Childhood Astrocytomas Treatment (PDQ®)

Patient Version

PDQ Pediatric Treatment Editorial Board.

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This PDQ cancer information summary has current information about the treatment of childhood astrocytomas. It is meant to inform and help patients, families, and caregivers. It does not give formal guidelines or recommendations for making decisions about health care.

Editorial Boards write the PDQ cancer information summaries and keep them up to date. These Boards are made up of experts in cancer treatment and other specialties related to cancer. The summaries are reviewed regularly and changes are made when there is new information. The date on each summary ("Date Last Modified") is the date of the most recent change. The information in this patient summary was taken from the health professional version, which is reviewed regularly and updated as needed, by the PDQ Pediatric Treatment Editorial Board.

General Information About Childhood Astrocytomas

Key Points for This Section

- Childhood astrocytoma is a disease in which benign (noncancer) or malignant (cancer) cells form in the tissues of the brain.

- Astrocytomas may be benign (not cancer) or malignant (cancer).

- The central nervous system controls many important body functions.

- The cause of most childhood brain tumors is not known.

- The signs and symptoms of astrocytomas are not the same in every child.

- Tests that examine the brain and spinal cord are used to detect (find) childhood astrocytomas.

- Childhood astrocytomas are usually diagnosed and removed in surgery.

- Certain factors affect prognosis (chance of recovery) and treatment options.

Childhood astrocytoma is a disease in which benign (noncancer) or malignant (cancer) cells form in the tissues of the brain.

Astrocytomas are tumors that start in star-shaped brain cells called astrocytes. An astrocyte is a type of glial cell. Glial cells hold nerve cells in place, bring food and oxygen to them, and help protect them from disease, such as infection. Gliomas are tumors that form from glial cells. An astrocytoma is a type of glioma.

Astrocytoma is the most common type of glioma diagnosed in children. It can form anywhere in the central nervous system (brain and spinal cord).

This summary is about the treatment of tumors that begin in astrocytes in the brain (primary brain tumors). Metastatic brain tumors are formed by cancer cells that begin in other parts of the body and spread to the brain. Treatment of metastatic brain tumors is not discussed here.

Brain tumors can occur in both children and adults. However, treatment for children may be different than treatment for adults. See the following PDQ summaries for more information about other types of brain tumors in children and adults.
**Astrocytomas may be benign (not cancer) or malignant (cancer).**

Benign brain tumors grow and press on nearby areas of the brain. They rarely spread into other tissues. Malignant brain tumors are likely to grow quickly and spread into other brain tissue. When a tumor grows into or presses on an area of the brain, it may stop that part of the brain from working the way it should. Both benign and malignant brain tumors can cause signs and symptoms and almost all need treatment.

**The central nervous system controls many important body functions.**

Astrocytomas are most common in these parts of the central nervous system (CNS):

- **Cerebrum**: The largest part of the brain, at the top of the head. The cerebrum controls thinking, learning, problem-solving, speech, emotions, reading, writing, and voluntary movement.
- **Cerebellum**: The lower, back part of the brain (near the middle of the back of the head). The cerebellum controls movement, balance, and posture.
- **Brain stem**: The part that connects the brain to the spinal cord, in the lowest part of the brain (just above the back of the neck). The brain stem controls breathing, heart rate, and the nerves and muscles used in seeing, hearing, walking, talking, and eating.
- **Hypothalamus**: The area in the middle of the base of the brain that controls body temperature, hunger, and thirst.
- **Visual pathway**: The group of nerves that connect the eye with the brain.
- **Spinal cord**: The column of nerve tissue that runs from the brain stem down the center of the back. It is covered by three thin layers of tissue called membranes. The spinal cord and membranes are surrounded by the vertebrae (back bones). Spinal cord nerves carry messages between the brain and the rest of the body, such as a message from the brain to cause muscles to move or a message from the skin to the brain to feel touch.

Anatomy of the brain. The supratentorial area (the upper part of the brain) contains the cerebrum, lateral ventricle...
and third ventricle (with cerebrospinal fluid shown in blue), choroid plexus, hypothalamus, pineal gland, pituitary gland, and optic nerve. The posterior fossa/infratentorial area (the lower back part of the brain) contains the cerebellum, tectum, fourth ventricle, and brain stem (pons and medulla). The tentorium separates the supratentorium from the infratentorium (right panel). The skull and meninges protect the brain and spinal cord (left panel).

The cause of most childhood brain tumors is not known.

