

AMERICAN BRAIN TUMOR ASSOCIATION

Oligodendroglioma



American
Brain Tumor
Association®

Providing and pursuing answers®

ABOUT THE AMERICAN BRAIN TUMOR ASSOCIATION

Founded in 1973, the American Brain Tumor Association (ABTA) was the first national nonprofit organization dedicated solely to brain tumor research. The ABTA has since expanded our mission and now provides comprehensive resources to support the complex needs of brain tumor patients and caregivers, across all ages and tumor types, as well as the critical funding of research in the pursuit of breakthroughs in brain tumor diagnoses, treatments and care.

To learn more, visit [abta.org](https://www.abta.org).

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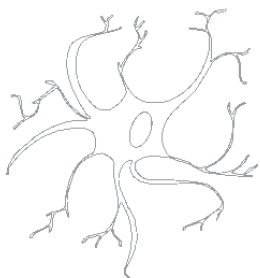
Oligodendroglioma

INTRODUCTION

This brochure is about **oligodendrogliomas**, which belong to a group of primary brain tumors called gliomas. Primary brain tumors start in the brain or spinal cord and rarely spread to other organs. Gliomas are one of the most common types of brain tumors.^{1,2} While there are several different types of gliomas, this publication discusses only one type: oligodendrogliomas.

Tumor Type

Under the microscope, **oligodendrogliomas** look like oligodendrocytes, a type of glial cell in the brain. It is thought that the tumor grows from this glial cell, but its exact origin is still unknown.¹

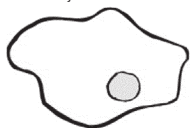


Astrocyte

Oligoastrocytoma is now a largely outdated term after the World Health Organization (WHO) changed the classification system for these brain tumors in 2016.³

However, many patients may carry this diagnosis from before that time. Oligoastrocytomas used to be

Oligodendrocyte



classified as tumors that look like oligodendrocytes and another type of glial cell called astrocytes.

Based on specific genetic tests, such as those that

identify the 1p/19q co-deletion, IDH mutation, and ATRX alteration, a tumor that would have been called oligoastrocytoma in the past is now classified as either oligodendroglioma or astrocytoma. In rare cases, oligoastrocytoma NOS (not otherwise specified) is used to classify these tumors.^{3,4} For patients carrying the oligoastrocytoma diagnosis, it is important to have the tumor genetically tested to determine the correct diagnosis under the current classification system..

A tumor is classified as an **oligodendroglioma** if it:

- has a mutation, meaning that the gene has a change or variation from the normal cells, in either the IDH1 or IDH2 gene, and
- is missing parts of certain genetic material called chromosomes. This is known as a codeletion of chromosomal arms 1p and 19q.

Tumor Location

The location of a tumor is linked to the symptoms a person may have because the lobes of the brain control different functions, such as thought and reasoning versus vision and hearing. Oligodendrogliomas most commonly are found in the frontal lobe, which controls emotions and personality, followed by the temporal lobe, which controls hearing.

Finding out the grade, type and location of your glioma through genetic testing will help you make more informed treatment decisions.

Tumor Grade

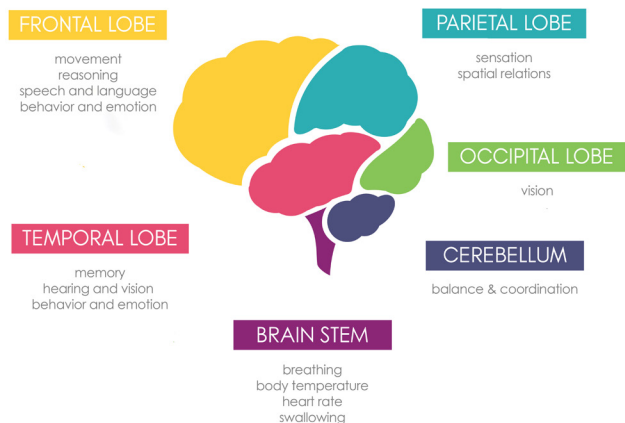
The WHO uses a grading system with a scale of 1 to 4 for brain tumors; grades 2 to 4 are the most common types found in adults. In general, as the grade increases, the prognosis worsens. Tumor grade dictates treatment options.

