

Common Tests Used to Diagnose Epilepsy

EEG: Electro Encephalo Gram

SPECT: Single-Photon Emission Computed Tomography

PET: Positron Emission Tomography

CT SCAN: Computed Axial Tomography

MRI: Magnetic Resonance Imaging

MEG: Magneto Encephalo Graphy

OHIP Coverage: Epilepsy diagnostic testing is covered under the Ontario Health Insurance Plan (OHIP), when prescribed by a doctor.

EEG

An **Electro Encephalo Gram (EEG)** is a non-invasive and painless diagnostic test used to measure electrical impulses between brain cells. By placing electrodes on your scalp, the frequency of these impulses can be measured and recorded on a graph.

Abnormalities in your regular brain waves can be used to identify the presence, location and severity of your seizures.

What can I expect?

You will be told to wash your hair the night before you arrive at the hospital (no conditioner or gel). You may also be asked to avoid caffeine 8 hours prior to your EEG appointment.

When you arrive at the hospital, you will be asked to either sit or lie down comfortably. A technician will measure your head and use wax to mark areas where the electrodes will be placed. A thick soap will then be applied to these areas. The electrodes, which are wired to a computer, will then be placed on your head with cream. Some hospitals may use a rubber cap with attached electrodes.

You will be asked to perform several tasks such as:

- stare at a flashing light
- breathe deeply
- open and close your eyes

Time: This test usually lasts about 60 minutes.

SPECT

A **Single-Photon Emission Computed Tomography (SPECT)** is a diagnostic imaging technique that measures blood flow through your brain. A small amount of a radioactive tracer will be introduced into your body that will emit particles measured by a SPECT camera. The greater the blood flow, the more particles are emitted. This allows doctors to visualize the functions of certain parts of your brain.

As the data is collected, an image of the brain is generated with different coloured areas to represent varying amounts of blood flow. This information will indicate if certain areas of your brain are getting too much or too little blood (and oxygen). Areas where seizures occur usually show increased blood flow.

This test is not usually necessary for diagnosing epilepsy. If your doctor recommends a SPECT test, you will likely also require an MRI.



What can I expect?

When you arrive at the hospital you will be asked a series of questions about your medical and seizure history and the possibility of pregnancy. You will then be led to a room where the radioactive tracer will be administered. It is often given by a needle but sometimes can be inhaled as a gas. You will then be required to wait for 10-20 minutes.

Next you will be led to the examination room where you will be asked to lie on a padded bed. During the test, the SPECT camera will circle your head. The camera may move very close to your head but will not touch it, it may however, brush against your shoulders.

Time: Test preparation will take approximately 30 minutes. The test itself will take an additional 30 minutes.

PET

A **Positron Emission Tomography (PET)** is an imaging technique that measures your brain's activity through its use of sugar and oxygen. Radioactive tracers are introduced into your body which release tiny particles called positrons. These positrons react with electrons in your bloodstream, releasing energy. Computers are able to generate images of your brain activity, using the data gathered from measuring the released energy.

This data enables doctors to determine where your seizures occur.

What can I expect?

You may be asked to wear a hospital gown and remove any metallic objects on your person (eg. jewellery, piercings).

You will be asked to lie down on a table and the tracer will be administered via an IV in your arm. Next, the table you are lying on will enter a doughnut shaped hole in the middle of the machine and a camera will rotate around you.

Time: This test lasts approximately 60 minutes.

After the test you will be told to drink lots of fluids the following day to flush the tracer out of your system.



CT Scan

A **Computed Axial Tomography scan (CAT or CT scan)** is a non-invasive and painless test. CT scans produce cross-sectional images (tomographs) of areas in your body that will be examined by doctors to look for abnormalities (eg. scar tissue, blood clots or tumours). For epilepsy, this usually involves a scan of your head to look for possible origins of seizures.

The machine looks like a large box with a donut shaped hole in the middle (a gantry). You will lie on a platform that slides in and out of the gantry as the x-ray rotates around you.

Low radiation x-rays pass through your body and are captured by detectors. Computers use this information to produce a 2-D image of the area.



What can I expect?

You may be asked not to eat several hours before the scan. Depending on what is being scanned, an iodine based liquid may be given to you through a needle. Do not be alarmed if you feel a warm sensation spreading across your body or have a metallic-like taste in your mouth.

You will need to wear a hospital gown and remove all metallic objects near the area being scanned (eg. earrings, dentures, piercings)

Children may be given a mild sedative (orally) if they are unable to stay still for the test. If this is the case, your child will be told not to eat anything eight hours prior to the test.

Time: The test can last between 10-60 minutes.

MRI

A **Magnetic Resonance Imaging (MRI)** is a non-invasive diagnostic test that uses a powerful magnet to measure magnetic field changes in the brain. MRIs produce many detailed cross-sectional images ("slices") of the brain's internal structure. These images can be used to detect structural abnormalities and may help pinpoint the cause of seizures. This is considered to be the most important scan when diagnosing epilepsy because it produces a very accurate representation of your brain.

This procedure is generally non-invasive, although a contrast dye may be administered by a needle to provide the doctor with a clearer image. Functional MRIs (fMRIs) monitor neural signals through changes in blood flow.



What can I expect?

The technologist will ask if you have any metallic objects in your body (eg. Dental Fillings), that may interfere with the magnets. You will be asked to remove any metal accessories such as jewellery or piercings. Also some tattoos may interfere with test as well. You will need to wear a hospital gown.

If the contrast dye is required, a nurse will insert a small IV tube into your arm. The dye will be added directly before the scan.

The MRI machine is a large metal box with a tunnel-like donut-shaped hole. You will lie down on a table with your head in a headrest. A cage will be lowered over your head but you will still be able to see and breathe. You may also wear earplugs or goggles. During the test, the table will slide in and out of the machine. This can be quite loud at times, but many people fall asleep during the test.

Time: The scan usually takes about 60 minutes.

Open MRI

Traditional MRI machines are 'donut-shaped' enclosed spaces. An open MRI offers the same advanced diagnostic imaging as a typical MRI but is open on all four sides. This enables patients who might be claustrophobic or have a larger body type to undergo an MRI with greater ease. Open MRI systems accommodate all sizes of patients and are often quieter.

Open MRIs are available at private clinics only. Ontario residents can visit Buffalo MRI in Buffalo, U.S. There will be fees for tests.

MEG

A **Magneto Encephalography (MEG)** is a new tool used to generate a representation of your brain's magnetic fields. By analyzing brain activity, the MEG can help localize areas in your brain causing the seizures. Doctors can then use this information to help determine what is provoking your seizures.

What can I expect?

You will be told not to wear makeup, hairspray or jewellery and will be asked to wear a hospital gown. A technician or doctor will ask you a series of questions regarding your medical history and if you have any metallic objects in your body (eg. Dental Fillings) that may interfere with the magnets. If so, another machine will move over your body to erase the interference.

Metal electrodes will be placed on your head and heart. Metal coils will also be attached to electrodes placed on your forehead.

During the test you will recline on the MEG chair and be given pillows and blankets for comfort. Sensors will then be placed over the top of your head, while your face will remain uncovered.

Time: This test usually lasts approximately 1-2 hours.



308-1 Promenade Circle
Thornhill, ON L4J 4P8

905-764-5099
1-800-463-1119
Fax: 905-764-1231

www.epilepsyontario.org

Charitable Reg # 11890 0844 RR0001

Content: Michael Salna
Cover Design and Layout: Paul Tarascio
Photos with permission from: Philips Healthcare



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

©Epilepsy Ontario August 2010

Diagnosing Epilepsy