Anything that increases your risk of getting a disease is called a risk factor. Having a risk factor does not mean that you will get cancer; not having risk factors doesn’t mean that you will not get cancer. Talk with your child's doctor if you think your child may be at risk. Possible risk factors for astrocytoma include:

- Past radiation therapy to the brain.
- Having certain genetic disorders, such as neurofibromatosis type 1 (NF1) or tuberous sclerosis.

Having NF1 may increase a child's risk of a certain type of tumor called visual pathway glioma. These tumors usually do not cause symptoms. Children with NF1 who develop visual pathway gliomas may not need treatment for the tumor unless signs or symptoms, such as vision problems, appear or the tumor grows.

The signs and symptoms of astrocytomas are not the same in every child.

Signs and symptoms depend on the following:

- Where the tumor forms in the brain or spinal cord.
- The size of the tumor.
- How fast the tumor grows.
- The child's age and development.

Some tumors do not cause signs or symptoms. Signs and symptoms may be caused by childhood astrocytomas or by other conditions. Check with your child's doctor if your child has any of the following:

- Morning headache or headache that goes away after vomiting.
- Nausea and vomiting.
- Vision, hearing, and speech problems.
- Loss of balance and trouble walking.
- Worsening handwriting or slow speech.
- Weakness or change in feeling on one side of the body.
- Unusual sleepiness.
- More or less energy than usual.
- Change in personality or behavior.
- Seizures.
- Weight loss or weight gain for no known reason.
- Increase in the size of the head (in infants).

Tests that examine the brain and spinal cord are used to detect (find) childhood astrocytomas.

The following tests and procedures may be used:

- **Physical exam and history**: An exam of the body to check general signs of health. This includes checking for...
signs of disease, such as lumps or anything else that seems unusual. A history of the patient’s health habits and past illnesses and treatments will also be taken.

- **Neurological exam**: A series of questions and tests to check the brain, spinal cord, and nerve function. The exam checks a person’s mental status, coordination, and ability to walk normally, and how well the muscles, senses, and reflexes work. This may also be called a neuro exam or a neurologic exam.

- **Visual field exam**: An exam to check a person’s field of vision (the total area in which objects can be seen). This test measures both central vision (how much a person can see when looking straight ahead) and peripheral vision (how much a person can see in all other directions while staring straight ahead). The eyes are tested one at a time. The eye not being tested is covered.

- **MRI (magnetic resonance imaging) with gadolinium**: A procedure that uses a magnet, radio waves, and a computer to make a series of detailed pictures of the brain and spinal cord. A substance called gadolinium is injected into a vein. The gadolinium collects around the cancer cells so they show up brighter in the picture. This procedure is also called nuclear magnetic resonance imaging (NMRI). Sometimes magnetic resonance spectroscopy (MRS) is done during the same MRI scan to look at the chemical makeup of the brain tissue.

**Childhood astrocytomases are usually diagnosed and removed in surgery.**

If doctors think there may be an astrocytoma, a biopsy may be done to remove a sample of tissue. For tumors in the brain, a part of the skull is removed and a needle is used to remove tissue. Sometimes, the needle is guided by a computer. A pathologist views the tissue under a microscope to look for cancer cells. If cancer cells are found, the doctor may remove as much tumor as safely possible during the same surgery. Because it can be hard to tell the difference between types of brain tumors, you may want to have your child's tissue sample checked by a pathologist who has experience in diagnosing brain tumors.
Craniotomy: An opening is made in the skull and a piece of the skull is removed to show part of the brain.

The following test may be done on the tissue that was removed:

- **Immunohistochemistry**: A test that uses antibodies to check for certain antigens in a sample of tissue. The antibody is usually linked to a radioactive substance or a dye that causes the tissue to light up under a microscope. This type of test may be used to tell the difference between different types of cancer. An MIB-1 test is a type of immunohistochemistry that checks tumor tissue for an antigen called MIB-1. This may show how fast a tumor is growing.

Sometimes tumors form in a place that makes them hard to remove. If removing the tumor may cause severe physical, emotional, or learning problems, a biopsy is done and more treatment is given after the biopsy.

Children who have NF1 may not need a biopsy or surgery to remove the tumor.

**Certain factors affect prognosis (chance of recovery) and treatment options.**
The prognosis (chance of recovery) and treatment options depend on the following:

- Where the astrocytoma formed in the CNS and if it has spread.
- Whether cancer cells remain after surgery.
- The type and grade of astrocytoma.
- Whether the child has NF1.
- Whether there are certain changes in the genes.
- The child’s age.
- Whether the astrocytoma has just been diagnosed or has recurred (come back).
- Whether the child has diencephalic syndrome, a condition which slows physical growth.
- Whether the child has intracranial hypertension at diagnosis, a condition in which cerebrospinal fluid pressure within the skull is high.