Grade 2 Oligodendrogliomas are:^{3,9}

- Referred to as low grade
- Generally slow growing and less aggressive
- Most often located in the frontal and temporal lobes

Grade 3 Oligodendrogliomas are:^{3,9}

- Referred to as high grade
- Generally fast growing and more aggressive
- Most often located in the frontal and temporal lobes



Lobes of the brain.

INCIDENCE

Oligodendrogliomas account for 4.5% of primary brain tumors. Oligodendrogliomas and anaplastic oligodendrogliomas are most common in adults and most often occur between the ages of 40 and 64.¹¹

For grade 2 oligodendroglioma it is 43 years, and for grade 3 oligodendroglioma it is 50 years.¹² Although these tumors are found in both men and women, they tend to occur more often in men.¹³

In children under the age of 15, oligodendrogliomas are very rare.^{9,14} For teens between the ages of 15 and 19, they account for only 1.5% of primary brain tumors.

CAUSES

Like other types of brain tumors, **the exact cause of most oligodendrogliomas is unknown.**^{9,15} Scientists have identified abnormalities in the genes of different chromosomes that may play a role in how brain tumors develop. But what causes normal brain cells to change into abnormal tumor cells is still unclear.⁸

In **oligodendrogliomas**, the discovery of the genetic mutation in the IDH1 or IDH2 gene and the missing parts of the two chromosomes (1p and 19q)³ is important because the lack of both chromosomes can help determine an individual's likely outcome of the disease (prognosis) and may predict response to treatment.^{16 17}

An estimated 1,070 people are diagnosed with oligodendrogliomas each year.¹¹

Anything that can increase a person's chance of developing a brain tumor is called a risk factor.¹⁵ Risk factors often influence the development of a brain tumor, but don't directly cause it to develop. Some people with a lot of risk factors never get a brain tumor, while others without any risk factors do develop a brain tumor.

Risk factors that may raise a person's chance of developing an oligodendroglioma include exposure to radiation, such as x-rays,^{9,18} and a family history. Certain gene mutations can be passed down through families, increasing a person's chance of developing an oligodendroglioma.¹⁹ Among them are Li-Fraumeni syndrome and familial adenomatous polyposis (also known as Turcot syndrome).¹⁹

SYMPTOMS

As a glioma grows within the brain, it spreads into normal brain tissue, which may increase pressure on the brain or disrupt connections between normal brain cells. An individual can experience symptoms as a result of this pressure and interference with brain function.^{20, 21}

Generally, **the most common signs** of an **oligodendroglioma** are seizures, headaches, and personality changes.^{5,22}

About 60% of people have a seizure before being diagnosed with a brain tumor.⁹ That is because grade 2 oligodendrogliomas grow slowly and are often present for years before they are diagnosed and any symptoms appear.¹⁶ Grade 3 tumors are less likely to cause seizures than grade 2 tumors,²² but more likely to cause headaches and cognitive changes, that is, changes related to

thinking, learning, concentrating, problem-solving, and decision-making.

Each person will experience unique or different symptoms based on the location of the tumor. Some people do not have any symptoms and are diagnosed with a brain tumor based on results of tests done for other reasons, such as trauma or migraines.¹⁶ This is called an incidental finding. Others have symptoms based on the location of the tumor, leading them to seek treatment. Although the frontal and temporal lobes are the most common locations for these tumors,^{5,6} gliomas can be found anywhere in the brain.

Tell your doctor all your symptoms as that can help diagnose the tumor. Relieving symptoms will be a part of your care and treatment.

Tumors in the **frontal lobe** may cause:²¹

- A decline in language skills
- Weakness/numbness/tingling on one side of the body
- Difficulty with short-term memory
- Sudden changes in a person's usual behavior or personality
- Changes in judgment
- Muscle weakness or paralysis
- An altered sense of touch or pressure

Tumors in the **temporal lobe** may cause changes in a person's:²¹

- Cognitive abilities
- Vision
- Hearing
- Memory
- Emotional state

DIAGNOSIS

Doctors use different types of tests to find, or diagnose, a brain tumor and learn what type it is and where it is located in the brain.^{8,23} Tests are often done by different specialists and healthcare providers who are part of the healthcare team.

