

AMERICAN BRAIN TUMOR ASSOCIATION

# Oligodendroglioma and Oligoastrocytoma



American  
Brain Tumor  
Association®

*Providing and pursuing answers®*

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Founded in 1973, the American Brain Tumor Association (ABTA) was the first national nonprofit organization dedicated solely to brain tumor research. For over 40 years, the Chicago-based ABTA has been providing comprehensive resources that support the complex needs of brain tumor patients and caregivers, as well as the critical funding of research in the pursuit of breakthroughs in brain tumor diagnosis, treatment and care.

To learn more about the ABTA, visit [www.abta.org](http://www.abta.org).

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# Oligodendroglioma and Oligoastrocytoma

## INTRODUCTION

Oligodendroglioma and oligoastrocytoma belong to a group of brain tumors called “gliomas.” Gliomas are tumors that arise from the glial, or supportive, cells of the brain. There are several different types of gliomas. This publication addresses two of the gliomas: oligodendroglioma and oligoastrocytoma.



Astrocyte



Oligodendrocyte

- Oligodendrogliomas arise from oligodendrocytes – fried egg-shaped cells within the brain. The role of normal oligodendrocytes is to form a covering layer for the nerve fibers in the brain.
- Astrocytomas are gliomas that arise from astrocytes – star-shaped cells within the brain. The normal role of astrocytes is to store information and nutrients for the nerve cells in the brain.
- Oligoastrocytomas are “mixed glioma” tumors, containing both abnormal oligodendroglioma and astrocytoma cells.

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Oligodendrogliomas are soft, greyish-pink tumors. They often contain solid mineral deposits – which are mostly calcium – called calcifications. Oligodendrogliomas may also contain small pockets of blood and/or cysts.

## **INCIDENCE**

Primary brain tumors are tumors that arise in the brain and tend to stay in the brain. About 40% of primary brain tumors are gliomas. About 10% of those gliomas are oligodendrogliomas. Mixed gliomas, primarily oligoastrocytomas, account for about 5–10% of all gliomas. However, oligodendrogliomas may be more common than older statistics indicate. Biologic markers now help pathologists separate oligodendrogliomas from other types of gliomas.

Oligodendrogliomas are most common in adults, and have a peak incidence in people ages 35–44. Anaplastic oligodendrogliomas tend to occur in slightly older adults, ages 45–74. Although these tumors are found in both men and women, they tend to occur more often in men.

Oligoastrocytomas are also most common in adults, and have a peak incidents in people ages 35–50. These tumors are found in both men and women.

Relatively few children are diagnosed with these tumors; only 3% of the primary brain tumors found in children ages 0–14, and about 5% in older children ages 15–19 are found to be oligodendrogliomas.

## **CAUSE**

The exact cause of these tumors, as well as other types of brain tumors, is unknown. We do know that tumors develop when a normal cell, for some unknown reason, becomes abnormal. That abnormal cell may produce the wrong number of proteins or enzymes, or it may be missing genetic material containing the cell's basic instructions.

When that abnormal cell reproduces itself, it creates two abnormal cells. Those two cells reproduce to create four cells, four cells create eight, and so on. This reproduction continues, resulting in a “lump” of abnormal cells. That lump is called a tumor.

Scientists now know that the cells of some oligodendrogliomas contain abnormal genetic material. Deletions or absence of chromosomes 1p and 19q are frequently seen in oligodendroglioma and oligoastrocytoma tumors. Combined deletion of 1p and 19q is a predictor of prognosis and may predict response to treatment. In addition, anaplastic (malignant) tumors appear to have abnormalities on chromosomes 9 or 10, along with unusual amounts of growth factors and gene proteins.

Those substances are thought to regulate the growth of blood vessels around a tumor. The greater the blood supply, the more nutrients brought to the tumor.

Researchers also believe both oligodendrogliomas and astrocytomas originate from one mother cell whose “offspring” may follow two slightly different developmental pathways. This research helps explain the biologic relationship between these two types of gliomas. However, the initial steps that change these cells from normal brain cells to abnormal tumor cells are still uncertain. Tracing these pathways is of interest to many researchers as our understanding of the biology of brain tumors continues to advance.