For recurrent astrocytoma, prognosis and treatment depend on how much time passed from the time treatment ended to the time the astrocytoma recurred.

**Stages of Childhood Astrocytomas**

**Key Points for This Section**

- The grade of the tumor is used to plan cancer treatment.
- An MRI is done after surgery.

**The grade of the tumor is used to plan cancer treatment.**

Staging is the process used to find out how much cancer there is and if cancer has spread. It is important to know the stage in order to plan treatment.

There is no standard staging system for childhood astrocytoma. Treatment is based on the following:

- The grade of the tumor.
- Whether the tumor is newly diagnosed or recurrent (has come back after treatment).

The grade of the tumor describes how abnormal the cancer cells look under a microscope and how quickly the tumor is likely to grow and spread.

The following grades are used:

**Low-grade astrocytomas**

Low-grade astrocytomas are slow-growing and rarely spread to other parts of the brain and spinal cord or other parts of the body. Low-grade astrocytomas can be either:

- Grade I tumors—pilocytic tumors, with cells that form a cyst.
- Grade II tumors—fibrillary tumors, with cells that look long or like fibers.

There are many types of low-grade astrocytomas. Several types of low-grade astrocytomas are discussed in this summary:

- A visual pathway glioma is a type of low-grade astrocytoma that forms along the optic nerve pathway.
A subependymal giant cell astrocytoma is a type of low-grade astrocytoma that may occur in children with tuberous sclerosis. Children who have neurofibromatosis type 1 may have more than one low-grade tumor in the brain.

**High-grade astrocytomas**

High-grade astrocytomas are fast-growing and often spread within the brain and spinal cord. High-grade astrocytomas can be either:

- Grade III tumors—anaplastic or malignant tumors.
- Grade IV tumors—glioblastoma, which spreads the fastest.

Childhood astrocytomas usually do not spread to other parts of the body.

**An MRI is done after surgery.**

An MRI (magnetic resonance imaging) is done in the first few days after surgery. This is to find out how much tumor, if any, remains after surgery and to plan further treatment.

**Recurrent Childhood Astrocytomas**

A recurrent childhood astrocytoma is an astrocytoma that has recurred (come back) after it has been treated. The cancer may come back in the same place as the first tumor or in other parts of the body. High-grade astrocytomas often recur within 3 years.

**Treatment Option Overview**

**Key Points for This Section**

- There are different types of treatment for patients with childhood astrocytoma.
- Children with astrocytomas should have their treatment planned by a team of health care providers who are experts in treating childhood brain tumors.
- Childhood brain tumors may cause signs or symptoms that begin before the cancer is diagnosed and continue for months or years.
- Some cancer treatments cause side effects months or years after treatment has ended.
- Six types of treatment are used:
  - New types of treatment are being tested in clinical trials.
  - If fluid builds up around the brain and spinal cord, a cerebrospinal fluid diversion procedure may be done.
  - Patients may want to think about taking part in a clinical trial.
  - Patients can enter clinical trials before, during, or after starting their cancer treatment.
- Follow-up tests may be needed.

**There are different types of treatment for patients with childhood astrocytoma.**

Different types of treatment are available for children with astrocytomas. Some treatments are standard (the currently used treatment), and some are being tested in clinical trials. A treatment clinical trial is a research study meant to help improve current treatments or obtain information on new treatments for patients with cancer. When clinical trials show that a new treatment is better than the standard treatment, the new treatment may become the standard treatment.
Because cancer in children is rare, taking part in a clinical trial should be considered. Some clinical trials are open only to patients who have not started treatment.

**Children with astrocytomas should have their treatment planned by a team of health care providers who are experts in treating childhood brain tumors.**

Treatment will be overseen by a pediatric oncologist, a doctor who specializes in treating children with cancer. The pediatric oncologist works with other healthcare providers who are experts in treating children with brain tumors and who specialize in certain areas of medicine. These may include the following specialists:

- Pediatrician.
- Pediatric neurosurgeon.
- Neurologist.
- Neuropathologist.
- Neuroradiologist.
- Rehabilitation specialist.
- Radiation oncologist.
- Endocrinologist.
- Psychologist.

**Childhood brain tumors may cause signs or symptoms that begin before the cancer is diagnosed and continue for months or years.**

Signs or symptoms caused by the tumor may begin before diagnosis. These signs or symptoms may continue for months or years. It is important to talk with your child's doctors about signs or symptoms caused by the tumor that may continue after treatment.