Different Tests

After getting a thorough medical history from the patient, the doctor will do a physical examination.²³ **Both a neurological exam**, which tests a person's vision, hearing, balance, coordination, and reflexes, **and neurocognitive testing**, which evaluates one's cognitive skills, help determine which part of the brain the tumor is affecting. The neurocognitive tests will be done by a clinical neuropsychologist, a psychologist who specializes in understanding the relationship between the brain and behavior.

A **magnetic resonance imaging (MRI)** scan is the most common type of imaging test used to help identify the size and exact location of a tumor.^{8,23} The doctor also may order a **computed tomography (CT)** scan, another form of imaging, if the patient cannot have an MRI. Patients with pacemakers or other artificial metal parts cannot

typically have an MRI. Although an MRI is preferred, a CT scan is quicker. These imaging tests can be used with or without contrast, which is a dye that makes the pictures more clear.⁸



Patient entering MRI machine.

Although imaging tests may give the doctor an educated idea of the tumor type, a **biopsy** or **surgical resection** is needed to be sure of the diagnosis.^{24,25}

During a **biopsy**, the neurosurgeon (a doctor who specializes in surgery of the nervous system) surgically removes a small piece of the tumor tissue and sends the sample to a pathologist who will examine it under a microscope and send a pathology report to the neurosurgeon. The pathologist reports the tumor type and grade. The neurosurgeon may remove a larger part of the tumor to send it for pathology testing. This is known as a surgical resection.²⁰

Doctors are increasingly using **genetic tests** (also referred to as molecular testing) to diagnose gliomas because they pick up on certain mutations found in oligodendrogliomas.^{8,23}

Testing usually involves a blood test. After sending the sample to a laboratory that specializes in genetic testing, the doctor will get a report with the test results.

The IDH gene mutation is found in about 70% to 80% of low-grade gliomas in adults.²³ This mutation is linked with better outcomes in both low-grade and high-grade gliomas.

Ask your doctor if genetic testing results can help inform your treatment options and improve your outcomes.

Another type of genetic test can detect the presence—or absence—of chromosomes. The loss of the 1p and 19q chromosomes is required for the diagnosis of oligodendrogliomas and suggests a positive response to chemotherapy. Having this information also can be helpful when considering treatment plans.

Researchers continue to study different gene mutations to determine the role they play in the risk and growth of a brain tumor.¹⁷

Tumor Grading

Primary brain cancers, unlike other cancers, are graded rather than staged because they generally do not travel to other parts of the body. A **tumor grade** tells how normal the tumor cells look when viewed under a microscope.⁸ The higher the grade, the less normal the cells look and the quicker the tumor grows.

Using the WHO's grading system of 1 through 4, cells appearing to be almost normal are assigned a grade 1. These tumors grow slowly. The cells of a grade 2 tumor appear slightly abnormal. Grade 3 tumor cells don't look like normal cells. The cells of a grade 4 tumor are very abnormal. In general, for any given tumor, the higher the grade, the more aggressive the tumor.

Oligodendrogliomas are usually either grade 2 or grade 3 (cancerous) tumors, per the WHO grading system.³ Grade 2 tumors are considered low-grade tumors,

which generally grow at a slower rate than grade 3 tumors.⁸ While these tumors grow slowly, they can invade normal brain tissue. Over time, grade 2 tumors may evolve into grade 3 tumors. Sometimes, a grade 2 tumor returns as a higher grade tumor following treatment.

Your initial diagnosis of a glioma may change to oligodendroglioma after the biopsy/surgical resection and test results are complete.



Results from MRI scans.

TREATMENT

Once diagnosed with an oligodendroglioma or oligoastrocytoma, treatment options will depend on many factors.²⁵ Among them are:

- The tumor size, type, and grade
- What parts of the brain, the tumor is located in
- Current symptoms caused by the tumor
- If the tumor has invaded other parts of the brain
- Possible side effects of treatment
- The patient's age, overall health and preference

No matter what type of treatment a patient decides on, follow-up MRIs should be done within weeks of completing the therapy to assess how well it worked.¹⁶ Generally, repeat MRIs will need to be done less often over time.

SURGERY

Surgery remains the first step in the treatment of oligodendrogliomas.^{8,25,27} The purpose of having surgery is to:^{8,23,24}

- Obtain tumor tissue for diagnosis and treatment planning (if a biopsy was not already done)
- Remove as much tumor as possible
- Reduce any symptoms caused by the tumor

For a low-grade glioma, surgery may be the only treatment needed, especially if the entire tumor is removed completely.²⁵ Many grade 2 tumors can be taken out completely.⁸ When the whole tumor is removed, the surgery is called a gross total resection.

