

*Each year more than 17,000 people in the United States find out they have a brain tumor.*

## About Brain Tumors

The body is made up of many types of cells. Each type of cell has special functions. Most cells in the body grow and then divide in an orderly way to form new cells as they are needed to keep the body healthy and working properly. When cells lose the ability to control their growth, they divide too often and without any order. The extra cells form a mass of tissue called a tumor. Tumors are benign or malignant.

- **Benign brain tumors** do not contain cancer cells. Usually these tumors can be removed, and they are not likely to recur. Benign brain tumors have clear borders. Although they do not invade nearby tissue, they can press on sensitive areas of the brain and cause symptoms.
- **Malignant brain tumors** contain cancer cells. They interfere with vital functions and are life threatening. Malignant brain tumors are likely to grow rapidly and crowd or invade the tissue around them. Like a plant, these tumors may put out "roots" that grow into healthy brain tissue. If a malignant tumor remains compact and does not have roots, it is said to be encapsulated. When an otherwise benign tumor is located in a vital area of the brain and interferes with vital functions, it may be considered malignant (even though it contains no cancer cells). The grade of a tumor refers to the way the cells look under a microscope. Cells from higher grade tumors are more abnormal looking and generally grow faster than cells from lower grade tumors; higher grade tumors are more malignant than lower grade tumors.

## Symptoms of Brain Tumors

The symptoms of brain tumors depend mainly on their size and their location in the brain. Symptoms are caused by damage to vital tissue and by pressure on the brain as the tumor grows within the limited space in the skull. They also may be caused by swelling and a buildup of fluid around the tumor, a condition called edema. Symptoms may also be due to hydrocephalus, which occurs when the tumor blocks the flow of cerebrospinal fluid and causes it to build up in the ventricles. If a brain tumor grows very slowly, its symptoms may appear so gradually that they are overlooked for a long time.

*The most frequent symptoms of brain tumors include:*

- Headaches that tend to be worse in the morning and ease during the day,
- Seizures (convulsions),
- Nausea or vomiting,
- Weakness or loss of feeling in the arms or legs,
- Stumbling or lack of coordination in walking (ataxic gait),
- Abnormal eye movements or changes in vision,
- Drowsiness,
- Changes in personality or memory, and
- Changes in speech.

These symptoms may be caused by brain tumors or by other problems. Only a doctor can make a diagnosis.

## Possible Causes

The causes of brain tumors are not known. Researchers are trying to solve this problem. The more they can find out about the causes of brain tumors, the better the chances of finding ways to prevent them. Doctors cannot explain why one person gets a brain tumor and another doesn't, but they do know that no one can "catch" a brain tumor from another person. Brain tumors are not contagious.

Although brain tumors can occur at any age, studies show that they are most common in two age groups. The first group is children 3 to 12 years old; the second is adults 40 to 70 years old.

By studying large numbers of patients, researchers have found certain risk factors that increase a person's chance of developing a brain tumor. People with these risk factors have a higher-than-average risk of getting a brain tumor. For example, studies show that some types of brain tumors are more frequent among workers in certain industries, such as oil refining, rubber manufacturing, and drug manufacturing. Other studies have shown that chemists and embalmers have a higher incidence of brain tumors. Researchers also are looking at exposure to viruses as a possible cause. Because brain tumors sometimes occur in several members of the same family, researchers are studying families with a history of brain tumors to see whether heredity is a cause. At this time, scientists do not believe that head injuries cause brain tumors to develop.

In most cases, patients with a brain tumor have no clear risk factors. The disease is probably the result of several factors acting together.

## Diagnosis

To find the cause of a person's symptoms, the doctor asks about the patient's personal and family medical history and performs a complete physical examination. In addition to checking general signs of health, the doctor does a neurologic exam. This includes checks for alertness, muscle strength, coordination, reflexes, and response to pain. The doctor also examines the eyes to look for swelling caused by a tumor pressing on the nerve that connects the eye and the brain.

*Depending on the results of the physical and neurologic examinations, the doctor may request one or both of the following.*

- **A CT (or CAT) scan** is a series of detailed pictures of the brain. The pictures are created by a computer linked to an x-ray machine. In some cases, a special dye is injected into a vein before the scan. The dye helps to show differences in the tissues of the brain.
- **MRI (magnetic resonance imaging)** gives pictures of the brain, using a powerful magnet linked to a computer. MRI is especially useful in diagnosing brain tumors because it can "see" through the bones of the skull to the tissue underneath. A special dye may be used to enhance the likelihood of detecting a brain tumor.



*The doctor may also request other tests such as:*

- **A skull x-ray** can show changes in the bones of the skull caused by a tumor. It can also show calcium deposits, which are present in some types of brain tumors.
- **A brain scan** reveals areas of abnormal growth in the brain and records them on special film. A small amount of a radioactive material is injected into a vein. This dye is absorbed by the tumor, and the growth shows up on the film. (The radiation leaves the body within 6 hours and is not dangerous.)
- **An angiogram, or arteriogram**, is a series of x-rays taken after a special dye is injected into an artery (usually in the area where the abdomen joins the top of the leg). The dye, which flows through the blood vessels of the brain, can be seen on the x-rays. These x-rays can show the tumor and blood vessels that lead to it.
- **A myelogram** is an x-ray of the spine. A special dye is injected into the cerebrospinal fluid in the spine, and the patient is tilted to allow the dye to mix with the fluid. This test may be done when the doctor suspects a tumor in the spinal cord.

## Treatment

Treatment for a brain tumor depends on a number of factors. Among these are the type, location, and size of the tumor, as well as the patient's age and general health. Treatment methods and schedules often vary for children and adults. The doctor develops a treatment plan to fit each patient's needs.

The patient's doctor may want to discuss the case with other doctors who treat brain tumors. Also, the patient may want to talk with the doctor about taking part in a research study of new treatment methods.

Many patients want to learn all they can about their disease and their treatment choices so they can take an active part in decisions about their medical care. A person with a brain tumor will have many questions, and the doctor is the best person to answer them. Most patients want to know what kind of tumor they have, how it can be treated, how effective the treatment is likely to be, and how much it's likely to cost.

Patients and their families have a lot to learn about brain tumors and their treatment. They should not feel that they need to understand everything the first time they hear it. They will have other chances to ask the doctor to explain things that are not clear.