**Some cancer treatments cause side effects months or years after treatment has ended.**

Side effects from cancer treatment that begin during or after treatment and continue for months or years are called late effects. Late effects of cancer treatment may include the following:

- Physical problems.
- Changes in mood, feelings, thinking, learning, or memory.
- Second cancers (new types of cancer).

Some late effects may be treated or controlled. It is important to talk with your child's doctors about the effects cancer treatment can have on your child. (See the PDQ summary on Late Effects of Treatment for Childhood Cancer for more information.)

**Six types of treatment are used:**

**Surgery**

Surgery is used to diagnose and treat childhood astrocytoma as discussed in the General Information section of this summary. If cancer cells remain after surgery, further treatment depends on:

- Where the remaining cancer cells are.
- The grade of the tumor.
- The age of the child.

Even if the doctor removes all the cancer that can be seen at the time of the surgery, some patients may be given
chemotherapy or radiation therapy after surgery to kill any cancer cells that remain. Treatment given after the surgery, to lower the risk that the cancer will come back, is called adjuvant therapy.

**Observation**

Observation is closely monitoring a patient’s condition without giving any treatment until signs or symptoms appear or change. Observation is often used for patients who have neurofibromatosis type 1 or a tumor that is not growing and spreading.

**Radiation therapy**

Radiation therapy is a cancer treatment that uses high-energy x-rays or other types of radiation to kill cancer cells or keep them from growing. There are two types of radiation therapy:

- **External radiation therapy** uses a machine outside the body to send radiation toward the cancer. Certain ways of giving radiation therapy can help keep radiation from damaging nearby healthy tissue. These types of radiation therapy include the following:
  - Conformal radiation therapy: Conformal radiation therapy is a type of external radiation therapy that uses a computer to make a 3-dimensional (3-D) picture of the tumor and shapes the radiation beams to fit the tumor.
  - Intensity-modulated radiation therapy (IMRT): IMRT is a type of 3-dimensional (3-D) external radiation therapy that uses a computer to make pictures of the size and shape of the tumor. Thin beams of radiation of different intensities (strengths) are aimed at the tumor from many angles.
  - Stereotactic radiation therapy: Stereotactic radiation therapy is a type of external radiation therapy. A rigid head frame is attached to the skull to keep the head still during the radiation treatment. A machine aims radiation directly at the tumor. The total dose of radiation is divided into several smaller doses given over several days. This procedure is also called stereotactic external-beam radiation therapy and stereotaxic radiation therapy.
  - Proton beam radiation therapy: Proton-beam therapy is a type of high-energy, external radiation therapy. A radiation therapy machine aims streams of protons (tiny, invisible, positively-charged particles) at the cancer cells to kill them.

- **Internal radiation therapy** uses a radioactive substance sealed in needles, seeds, wires, or catheters that are placed directly into or near the cancer.

The way the radiation therapy is given depends on the type of tumor and where the tumor formed in the brain or spinal cord. External radiation therapy is used to treat childhood astrocytomas.

Radiation therapy to the brain can affect growth and development in young children. For children younger than 3 years, chemotherapy may be given instead, to delay or reduce the need for radiation therapy.

**Chemotherapy**

Chemotherapy is a cancer treatment that uses drugs to stop the growth of cancer cells, either by killing the cells or by stopping them from dividing. When chemotherapy is taken by mouth or injected into a vein or muscle, the drugs enter the bloodstream and can reach cancer cells throughout the body (systemic chemotherapy). When chemotherapy is placed directly into the cerebrospinal fluid, an organ, or a body cavity such as the abdomen, the drugs mainly affect cancer cells in those areas (regional chemotherapy). Combination chemotherapy is the use of more than one anticancer drug.

The way the chemotherapy is given depends on the type of tumor and where the tumor formed in the brain or spinal cord. Systemic chemotherapy is used in the treatment of children with astrocytoma. High-dose chemotherapy may be used in the treatment of children with newly diagnosed high-grade astrocytoma.

**High-dose chemotherapy with stem cell transplant**

High-dose chemotherapy with stem cell transplant is a way of giving high doses of chemotherapy and replacing blood-
forming cells destroyed by the cancer treatment. Stem cells (immature blood cells) are removed from the blood or bone marrow of the patient or a donor and are frozen and stored. After the chemotherapy is completed, the stored stem cells are thawed and given back to the patient through an infusion. These reinfused stem cells grow into (and restore) the body's blood cells.

For high-grade astrocytoma that has come back after treatment, high-dose chemotherapy with stem cell transplant is used if there is only a small amount of tumor.