However, some tumors cannot be removed because of their location.²⁵ They could be hard to reach or near a vital area in the brain that, if damaged, could affect the patient's movement, sensation, or speech. This is called an "eloquent" area. If the tumor cannot be operated on, which is considered inoperable, the neurosurgeon may still be able to perform a biopsy to get a tissue sample and confirm the exact diagnosis or remove a portion of the tumor. Removing only part of the tumor is called a subtotal resection.⁸

Some doctors recommend removing as much of the tumor as possible in all patients as soon as they are diagnosed.²⁰ They agree with the studies that suggest

patients who have surgery right after their diagnosis live longer, perhaps because the tumor is less likely to become more aggressive over time.

Other doctors recommend that certain patients should be carefully watched until the tumor grows or symptoms worsen even after medical therapy. This is known as observation and involves repeating one or more tests, such as MRIs, over time to monitor the tumor's behavior.⁸ The reasons for this approach is the slow growth rate of low-grade gliomas, symptoms from surgery could be worse than those from the tumor, and postponed surgery may be as effective in prolonging a patient's life.²⁰

Common side effects of surgery include pain, swelling, scarring, headaches, and scalp pain.⁸ Rare side effects include infection, major bleeding, blood clots, seizures, and brain damage.

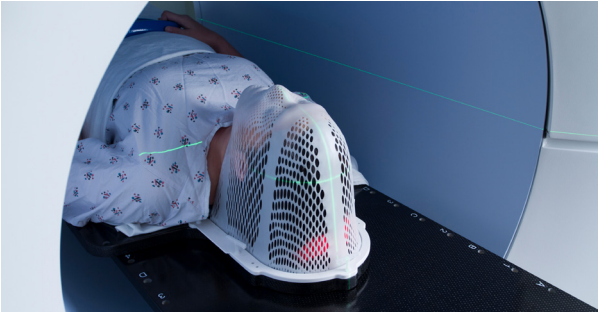
To learn more, read the ABTA's Surgery brochure.

Discuss your goals for treatment and quality of life with your doctor, weighing the benefits and risks of surgery.

RADIATION

If the tumor cannot be removed surgically or only a portion of it is removed, the doctor may recommend radiation therapy to slow or stop the glioma from growing.^{8,20} Radiation therapy uses high-energy, very focused rays (either x-rays, photons, or protons) to kill the tumor cells that remain in the brain.

A doctor who specializes in giving radiation therapy is called a radiation oncologist. The most common type of radiation used to treat gliomas is known as **external**



Patient receiving targeted radiation therapy while wearing a customized mask for head stabilization during treatment

beam radiation therapy or EBRT. There are different methods for doing EBRT, but all of them involve using a machine to deliver the radiation through the skin directly to the glioma.

These include:

- Conventional radiation therapy
- Three-dimensional conformal radiation therapy
- Intensity modulated radiation therapy
- Proton therapy
- Stereotactic radiosurgery
- Fractionated stereotactic radiation therapy

All these techniques deliver a precise amount of radiation to the tumor and limit the amount of radiation to nearby healthy brain tissue.²⁵ Depending on the size and location of the tumor, the radiation oncologist may choose one or a combination of these radiation techniques. Generally, radiation therapy is given in a series of treatments over several weeks.²⁰

Common side effects from radiation therapy include fatigue (extreme tiredness even after sleeping), hair loss, mild skin reactions, upset stomach and loss of appetite.^{8,20}

Different people experience different side effects. While radiation is very effective in killing tumor cells, it also can harm normal cells. This damage may result in cognitive changes, such as a decline in mental sharpness, thought processes, and memory. Sometimes, increased swelling in the area of the radiated tumor occurs; in these cases, corticosteroids may be used to reduce the swelling.^{8,20}

To learn more, read the ABTA's **Conventional Radiation, Proton Therapy and Stereotactic Radiosurgery brochures.**

Talk to your doctor about the different types of radiation therapy and which one might be right for you.

