**Brain tumor:**

A brain tumor, known as an intracranial tumor, is an abnormal mass of tissue in which cells grow and multiply uncontrollably, seemingly unchecked by the mechanisms that control normal cells. More than 150 different brain tumors have been documented, but the two main groups of brain tumors are termed [**primary**](http://www.nlm.nih.gov/medlineplus/ency/article/007222.htm) and [**metastatic**](http://www.nlm.nih.gov/medlineplus/ency/article/000769.htm).

Primary brain tumors include tumors that originate from the tissues of the brain or the brain's immediate surroundings. Primary tumors are categorized as glial (composed of [**glial cells**](http://en.wikipedia.org/wiki/Neuroglia)) or non-glial (developed on or in the structures of the brain, including nerves, blood vessels and glands) and [**benign**](http://www.nlm.nih.gov/medlineplus/ency/article/002236.htm) or [**malignant**](http://www.ncbi.nlm.nih.gov/pubmedhealth/PMH0002267/).

[**Metastatic brain tumors**](https://www.aans.org/Patients/Neurosurgical-Conditions-and-Treatments/Metastatic-Brain-Tumors) include tumors that arise elsewhere in the body (such as the breast or lungs) and migrate to the brain, usually through the bloodstream. Metastatic tumors are considered cancer and are malignant.

Metastatic tumors to the brain affect nearly one in four patients with cancer, or an estimated 150,000 people a year. Up to 40 percent of people with lung cancer will develop metastatic brain tumors. In the past, the outcome for patients diagnosed with these tumors was very poor, with typical survival rates of just several weeks. More sophisticated diagnostic tools, in addition to innovative surgical and radiation approaches, have helped survival rates expand up to years; and also allowed for an improved quality of life for patients following diagnosis.

Types of Benign Brain Tumors

* [**Chordomas**](http://en.wikipedia.org/wiki/Chordoma) are benign, slow-growing tumors that are most prevalent in people ages 50 to 60. Their most common locations are the base of the skull and the lower portion of the spine. Although these tumors are benign, they may invade the adjacent bone and put pressure on nearby neural tissue. These are rare tumors, contributing to only 0.2 percent of all primary brain tumors.
* [**Craniopharyngiomas**](http://en.wikipedia.org/wiki/Craniopharyngioma) typically are benign, but are difficult tumors to remove because of their location near critical structures deep in the brain. They usually arise from a portion of the [**pituitary gland**](http://en.wikipedia.org/wiki/Pituitary_gland) (the structure that regulates many hormones in the body), so nearly all patients will require some [**hormone replacement therapy**](http://www.nlm.nih.gov/medlineplus/hormonereplacementtherapy.html).
* [**Gangliocytomas**](http://wiki.cns.org/wiki/index.php/Gangliocytoma), gangliomas and anaplastic [**gangliogliomas**](http://en.wikipedia.org/wiki/Ganglioglioma) are rare tumors that include [**neoplastic**](http://en.wikipedia.org/wiki/Neoplasm) nerve cells that are relatively well-differentiated, occurring primarily in young adults.
* [**Glomus jugulare**](http://www.nlm.nih.gov/medlineplus/ency/article/001634.htm) tumors most frequently are benign and typically are located just under the skull base, at the top of the jugular vein. They are the most common form of [**glomus tumor**](http://en.wikipedia.org/wiki/Glomus_tumor). However, glomus tumors, in general, contribute to only 0.6 percent of neoplasms of the head and neck.
* [**Meningiomas**](http://en.wikipedia.org/wiki/Meningioma) are the most common benign intracranial tumors, comprising 10 to 15 percent of all brain neoplasms, although a very small percentage are malignant. These tumors originate from the [**meninges**](http://en.wikipedia.org/wiki/Meninges), the membrane-like structures that surround the brain and spinal cord.
* [**Pineocytomas**](http://en.wikipedia.org/wiki/Pineocytoma) are generally benign lesions that arise from the [**pineal cells**](http://en.wikipedia.org/wiki/Pineal_gland), occurring predominantly in adults. They are most often well-defined, noninvasive, homogeneous and slow-growing.
* [**Pituitary adenomas**](http://neurosurgery.ucla.edu/body.cfm?id=1123&ref=80&action=detail) are the most common intracranial tumors after gliomas, meningiomas and schwannomas. The large majority of pituitary adenomas are benign and fairly slow-growing. Even malignant pituitary tumors rarely spread to other parts of the body. Adenomas are by far the most common disease affecting the pituitary. They commonly affect people in their 30s or 40s, although they are diagnosed in children, as well. Most of these tumors can be treated successfully.
* **Schwannomas** are common benign brain tumors in adults. They arise along nerves, comprised of cells that normally provide the "electrical insulation" for the nerve cells. Schwannomas often displace the remainder of the normal nerve instead of invading it. [**Acoustic neuromas**](http://www.nlm.nih.gov/medlineplus/acousticneuroma.html) are the most common schwannoma, arising from the eighth cranial nerve, or **[vestibularcochlear nerve](http://en.wikipedia.org/wiki/Vestibulocochlear_nerve%22%20%5Ct%20%22_blank)**, which travels from the brain to the ear. Although these tumors are benign, they can cause serious complications and even death if they grow and exert pressure on nerves and eventually on the brain. Other locations include the spine and, more rarely, along nerves that go to the limbs.