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*If your doctor initially calls your tumor a glioma, and later tells you it is an oligodendroglioma or an oligoastrocytoma, the diagnosis did not “change.” These are both very specific types of glioma.*

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## SYMPTOMS

Some oligodendrogliomas grow slowly and may be present for years before diagnosis, while oligoastrocytomas can

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grow more aggressively. When the tumor makes its presence known, the most common symptoms are seizures, headaches and personality changes. Other symptoms vary by location and size of the tumor, and can include weakness, numbness, or visual symptoms.

The frontal and temporal lobes are the most common locations for these tumors, although they can be found anywhere within the cerebral hemispheres of the brain. The frontal lobe controls the movement of your arms and legs, houses personality and behavior characteristics, controls language, and maintains your ability to reason. Tumors of the frontal lobe may cause weakness on one side of the body, difficulty walking or seizures. Difficulty remembering very recent occurrences, comments that do not match the conversation, or sudden changes in a person's usual behavior may be some of the symptoms of a tumor in the frontal lobe.

The temporal lobe of the brain generally controls memory, understanding language, comprehending what your eyes see and understanding the significance of what is seen, some emotions, and interpreting sensations. Temporal lobe tumors generally cause few "visible" symptoms other than partial seizures and subtle language problems. Sometimes the seizures will start with unusual smells or tastes.

## **DIAGNOSIS**

After a neurological examination, done in the office by your doctor, MRI and/or CT scans may be suggested. The calcifications sometimes present in an oligodendroglioma may be seen on a scan, and suggest the diagnosis of oligodendroglioma. Sometimes both an MRI and a CT scan will be ordered; MRI visualizes the softer tissues and blood vessels, while CT can better see structures such as the skull, calcifications within the tumor, and blood.

Although scans may give your doctors an educated idea of the tumor type, only examination of a sample of tumor tissue by a pathologist confirms the exact diagnosis and leads to appropriate treatment. This is why surgery or a biopsy will be done to obtain tumor tissue.

Following the surgery, a pathologist will microscopically examine the removed tumor tissue. A report, called a pathology report, will be sent back to your neurosurgeon. If the pathologist is part of the hospital system, the report will take about three to five days. If tissue was also sent out of the hospital to another institution, that report may take a few weeks. The pathology report states the type of tumor and the “grade” of the tumor. An additional part of the report may contain the study to determine whether the tumor has deletions of 1p and 19q. This additional study may take longer to complete.

Grading tells you how close to normal, or how abnormal, the tumor cells looked when viewed under a microscope. The higher the grade number, the more abnormal the cells, and the more aggressive the tumor. Using the World Health Organization grading system of I through IV, “almost normal” appearing cells are assigned a grade I. The cells of a grade II tumor appear slightly abnormal. Grade III tumor cells are definitely abnormal in appearance. The cells of a grade IV tumor are very abnormal.

In this system, oligodendrogliomas and oligoastrocytomas are usually grade II or grade III tumors. Grade II tumors are considered low-grade tumors, which generally grow at a slower rate than grade III tumors. Grade II tumors may evolve over time into grade III tumors. Grade III tumors are anaplastic. “Anaplastic” tumors are malignant tumors. Sometimes anaplastic oligoastrocytomas contain glioblastoma cells – which are grade IV astrocytoma cells – fast growing, aggressive tumor cells. If your tumor is an oligodendroglioma or anaplastic oligodendroglioma, additional testing may be done to determine if your tumor shows a loss of chromosomes 1p and 19q. This

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laboratory test looks for the presence – or absence – of bits of genetic material called chromosomes. Recent research found that oligodendrogliomas can be further subdivided based on the status of these two chromosomes. If this test is ordered for your tumor, it will take about two to three weeks for the results to be returned to your neurosurgeon.