SYSTEMIC THERAPY

Systemic therapy uses medication to kill tumor cells.²⁵ These therapies are usually prescribed by a medical oncologist or neuro-oncologist, doctors who specialize in treating tumors with drugs. They are given through an intravenous (IV) tube into one's vein, usually in the arm, or a pill that is swallowed. Systemic therapies used to treat gliomas are **chemotherapy** and **targeted therapy**, both effective methods of cancer treatment. The main difference between them is that chemotherapy kills both cancer cells and healthy cells, while targeted therapy kills only cancer cells primarily.

Chemotherapy

Chemotherapy uses medications to stop or slow the growth of the cancer cells.^{8,20} Sometimes, one or more drugs are recommended for treating gliomas. Chemotherapy is usually scheduled for a specific

number of cycles given over a set period of time.²⁵

Grade 2 and 3 tumors tend to be responsive to chemotherapy, especially for those that are missing the 1p and 19q chromosomes.^{8,25,28} Sometimes chemotherapy is given with radiation for certain types of low-grade gliomas.²⁰

- Temozolomide is an oral chemotherapy drug commonly used to treat oligodendrogliomas.
- The combination of three drugs—procarbazine, lomustine, and vincristine known as PCV—attack the tumor in different ways and are more effective when used together.
- Cisplatin and carboplatin are the basis of what is called platinum-based chemotherapy. Alkylator chemotherapy includes PCV and platinum-based drugs among other drugs.

Carmustine is sometimes used to treat high-grade gliomas. In rare cases, during surgery, carmustine wafers are placed in the area where the tumor was removed and eventually dissolve.²⁵ Research has shown that the use of carmustine wafers, which attack any tumor cells that remain in the brain, helps prolong a person's life.⁸

Common side effects of chemotherapy include fatigue, nausea and vomiting, mouth sores, hair loss, loss of appetite, constipation, and diarrhea. Side effects happen more often when patients are getting two or more drugs at the same time, and with higher doses compared with lower doses.²⁰

To learn more, read the ABTA's Chemotherapy brochure.



Nurse prepares patient for IV/infusion chemotherapy.

Talk to your doctor about the different types of chemotherapy and possible side effects.

Targeted Therapy

Targeted therapy refers to treatments that target certain proteins that help cause the glioma to grow and survive. Unlike chemotherapy that can kill all cells, targeted therapy is more precise in killing specific tumor cells with a specific abnormal protein. Currently, there are only a few targeted therapies that will reach the brain tumor at high enough concentrations to kill the cancer cells. **The doctor can run genetic tests to identify which proteins the tumor is made of to help determine the best targeted therapy for each patient.** Scientists are doing research studies to identify more proteins and new treatments targeting them.^{17,25}

Ask your doctor if genetic testing can help identify a targeted therapy to treat the tumor.

Bevacizumab is an antibody targeted therapy that is given by IV and recommended for the treatment

of gliomas. It works by targeting a protein known as vascular endothelial growth factor.²⁵ This protein triggers the making of new blood vessels, which in turn, feed the tumor, enabling it to spread and grow. Essentially, the targeted therapy stops the blood vessels from growing and therefore starves the tumor of nutrients.⁸ Common **side effects** of bevacizumab include high blood pressure, diarrhea, fatigue, and weakness.

PALLIATIVE CARE

Oligodendrogliomas and their treatments cause physical symptoms and side effects.²⁵ Relieving these symptoms and side effects is an important part of supportive care, sometimes referred to as palliative care. Palliative care is for anyone, regardless of their age, or tumor type and stage. It should be started shortly after diagnosis for best results. **People who receive palliative care often have less severe symptoms, better quality of life, and are more satisfied with treatment.**

Palliative care may include medications, nutritional changes, relaxation techniques, and emotional and spiritual support, among others to help manage physical symptoms and side effects.²⁵

Antiepileptic and anticonvulsant drugs may help to control seizures.²⁰ **Levetiracetam** is commonly used, but other antiseizure medications are helpful as well.²²

- **Steroids** may be used to reduce the edema (swelling in the brain near the tumor) that is sometimes caused by the brain tumor or treatments. The most commonly used steroid is **dexamethasone**.
- **Antiemetic medications** may help to prevent vomiting and control nausea.

