

## **Neuroimaging Study**

Neuroimaging studies add in the evaluation, diagnosis, and treatment of neurological and systemic disorders that affect the eye and brain and manifest with the visual symptoms. Symptoms of relevance include vision loss or impairment, floaters, flashing lights, shadows or curtain, and pain, unexplained loss of visual acuity, loss of peripheral vision and double vision.

Neuroimaging studies are performed in selected Calgary health centres and include *structural imaging*, such as CT (Computed Tomography), MRI (Magnetic Resonance Imaging), MRA (Magnetic Resonance Angiography), and *functional imaging*, such as PET (Positron Emission Technology) and SPECT (Single Photon Emission Computed Tomography).

### **Why it is performed**

The primary objective is to assess the structure and the function of the visual system. Structural imaging provides information about the anatomy and pathology of orbital and skull bones, as well as the orbits, and brain structures including the blood supply.

Physiologic imaging provides information about the function of brain, including blood flow, blood volume, and brain metabolism with the focus on the visual areas of the brain. Information obtained from these diagnostic studies assists in establishing the diagnosis and evaluating the treatment outcomes.

### **How to prepare**

Some imaging techniques require a short-lived pharmacological agent to be injected in patient's blood circulation. Patients are asked provide detailed medical history, including chronic conditions and allergies. In most instances patients are advised to arrange for transportation.

### **How it is performed**

**CT exam:** uses a computer driven, rotating x-ray device to generate a three-dimensional image of the internals a body part from multiple two-dimensional images taken around a single axis of rotation. In some instances contrast enhancement agents are used intravenously to improve the contrast of the captured images.

**MRI exam:** uses magnetic fields and radio waves to produce high quality two- or three-dimensional images of body part structures. MRA is used to generate images of the blood vessels using a paramagnetic contrast agent administered intravenously.

**PET imaging:** requires a short-lived radioactive tracer to be injected in patient's blood circulation. After a short waiting period, the patient is placed in the PET scanner to perform the imaging study.

**SPECT imaging:** requires a short-lived radioisotope tracer to be injected in patient's blood circulation. SPECT imaging is performed by using gamma rays and specialized gamma cameras to acquire multiple two-dimensional images and generate a three-dimensional image of the internal body part from multiple two-dimensional images.

During image acquisition, patients are asked to remain still and are sometimes restrained with soft pads to prevent motion. The neuroimaging studies last between 30 minutes and 1-2 hours depending on the objectives and techniques used.

## **Results**

The results of neuroimaging studies vary significantly.

## **How it feels**

There is no pain or discomfort associated with the neuroimaging studies.

## **What the risks are**

There are no known risks. Some patients may experience mild side effects caused by the pharmacological image enhancing agents.