As you learn more about brain tumors, you will often see the word “genetic.” Genetic means “pertaining to the genes” – the tiny parcels that carry cell instructions. Genetic is not the same as hereditary (the ability to pass disease from one generation to another). Less than 5% of brain tumors are thought to be hereditary tumors. Those tend to be part of hereditary syndromes, such as neurofibromatosis or Li Fraumeni syndrome, which cause tumors in other parts of the body as well as the brain.

## **TREATMENT**

### **SURGERY**

For both oligodendrogliomas and oligoastrocytomas, surgery remains the first step in treatment for most brain tumors located in an accessible area of the brain. An “accessible” tumor is one that can be removed without causing severe neurological damage. Numerous tools are available to assist the neurosurgeon in tumor removal. Computer-guided stereotactic navigational systems, along with sophisticated imaging equipment, can help define the exact tumor location. A special functional MRI may help to identify whether or not vital areas of function are mixed in with the tumor or not. Using that information, brain-mapping techniques may help outline vital parts of the brain to be avoided during surgery. Lasers and tiny microscopic instruments may be used to further remove tumor tissue. MRI scanners in or near the operating room can provide up-to-the moment images of the tumor site.

Even with the use of all of these tools, however, some tumors can be only partially removed because of their location. If the tumor is considered “inoperable,” the neurosurgeon may be able to perform a biopsy to obtain a tissue sample and confirm the exact diagnosis.

## **CHEMOTHERAPY**

If your tumor is an anaplastic tumor, or a mixed tumor such as an oligoastrocytoma, or if the tissue shows a loss (also called a “deletion”) of chromosomes 1p or 19q, your doctor may talk with you about chemotherapy as part of your treatment plan. Temozolomide (Temodar) is an oral chemotherapy drug that may be suggested. “PCV” is an acronym for the combination of the drugs procarbazine, lomustine (CCNU), and vincristine. Gliadel wafers contain carmustine (BCNU) – they may be placed during surgery in the space created by the removal of the tumor. Drugs given in high doses followed by a stem cell or bone marrow transplant may be considered.

There are also several new drugs being tested for oligodendroglioma and oligoastrocytoma. The ABTA’s clinical trial matching service, TrialConnect®, can help you find a clinical trial. Visit [www.abtatrialconnect.org](http://www.abtatrialconnect.org) or call 877-769-4833.

Chemotherapy may also be used in infants and very young children to delay radiation therapy until the child is older. Clinical trials are underway to evaluate the most effective ways of treating these tumors in infants and children.

There are a few other drugs that may be suggested for someone with a brain tumor. It is not unusual for a tumor to cause swelling, or edema, around the tumor. Steroids are drugs used to decrease that edema. Antiepileptic drugs, also called “AEDs” or anticonvulsant drugs, are used to control seizures. Antiemetic drugs prevent vomiting and help control nausea.

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## **RADIATION**

Radiation therapy may be suggested as an additional treatment. The timing of radiation is determined by many factors. It may be recommended as a part of initial treatment for oligoastrocytoma or for a tumor that does not show a loss of chromosomes 1p or 19q. If the tumor is a low-grade oligodendroglioma, your doctor will determine if radiation therapy is recommended at this time. If your tumor is a high-grade tumor, radiation may be given at the time of diagnosis or deferred depending on other factors.

There are different types of radiation, using various doses and schedules. Most forms of radiation, however, are aimed at the tumor and a small area around the tumor. Conventional external beam radiation is “standard” radiation given five days a week for five or six weeks. A form of “local radiation” may be used to boost the conventional radiation. Stereotactic radiosurgery aims converged beams of radiation at small areas. Intensity-modulated radiation therapy (IMRT) shapes radiation beams to the shape of the tumor. Several of these radiation techniques are investigational and are offered in clinical trials. Your doctor can tell you if the radiation technique you are considering is a standard treatment or an investigational treatment.

Just as in treating any disease, treatment for a brain tumor may have side effects. Ask your doctor to talk with you and your family about these potential effects. He or she can also help you balance the risks of treatment against the potential benefits.