Talk with your doctor about your symptoms and side effects. Learn what therapies can be used to treat them. Relieving symptoms is an important part of the treatment and care plan.²⁵

Clinical Trials

Clinical trials offer individuals the chance to use new or experimental (meaning it has not yet been proven) tests and treatments before they are available to the public.²⁹ There are several new drugs being tested for the treatment of oligodendrogliomas. Researchers are exploring new medications and new drug combinations, which also may be used to treat recurring gliomas. There are also clinical trials open to people who have a recurrent tumor. People who want to join a clinical trial have to meet certain criteria, such as having a specific type of tumor or not having been treated with a certain therapy before. Most clinical trials cover treatment costs.

To learn more, read the ABTA's Clinical Trials brochure.

Clinical trials test new treatment approaches. But there is a risk that the treatment being studied may not work or the side effects are too much to handle.²⁹ Talk to your doctor to see if a clinical trial is right for you.

RECURRENCE

Following treatment for a glioma, patients should schedule regular appointments with their healthcare team to check if the tumor has returned, manage any side effects that continue after the treatment has ended,

and monitor their overall health.³¹ **This follow-up care may include** regularly scheduled physical examinations, blood tests, and MRIs. It's an important part of a person's overall care plan because many brain tumors are likely to recur^{25,30} and low-grade gliomas generally progress over time.²⁰

Because many oligodendrogliomas are generally slow-growing tumors, it may be as long as 10 or more years before a tumor returns.²⁰ These gliomas tend to come back near the area where they were first found.²⁵

When a tumor does return, the doctor will perform a new round of tests to learn as much about the recurrent tumor as possible to help figure out the best treatment options. In addition to an MRI or CT scan, tests may include an MR spectroscopy, MR perfusion, or positron emission tomography, or PET scan.

In general, treatments for a recurrent glioma may include additional surgery, radiation therapy (depending on whether or how much radiation was given after the original diagnosis), chemotherapy, and targeted therapy.²⁰ If it has been a long time since the original treatment, sometimes physicians will try the same treatment for a recurrence. Both PCV and Temozolomide may help patients who have recurrence after initial chemotherapy treatment. As with the original diagnosis, treatments aimed at relieving a person's symptoms and side effects should be part of the care plan.

Specifically, for a low-grade recurrent oligodendroglioma, surgery may be an option.⁸ If a high-grade oligodendroglioma returns, treatment options depend on where the cancer is and where else it has spread. When surgery to remove the tumor is not an option, chemotherapy, surgery to relieve symptoms, and palliative care may be options.⁸

Talk to your doctor about the risk of the tumor returning and learn what steps you should be taking with your healthcare team.²⁵

PROGNOSIS

Prognosis refers to the chance of recovery or survival from a disease.³³ A prognosis is based on statistics that look at a large group of people with the same disease over time. Keep in mind that statistics on survival rates are estimates. Typically, they are measured every five years, so the latest estimates may not include the most current methods of diagnosing and treating oligodendrogliomas.³⁴

A patient's prognosis should take into account the following factors:³⁵

- The tumor type, grade, location, and genetic mutations (if any)—for most tumors, the lower the grade, the better the prognosis.
- Age and ability to function and carry out daily activities—generally, a younger adult has a better prognosis.
- Type of symptoms and how long they last—seizures and having symptoms for a long time are linked with a better prognosis.
- How much tumor remains in the brain after surgery—the prognosis is better when all the tumor can be surgically removed.
- Whether the tumor has spread to other parts of the body—not spreading to other parts of the body is linked with a better prognosis.

Researchers are looking at other genetic tests that may help more accurately predict a patient's prognosis.³⁵ This is another reason why genetic testing is so important. Although people with low-grade gliomas are rarely cured, most of them are able to continue working, attending school, and doing other activities and tasks for a number of years after they are first diagnosed.²⁰ They can have a high quality of life and limited disability if as much of the tumor is removed as possible and their symptoms and medications are being properly managed.

Talk to your doctor about your prognostic factors, as listed above, to get a more individualized prognosis.

