

Oligodendroglioma

Glioma

Gliomas are a family of tumors that are born in and grow from brain tissue rather than spreading from other parts of the body (*metastatic* brain tumors). The two most common types of glioma are **astrocytoma** and **oligodendroglioma**. These tumors are distinguished by their features when examined under a microscope by a *pathologist* (a physician who examines tissue removed from the body by a surgeon).

Oligodendrogliomas are rare. Less than 1,000 new cases are diagnosed in the United States every year. There are no definite causes for these tumors. A variety of factors have been investigated, including cell phone usage, but no definite associations have been established. Similarly, gliomas are not genetically inherited.

Glioma Growth and Spread

Gliomas are characterized by *invasive* growth – they form roots that invade the normal, surrounding brain. The roots cannot be seen on MRI or any other type of imaging. Consequently, even when the entire *visible* tumor is surgically removed, tumor cells are always left behind. As such, gliomas cannot be surgically cured. Furthermore, the nature of the brain is such that not all parts can be operated on. Therefore, the neurosurgeon may not be able to remove the entire visible tumor without causing permanent brain damage. In these cases, the neurosurgeon will purposely leave tumor fragments in the brain. Although gliomas can invade the brain, they only rarely spread to other parts of the body (they do not *metastasize*).

Tumor Grade and Stage

Gliomas are *not staged*. Instead, they are *graded*. The grade of a tumor is determined by how abnormal the tumor looks when examined by the pathologist under a microscope. The lower the grade the more normal the tissue appears. The higher the grade the more abnormal the tissue appears. The grade of the tumor cannot be established by imaging. Only the pathologist can determine the grade when viewing the tumor under the microscope. Higher grade tumors tend to be more aggressive

	Grade	
Low-Grade	2	Oligodendroglioma
High-Grade	3	Anaplastic Oligodendroglioma

Molecular Genetics of Oligodendroglioma

In addition to defining tumors by their appearance under the microscope, oligodendrogliomas can be tested for certain proteins and genes that are abnormal inside tumor cells.

- **IDH** (isocitrate dehydrogenase) is a gene that is mutated (abnormal) in the cells of oligodendrogliomas. We routinely test for oligodendrogliomas for this mutation but it may take 1 - 2 weeks to get the results.
- **1p/19q:** 1p and 19q are sections of two different *chromosomes* (the part of our cells that contains genetic information) that are “deleted” or missing from cells in grade 2 and 3 oligodendrogliomas. We routinely test for the deletions of 1p and 19q when we suspect the tumor is an oligodendroglioma.

- **MGMT** (Methylguanine Methyltransferase) is another protein present in all cells of our body. It is actually a protein that repairs damaged DNA and therefore protects our normal tissue from damage. There is a switch (called methylation) that controls whether a cell produces MGMT. In some tumors the switch is on, while in others it is off. As a result, some tumors have higher levels of the protein, while others have lower levels. Whether the gene is on or off may predict how aggressive the tumor is or how it responds to certain medicines (chemotherapy). We routinely test oligodendrogliomas for MGMT but it may take 2 weeks to get the results.

Behavior

Benign and *malignant* are terms often used to describe the behavior of tumors. Their meaning can be vague and difficult to apply to brain tumors, however. There is no cure for gliomas. Generally speaking, the higher the grade of tumor, the more aggressive the behavior and the higher the likelihood the tumor will return in a shorter period of time.

Typically, all gliomas, including low-grade tumors, grow back at some point. The behavior of gliomas, however, is difficult to predict. In addition, the nature of the brain and spine is such that even a slow-growing tumor can cause symptoms.