

# Symptoms & Diagnosis

## **What are the symptoms of a brain tumor?**

Each individual and each brain tumor is unique and so are the accompanying symptoms. Brain tumors can be difficult to diagnose because the symptoms are often vague and confusing. Often brain tumor symptoms are subtle and mimic other diseases. That said, there are some general symptoms that can be associated with brain tumors. They include: head or neck pain, seizures, memory problems, speech or communication problems, vision impairment, changes in temperament, nausea and vomiting, and fatigue. Specific symptoms depend on the tumor's location, type, and size.

## **How is a brain tumor diagnosed?**

When symptoms arise that may indicate a brain tumor, the first step in diagnosis will involve a basic neurological exam. This kind of exam will measure central nervous system responses and might include: vision testing, hearing tests, reflex responses, balance and coordination tests, sense of touch tests, sense of smell tests, and various memory and thinking tests.

Conventional x-rays do not show tumors growing behind the bones of the skull, so special scans are used to look for tumors. Computerized Tomography (CT) or Magnetic Resonance Imaging (MRI) scans both use computer graphics to create an image of the brain. For both of these scans, the patient lies on a table that slides into the imaging device. For the images to be precise, the patient must lie very still. If the patient is unable to lie still, sedation may be required. Often an injection of a special contrast material is given to help enhance the images. The scan can be very noisy and the length of time varies. The CT and MRI are only two of the types of scans available. Other specialized scans can measure the rate of blood flow to the brain, provide brain mapping for use during surgery, or measure the magnetic fields created by nerve cells. Once the scan is complete, a radiologist interprets the computer images and provides a tentative diagnosis.

**CT Scan (Computerized Tomography):** the CT scanner provides many x-ray views of thin sections of the brain, increasing the likelihood that a tumor can be detected at an early stage. Contrast agents, which are given by an injection before CT scanning, are used to scan highlighted abnormal areas in the scan, such as tumor tissue. By causing the tumor to enhance they make the picture clearer, permitting the physician to see the tumor more clearly.

**MRI (Magnetic Resonance Imaging):** MR Imaging or MRI is a very precise and sensitive test for detecting tumors. The use of the contrast agent gadolinium improves its sensitivity of diagnostic imaging. MR imaging is rapidly becoming one of the most widely used diagnostic tests. However, there are cases in which CT Scans or other tests are necessary to provide the best diagnostic information. Your physician will determine which test is most appropriate for you.

**PET Scanning (Positron Emission Tomography):** PET scanning or Positron Emission Tomography is a highly sensitive diagnostic test for detecting recurrent brain tumors. For PET scanning, a radioactively labeled sugar substance – deoxyglucose – acts much like a contrast agent as in other diagnostic tests. After deoxyglucose is injected into the patient’s vein, the scanning takes 1 to 4 hours and generates images of high and low uptake of the deoxyglucose in the brain. Normal brain cells and tumor cells typically take up high levels of the deoxyglucose, whereas radiation causes cells to take up much less deoxyglucose. This can allow doctors to tell the difference between a tumor that is growing back versus radiation effects, which often have a better outcome.

Exact diagnosis comes only from examination of the tumor cells under a microscope by a pathologist. These cells can be acquired during surgery, or as a separate diagnostic procedure called a biopsy. There are also laboratory tests that can verify the presence of a tumor by checking the cerebrospinal fluid for a variety of markers, or measure hormones taken from blood samples.