**Types of Malignant Brain Tumors**

[**Gliomas**](http://en.wikipedia.org/wiki/Glioma) are the most prevalent type of adult brain tumor, accounting for 78 percent of malignant brain tumors. They arise from the supporting cells of the brain, called the **glia**. These cells are subdivided into [**astrocytes**](http://en.wikipedia.org/wiki/Astrocyte), [**ependymal cells**](http://en.wikipedia.org/wiki/Ependyma) and **[oligodendroglial cells](http://en.wikipedia.org/wiki/Oligodendrocyte%22%20%5Ct%20%22_blank)** (or oligos). Glial tumors include the following:

* [**Astrocytomas**](http://www.cedars-sinai.edu/Patients/Health-Conditions/Astrocytoma-Brain-Tumors.aspx) are the most common glioma, accounting for about half of all primary brain and spinal cord tumors. Astrocytomas develop from star-shaped glial cells called astrocytes, part of the supportive tissue of the brain. They may occur in many parts of the brain, but most commonly in the cerebrum. People of all ages can develop astrocytomas, but they are more prevalent in adults — particularly middle-aged men. Astrocytomas in the base of the brain are more prevalent in children or younger people and account for the majority of children's brain tumors. In children, most of these tumors are considered low-grade, while in adults, most are high-grade.
* [**Ependymomas**](http://www.cedars-sinai.edu/Patients/Health-Conditions/Ependymomas.aspx) are derived from a neoplastic transformation of the ependymal cells lining the [**ventricular system**](http://en.wikipedia.org/wiki/Ventricular_system) and account for two to three percent of all brain tumors. Most are well-defined, but some are not.
* [**Glioblastoma multiforme (GBM)**](http://www.aans.org/Patient%20Information/Conditions%20and%20Treatments/Glioblastoma%20Multiforme.aspx) is the most invasive type of glial tumor. These tumors tend to grow rapidly, spread to other tissue and have a poor prognosis. They may be composed of several different kinds of cells, such as astrocytes and oligodendrocytes. GBM is more common in people ages 50 to 70 and are more prevalent in men than women.
* [**Medulloblastomas**](http://en.wikipedia.org/wiki/Medulloblastoma) usually arise in the [**cerebellum**](http://en.wikipedia.org/wiki/Cerebellum), most frequently in children. They are high-grade tumors, but they are usually responsive to [**radiation**](http://www.cancer.gov/cancertopics/factsheet/Therapy/radiation) and [**chemotherapy**](http://en.wikipedia.org/wiki/Chemotherapy).
* [**Oligodendrogliomas**](http://en.wikipedia.org/wiki/Oligodendroglioma) are derived from the cells that make [**myelin**](http://www.nlm.nih.gov/medlineplus/ency/article/002261.htm), which is the insulation for the wiring of the brain.

## Brain Tumor Causes

Brain tumors are thought to arise when certain genes on the [**chromosomes**](http://www.nlm.nih.gov/medlineplus/ency/article/002327.htm) of a cell are damaged and no longer function properly. These genes normally regulate the rate at which the cell divides (if it divides at all) and repair genes that fix defects of other genes, as well as genes that should cause the cell to self-destruct if the damage is beyond repair. In some cases, an individual may be born with partial defects in one or more of these genes. Environmental factors may then lead to further damage. In other cases, the environmental injury to the genes may be the only cause. It is not known why some people in an "environment" develop brain tumors, while others do not.

## Diagnosis

Sophisticated imaging techniques can pinpoint brain tumors. Diagnostic tools include [**computed tomography**](http://en.wikipedia.org/wiki/X-ray_computed_tomography) (CT or CAT scan) and [**magnetic resonance imaging (MRI)**](http://en.wikipedia.org/wiki/Magnetic_resonance_imaging). Other MRI sequences can help the surgeon plan the resection of the tumor based on the location of the normal nerve pathways of the brain. Intraoperative MRI also is used during surgery to guide tissue [**biopsies**](http://en.wikipedia.org/wiki/Biopsy) and tumor removal. [**Magnetic resonance spectroscopy (MRS)**](http://en.wikipedia.org/wiki/In_vivo_magnetic_resonance_spectroscopy) is used to examine the tumor's chemical profile and determine the nature of the lesions seen on the MRI. [**Positron emission tomography (PET scan)**](http://www.nlm.nih.gov/medlineplus/ency/article/003827.htm) can help detect recurring brain tumors.

Sometimes the only way to make a definitive diagnosis of a brain tumor is through a biopsy. The neurosurgeon performs the biopsy and the pathologist makes the final diagnosis, determining whether the tumor appears benign or malignant, and grading it accordingly.

## Brain Tumor Treatment

Brain tumors (whether primary or metastatic, benign or malignant) usually are treated with surgery, radiation, and/or chemotherapy — alone or in various combinations. While it is true that radiation and chemotherapy are used more often for malignant, residual or recurrent tumors, decisions as to what treatment to use are made on a case-by-case basis and depend on a number of factors. There are risks and side effects associated with each type of therapy.