extra strain on the heart, the possibility of injury, or reduced intake of oxygen.
- Seizures are not dangerous to others.



Suite 308, 1 Promenade Circle
Thornhill, Ontario L4J 4P8

905-764-5099
1-800-463-1119

fax 905-764-1231

info@epilepsyontario.org
www.epilepsyontario.org

Charitable Reg #11890 0844 RR0001



For local information and support,
call 1-866-EPILEPSY (374-5377)

©2002 Epilepsy Ontario
rev. 0610