



Tests and scans

Some of these tests may be done very soon after admission to hospital as the doctors need to rapidly assess the danger of the brain injury worsening.

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What the tests examine

Neurologic tests fall into two groups: tests that examine the structure of the brain and those examining the function of the brain. The first group includes the CT Scan and MRI, the second group includes the EEG, SPECT scan, PET scan, and evoked studies. These tests are commonly used after a traumatic brain injury (TBI), but could also apply for other types of brain disorder as well.

The long-term effects of a brain injury may not be evident for some time. At best, those with a mild brain injury may be able to return to work but will spend the rest of their lives battling a range of Cognitive problems. Others will find themselves dependent on others for the rest of their lives, while the most unfortunate may never emerge from a state of Coma.

MRI, CT and MRA

The MRI (Magnetic Resonance Imaging) and CT (Computed Tomography, also known as CAT - Computerized Axial Tomography) scan the brain in cross sections. MRI does this with magnetic fields; the CT scan uses x-rays.

The MRI has a higher degree of resolution than the CT scan so trauma seen by MRI may go unseen by CT scan. The X-rays used in CT scans are better at detecting fresh blood while the MRI scan is better at detecting the remnants of old hemorrhaged blood, or damaged but intact nerve tissue.

CT scans may be done frequently after the injury to keep an eye on the amount of brain injury. The MRA (Magnetic Resonance Angiogram) is a specialized form of MRI which detects blood vessels instead of brain tissue and can be used to check for bleeding or for the health of blood vessels.

EEG

The Electroencephalogram records the ever changing but tiny electrical signals coming from the brain using electrodes placed on the scalp. Slowing of electrical activity in some areas of the brain while the person is awake may indicate a lesion. Widespread slowing may indicate a widespread disturbance of brain function. Waves of electrical discharges indicate an irritable area of the cerebral cortex.

If allowed to spread, these spikes can produce a seizure. A Quantitative EEG is capable of creating a map of the brain's electrical activity throughout the day. Comparison with a typical EEG makes it possible to localize areas of slowing of electrical activity. Alone, a QEEG is insufficient to diagnose brain damage but can help to confirm other tests.



PET scan

Positron emission tomography measures concentrations of positron-emitting radioisotopes within brain tissue. The brain uses glucose for energy so glucose molecules are given a radioactive "tag" and then breathed in by the patient. The person places their head under a large Geiger counter that is able to detect areas of the brain that are not using enough glucose.

Combined MRI & PET

The combined MRI/PET scan was announced in June 2007. The technology is still in the prototype stage, but allows for the simultaneous measurement of anatomy, functionality and biochemistry. Although the scans are conducted separately, combining them in one machine ensures that the images overlap perfectly. This gives doctors a better picture of the state of brain tissue following an injury, or the progression of a degenerative condition such as Alzheimer's disease.

SPECT Scan

Single-photon emission computed tomography, like PET, acquires information about the concentration of radio-nucleides introduced to the patient's body. The radioactive chemical does not enter the brain itself but stays in the bloodstream. It allows examination of the brain's blood supply which is normally reduced to damaged areas. Its advantage over PET scans is availability and cost.

Evoked potentials

Every time we hear, see, touch or smell our brain generates an electrical signal. Evoked potentials are recorded by placing wires on different parts of the scalp for different senses.

Lumbar puncture

A lumbar puncture is a diagnostic test where cerebrospinal fluid is extracted for examination, and pressure of the spinal column is measured. In relation to acquired brain injury, it can look for primary or metastatic brain or spinal cord neoplasm or cerebral hemorrhage.

MRS & MRA

Magnetic resonance spectroscopy is an imaging method of detecting and measuring activity at the cellular level. It provides chemical information and is used in conjunction with MRI which gives three dimensional information and has great potential in the area of acquired brain injury.

Magnetic resonance angiography produces extremely detailed pictures of body tissues and organs without the need for x-rays. The quality is not the same as normal arteriography, but the patient is spared the risks of catheterization and allergic reactions to the dye. The MRA procedure is painless. The magnetic field is not known to cause any tissue damage.

Intracranial pressure monitor

Swelling of the brain is a potentially very serious issue immediately after a traumatic brain injury so doctors often insert an intracranial pressure monitor into the skull to make sure there is no increased pressure that could worsen the injury.