



# EPILEPSY YORK REGION

## DIAGNOSING EPILEPSY

Diagnosing Epilepsy involves a series of tests and procedures. Physicians will initially take a person's medical history including their family's health history. Health care professionals will need to know when the seizures started and a detailed description of the seizures; what a person was doing before the seizure and how long it lasted are examples of things to record and pass along to your Doctor. Diagnosis of a seizure disorder is based on the following considerations and diagnostic tests.

### 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 passing through the head to create cross-sectional images of the brain. These may reveal abnormalities (blood clots, cysts, tumours, scar tissue, etc.) in the skull or 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 - the instrument used to register this activity and record it on graph paper or on a computer screen.

This safe and painless procedure will not affect you in any way.

An EEG is used by a neurologist to determine whether there are any irregular electrical activities 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 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; "see" the magnetic fields associated with sensory areas of the brain by stimulating the senses during MEG recording sessions; view the brain zones which control language by having the patient perform linguistic tasks during MEG; and, identify the brain zones associated with learning and memory by having the patient perform cognitive tasks during 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.

An MRI offers doctors the best chance of finding the source of seizures. Because seizures can arise from scar tissue in the brain, 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.

## MRSI

Magnetic Resonance Spectroscopic Imaging is similar to MRI except that, 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 from which a seizure originates.

The PET scan provides information about metabolic activities, chemistry or blood flow by detecting how quickly tissues absorb radioactive isotopes. A small amount of radioactive substance is injected into the body. When this substance reaches the brain during the scan, a computer uses the recorded signals to create images of specific brain functions. A functional image of brain activity is important because functional changes are often present 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 your 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 small. It is in the range of 1 to 3 times your annual exposure to natural background radiation.

Information provided is not intended to replace any medical advice provided by your physician or neurologist. It is intended to supply general information on epilepsy and seizures. For further medical information or specific diagnostic questions, please refer your concerns to your physician or neurologist.



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