The following are the five-year and ten-year survival rates for individuals with oligodendrogliomas and oligoastrocytomas using the 2016 WHO Classification:

Tumor Type	Age Group	5-Year Survival Rates	10-Year Survival Rates
Oligodendrogliomas	Children (0-14)	90%	89%
	Adults 15-39	90%	74%
	Adults 40+	75%	59%
Anaplastic Oligodendrogliomas	Children (0-14)	No reported cases	No reported cases
	Adults 15-39	72%	56%
	Adults 40+	52%	39%
Oligoastrocytic Tumors	Children (0-14)	83%	81%
	Adults 15-39	76%	56%
	Adults 40+	52%	39%

Source: CBTRUS 2018

FUTURE DIRECTIONS

The growing knowledge of genes and their role in brain tumor development has allowed researchers to further categorize oligodendrogliomas and astrocytomas in ways that are having a significant impact on both treatment and survival. But there is much more work to be done.

Knowing the genetic make-up of the tumor is an important first step in developing drugs that target and kill the cancer cells. Genetic testing is playing an increasingly greater role in helping make that determination. Research efforts also are attempting to decrease the side effects of treatment therapies, while keeping high cure rates in patients with oligodendrogliomas. The goal is to improve survival and quality of life after therapy.

The hope is that this better understanding will lead to better and more precise treatment. Together, the medical and scientific communities, supporting organizations, and the patients and their families are building on past successes toward a better cure for all persons diagnosed with oligodendrogliomas.

AMERICAN BRAIN TUMOR ASSOCIATION INFORMATION, RESOURCES AND SUPPORT

BROCHURES

Educational brochures are available on our website or can be requested in hard copy format for free by calling the ABTA. Most brochures are available in Spanish.

GENERAL INFORMATION

About Brain Tumors: A Primer for Patients and Caregivers

Brain Tumor Dictionary

Brain Tumors Handbook for the Newly Diagnosed

Caregiver Handbook

Neuropsychiatric Symptoms

TUMOR TYPES

Ependymoma

Glioblastoma and High-Grade Astrocytoma

Medulloblastoma

Meningioma

Metastatic Brain Tumors

Oligodendrogliomas

Pituitary Tumors

TREATMENT

Chemotherapy

Clinical Trials

Conventional Radiation Therapy

Proton Therapy

Stereotactic Radiosurgery

Steroids

Surgery

AMERICAN BRAIN TUMOR ASSOCIATION INFORMATION, RESOURCES AND SUPPORT

Information

ABTA WEBSITE | ABTA.ORG

Offers more than 200 pages of information, programs, support services and resources, including: brain tumor treatment center and support group locators, caregiver resources, research updates and tumor type and treatment information across all ages and tumor types.

Education & Support

- **ABTA Educational Meetings & Webinars**
In-person and virtual educational meetings led by nationally-recognized medical professionals.
- **ABTA Patient & Caregiver Mentor Support Program**
Connect with a trained patient or caregiver mentor to help navigate a brain tumor diagnosis.
- **ABTA Connections Community**
An online support and discussion community of more than 35,000 members.
- **ABTA CareLine**
For personalized information and resources, call 800-886-ABTA (2282) or email info@abta.org to connect with a CareLine staff member.

Get Involved

- Join an ABTA fundraising event.
- Donate by visiting abta.org/donate.

Contact The ABTA

CareLine: 800-886-ABTA (2282)