## **RECURRENCE**

Tumors recur or progress when all the tumor cells cannot be removed by surgery or killed by other treatments. Over time, those cells multiply and result in tumor regrowth. A tumor may recur as a higher-grade tumor. It may contain a greater percentage of

anaplastic cells, more astrocytoma cells, or the tumor may spread into the spinal canal. Oligoastrocytoma growth generally depends on the percent of astrocytoma in the tumor, as astrocytomas tend to grow more rapidly than oligodendrogliomas. Because many oligodendrogliomas are generally slow growing tumors, it may be years before regrowth occurs.

Treatment for a recurrent tumor may be additional surgery, radiation therapy if the tumor was not previously radiated, or a form of local radiation if the tumor was previously radiated. There are also many clinical trials open to those with a recurrent tumor. Researchers are exploring the role of new drugs and new drug combinations. Anti-angiogenesis drugs, thought to interfere with the growth of new blood vessels which feed a tumor, are being evaluated and developed. Monoclonal antibodies are being studied for their potential in seeking out tumor cells and killing them and for their ability to carry tumor-killing substances to the tumor. They may also have anti-angiogenesis properties. Other drugs which inhibit specific growth factors or receptors may also be used and several of these compounds are currently being evaluated in clinical trials.

## **PROGNOSIS**

“Prognosis” is the medical term for a prediction of life expectancy. Keep in mind that these predictions are estimates. When your doctor talks with you about prognosis, s/he will take into account your age, the location of the tumor, grade of the tumor cells, whether your tumor has deletions of 1p and 19q, and the amount of tumor removed during surgery. Low-grade oligodendrogliomas tend to be slow growing tumors. Anaplastic oligodendrogliomas are more aggressive tumors that grow more quickly. Oligoastrocytoma growth generally depends on the percent of astrocytoma in the tumor, as astrocytomas tend to grow more rapidly than oligodendrogliomas. Scientists continue to study the

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impact of natural biologic differences amongst all of these tumors and the role of various treatment plans.

If you would like detailed information about prognosis, we encourage you to feel comfortable asking your doctor about your expected outcome. Make your question direct, and to the point. Your physician can provide you with prognosis information specific to your tumor and the biology of your tumor. When considering a therapy, ask your doctor how the recommended treatment will affect your prognosis.

Other questions you may wish to ask could include:

- What are the expected benefits of this treatment?
- What are the risks?
- What quality of life can you expect during and after the treatment?
- If this is an investigational treatment, how many patients with your tumor type have received this treatment, and what were their results?

## **THE ABTA IS HERE FOR YOU**

You don't have to go through this journey alone. The American Brain Tumor Association is here to help.

Visit us at [www.abta.org](http://www.abta.org) to find additional brochures, read about research and treatment updates, connect with a support community, join a local event and more.

We can help you better understand brain tumors, treatment options, and support resources. Our team of licensed health care professionals are available via email at [abtacares@abta.org](mailto:abtacares@abta.org) or via our toll-free CareLine at 800-886-ABTA (2282).



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## NOTES/QUESTIONS

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## AMERICAN BRAIN TUMOR ASSOCIATION PUBLICATIONS AND SERVICES

### CARE & SUPPORT

CareLine: 800-886-ABTA (2282)

Email: [abtacares@abta.org](mailto:abtacares@abta.org)

### PUBLICATIONS

*About Brain Tumors: A Primer for Patients and Caregivers\**

#### Tumor Types:

Ependymoma

Glioblastoma and Malignant Astrocytoma\*

Medulloblastoma\*

Meningioma\*

Metastatic Brain Tumors\*

Oligodendroglioma and Oligoastrocytoma\*

Pituitary Tumors\*

#### Treatments:

Chemotherapy\*

Clinical Trials

Conventional Radiation Therapy\*

Proton Therapy

Stereotactic Radiosurgery

Steroids\*

Surgery\*

*\*These publications also available for download in Spanish.*

### CLINICAL TRIALS

TrialConnect®: [www.abtatrialconnect.org](http://www.abtatrialconnect.org) or 877-769-4833

*More brain tumor resources and information  
are available at [www.abta.org](http://www.abta.org).*

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