Seizure Smart

EPILEPSY ACTION AUSTRALIA

EVALUATING EPILEPSY

This is a brief guide to the tests that assist in diagnosing epilepsy. Not everyone will need every test. For example, CT and MRI are rarely useful in people with genetic epilepsy forms, while PET and SPECT are mostly used when undergoing assessment for surgical treatment. If you're unsure why your doctor ordered particular tests and not others, you are advised to ask.

The EEG

An electroencephalogram (EEG) is a recording of the brain's electrical rhythms. It is simple, painless and harmless. Small discs called electrodes are placed on the surface of the scalp by parting the hair and holding them in place with temporary glue, or sometimes a special cap. The electrical activity of the brain is recorded, and may reveal changes that are helpful in diagnosing epilepsy.

An EEG usually takes about one hour. The person relaxes with eyes closed for most of the test, and may be asked to open and close their eyes at various times, breathe deeply for a few minutes and later be exposed to a flashing light. These measures may provoke changes in the EEG. An EEG performed while asleep can give added information. No electricity from the machine passes into the person's brain during the procedure.

EEG ambulatory monitoring

In certain cases it is necessary to obtain a recording over several hours or days. A compact portable EEG recorder may be worn which records brain activity while the person carries out normal daytime activities, and during sleep. The person will also be asked to keep a diary of symptoms.

EEG/video monitoring

At times it is necessary to perform simultaneous EEG and video recording. This combined information can be valuable in understanding a person's seizure activity. Continuous monitoring may be needed for hours or days, depending on the frequency of symptoms and seizures.

At times it is necessary to admit the person to hospital for several days, sometimes reducing or withholding medication to make seizures more likely.

CT scanning

Computerised Tomography (CT) is a non-invasive test, which uses x-rays to take pictures of the brain, displayed as cross-sectional images or slices. The person lies on a table, and the head of the table is placed into the CT unit. Pictures are taken at many angles to generate the brain images. Sometimes a dye is injected into a vein of the arm or hand to enhance the quality of the images. The entire procedure takes 30-45 minutes.

The test is painless except for the discomfort of the injection if this is required. Rarely, the person may experience an allergic reaction to the dye. This may cause a skin rash, mild symptoms of flushing, nausea and some difficulty with breathing.

As complete stillness is required during the test, young children and people with an intellectual disability may require sedation or a light, general anaesthetic.

MRI scanning

MRI or Magnetic Resonance Imaging produces extremely clear and detailed images of the brain without the use of x-rays. The person lies within a strong magnetic field and radio frequency waves are used to produce energy changes in the brain that are measured and then used to generate images, either two or three dimensional. The magnetism and radio frequency waves appear safe and they are not known to harm the cells.

For an MRI, the person is put on a table and placed inside the scanner, which is like a tunnel. As this can be distressing for those who dislike confined spaces, a mirror at the person's head provides a view of the room and the operator, while a call button and an intercom allows contact.

During the scan, the machine makes a metallic thumping noise, like the beating of a drum, and if the sound is annoying wearing earplugs can help.

Again, complete stillness is required during this test and young children and people with an intellectual disability may require sedation or a light, general anaesthetic. The entire procedure takes 30-60 minutes.

SPECT scanning

Single Photon Emission Computerised Tomography (SPECT) also uses a computer to generate pictures that look at the blood flow within the brain. A radioactive substance is injected into a vein and is carried to the brain in the bloodstream. Areas of the brain where blood flow is increased will contain more radioactivity and produce brighter images. A scan is then performed which produces a picture of the brain showing where blood flow is increased or decreased. Blood flow in the area triggering seizures can be reduced in between seizures and temporarily increased during seizures.

Scans usually take 20-30 minutes and are usually performed in hospital as part of EEG/video monitoring for surgical assessment.

PET scanning

Positron Emission Tomography (PET) appears similar to SPECT but the radioactive substance goes to areas of the brain that are actively working, so it tests the glucose metabolism within the brain. In the area triggering seizures, brain cells are often functioning at lower levels between seizures.

The actual process is similar to what the person experiences with CT, MRI or SPECT. PET uses similar cameras to SPECT. Fasting is generally necessary prior to scanning and the scan takes approximately 30-60 minutes. EEG monitoring may also need to be performed during the PET.