Email: info@abta.org

Website: abta.org

REFERENCES

1. Brain Tumor: Introduction. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/introduction>. (Accessed 7-15-19)
2. Louis DN, Schiff D, Batchelor T. (2019). Classification and pathologic diagnosis of gliomas. In AF Eichler (Ed.), UpToDate. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-19-19)
3. WHO Classification of Tumours of the Central Nervous System, 4th ed, Louis DN, Ohgake H, Wiestler OD, Cavenee WK (Eds), International Agency for Research on Cancer. Lyon, France:2016.
4. Van Den Bent M. Oligodendrogliomas: A short history of clinical developments. *CNS Oncol.* 2015;4(5):281-5.
5. Engelhard HH, Stelea A, Mundt A. Oligodendroglioma and anaplastic oligodendroglioma: clinical features, treatment, and prognosis. *Surg Neurol* 2003; 60(5): 443-56.
6. Lassman AB, Iwamoto FM, Cloughesy TF, Aldape KD, Rivera AL, Eichler AF, et al. International retrospective study of over 1000 adults with anaplastic oligodendroglial tumors. *Neuro Oncol* 2011;13(6):649-59.
7. Ostrom QT, Gittleman H, Truitt G, Boscia A, Kruchko C, Barnholtz-Sloan JS. CBTRUS Statistical Report: Primary brain and other central nervous system tumors diagnosed in the United States in 2011-2015. *Neuro Oncol.* 2018, p.11.
8. National Comprehensive Cancer Network. NCCN guidelines for patients®. Brain Cancer: Gliomas. Version 1.2016. <https://www.nccn.org/patients/guidelines/brain-gliomas/files/assets/common/downloads/files/gliomas.pdf> (Accessed 7-25-19)
9. National Cancer Institute. Oligodendroglioma. 2018. <https://www.cancer.gov/NCI/rare-brain-spine-tumor/tumors/oligodendroglioma>. (Accessed 7-8-19)
10. CBTRUS, p. 10.
11. CBTRUS, p. 72.
12. CBTRUS, p. 36.
13. CBTRUS, p. 13.
14. CBTRUS, p. 18.
15. Brain Tumor: Risk Factors. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/risk-factors>. (Accessed 7-15-19)
16. Van den Bent M. (2019). IDH-mutant, 1p/19q-codeleted oligodendrogliomas: Clinical features, pathology, and prognostic factors. In AF Eichler (Ed.), UpToDate. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-19-19)
17. Brain Tumor: Latest Research. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/latest-research>. (Accessed 7-15-19)
18. Braganza MZ, Kitahara CM, Berrington de Gonzalez A, Inskip PD, Johnson KJ, Rajaraman P. Ionizing radiation and the risk of brain and central nervous system tumors: A systematic review. *Neuro Oncol* 2012; 14 (11):1316-24.

-
19. Michaud D, Batchelor T. (2019). Risk factors for brain tumors. In AF Eichler (Ed.), UpToDate. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-19-19)
 20. Recht LD. (2019). Patient education: Brain cancer low-grade glioma in adults (Beyond the basics). In AF Eichler (Ed.), UpToDate®. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-21-19)
 21. Brain Tumor: Symptoms and Signs. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/symptoms-and-signs>. (Accessed 7-15-19)
 22. Wong ET, Wu JK. (2019). Overview of the clinical features and diagnosis of brain tumors in adults. UpToDate 2019. In AF Eichler (Ed.), UpToDate. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-15-19)
 23. Brain Tumor: Diagnosis. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/diagnosis>. (Accessed 7-15-19)
 24. Patient education: Brain cancer (The basics). (2019). UpToDate. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-21-19)
 25. Brain Tumor: Types of treatments. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/types-treatment>. (Accessed 7-15-19)
 26. National Cancer Institute. How is genetic testing done? 2019. <https://www.cancer.gov/about-cancer/causes-prevention/genetics/genetic-testing-fact-sheet#how-is-genetic-testing-done> (Accessed 7-8-19)
 27. Thon N, Kreth FW, Tonn JC. The role of surgery in grade II/III oligodendroglial tumors. *CNS Oncol*. 2015;4(5):317-23.
 28. Nabors LB, Portnow J, Ammirati M, Baehring J, Brem H, Butowski N, et al. NCCN Guidelines® Insights Central Nervous System Cancers, Version 1.2017. *J Natl Compr Canc Netw* 2017;15(11):1331-45.
 29. Brain Tumor: About clinical trials. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/about-clinical-trials>. (Accessed 7-15-19)
 30. National Cancer Institute. Rare brain and spine tumor clinical studies. 2019. <https://www.cancer.gov/nci/rare-brain-spine-tumor/refer-participate/clinical-studies>. (Accessed 7-19-19)
 31. Brain Tumor: Follow-up care. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/follow-care>. (Accessed 7-15-19)
 32. Van den Bent M. (2019). Management of anaplastic oligodendroglial tumors. In AF Eichler (Ed.), UpToDate. Retrieved from <http://www.uptodate.com/home/index.html>. (Accessed 7-19-19)
 33. ASCO® answers: Brain Tumor. 2017. https://www.cancer.net/sites/cancer.net/files/asco_answers_brain.pdf. (Accessed 7-14-19)
 34. Brain Tumor: Statistics. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/statistics>. (Accessed 7-14-19)
 35. Brain Tumor: Grades and prognostic factors. Doctor-Approved Patient Information from ASCO®. 2019. <https://www.cancer.net/cancer-types/brain-tumor/grades-and-prognostic-factors>. (Accessed 7-15-19)

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