**Targeted therapy**

Targeted therapy is a type of treatment that uses drugs or other substances to identify and attack specific cancer cells without harming normal cells. There are different types of targeted therapy:

- **Kinase inhibitors** stop cells from dividing and may prevent the growth of new blood vessels that tumors need to grow. Everolimus and sirolimus are kinase inhibitors used to treat childhood subependymal giant cell astrocytomas.

- **Monoclonal antibody therapy** uses antibodies made in the laboratory, from a single type of immune system cell, to stop cancer cells. These antibodies can identify substances on cancer cells or normal substances that may help cancer cells grow. The antibodies attach to the substances and kill the cancer cells, block their growth, or keep them from spreading. Monoclonal antibodies are given by infusion into a vein. They may be used alone or to carry drugs, toxins, or radioactive material directly to cancer cells. Bevacizumab is a type of monoclonal antibody being used to treat of childhood astrocytoma.

- **Protein kinase inhibitors** block proteins needed for cell growth and may kill cancer cells. Vemurafenib is a BRAF kinase inhibitor being used to treat recurrent childhood high-grade astrocytoma. Selumetinib and dabrafenib are types of protein kinase inhibitors being studied in the treatment of childhood astrocytoma.

See Drugs Approved for Brain Tumors for more information.

**New types of treatment are being tested in clinical trials.**

This summary section describes treatments that are being studied in clinical trials. It may not mention every new treatment being studied. Information about clinical trials is available from the NCI website.

**Other drug therapy**

Lenalidomide is a type of angiogenesis inhibitor. It prevents the growth of new blood vessels that are needed by a tumor to grow.

**If fluid builds up around the brain and spinal cord, a cerebrospinal fluid diversion procedure may be done.**

Cerebrospinal fluid diversion is a method used to drain fluid that has built up around the brain and spinal cord. A shunt (long, thin tube) is placed in a ventricle (fluid-filled space) of the brain and threaded under the skin to another part of the body, usually the abdomen. The shunt carries extra fluid away from the brain so it may be absorbed elsewhere in the body.
Cerebrospinal fluid (CSF) diversion. Extra CSF is removed from a ventricle in the brain through a shunt (tube) and is emptied into the abdomen. A valve controls the flow of CSF.

Patients may want to think about taking part in a clinical trial.

For some patients, taking part in a clinical trial may be the best treatment choice. Clinical trials are part of the cancer research process. Clinical trials are done to find out if new cancer treatments are safe and effective or better than the standard treatment.
Many of today's standard treatments for cancer are based on earlier clinical trials. Patients who take part in a clinical trial may receive the standard treatment or be among the first to receive a new treatment.

Patients who take part in clinical trials also help improve the way cancer will be treated in the future. Even when clinical trials do not lead to effective new treatments, they often answer important questions and help move research forward.

**Patients can enter clinical trials before, during, or after starting their cancer treatment.**

Some clinical trials only include patients who have not yet received treatment. Other trials test treatments for patients whose cancer has not gotten better. There are also clinical trials that test new ways to stop cancer from recurring (coming back) or reduce the side effects of cancer treatment.

Clinical trials are taking place in many parts of the country. See the Treatment Options section that follows for links to current treatment clinical trials. These have been retrieved from NCI's listing of clinical trials.

**Follow-up tests may be needed.**

Some of the tests that were done to diagnose the cancer or to find out the stage of the cancer may be repeated. (See the General Information section for a list of tests.) Some tests will be repeated in order to see how well the treatment is working. Decisions about whether to continue, change, or stop treatment may be based on the results of these tests.

Regular MRIs will continue to be done after treatment has ended. The results of the MRI can show if your child's condition has changed or if the astrocytoma has recurred (come back). If the results of the MRI show a mass in the brain, a biopsy may be done to find out if it is made up of dead tumor cells or if new cancer cells are growing.

**Treatment Options for Childhood Astrocytomas**

**Newly Diagnosed Childhood Low-Grade Astrocytomas**

When the tumor is first diagnosed, treatment for childhood low-grade astrocytoma depends where the tumor is, and is usually surgery. An MRI is done after surgery to see if there is tumor remaining.

If the tumor was completely removed by surgery, more treatment may not be needed and the child is closely watched to see if signs or symptoms appear or change. This is called observation.

If there is tumor remaining after surgery, treatment may include the following:

- Observation.
- A second surgery to remove the tumor.
- Radiation therapy, which may include conformal radiation therapy, intensity-modulated radiation therapy, or stereotactic radiation therapy, when the tumor begins to grow again.
- Combination chemotherapy with or without radiation therapy.
- A clinical trial of targeted therapy with selumetinib.

In some cases, observation is used for children who have a visual pathway glioma. In other cases, treatment may include surgery to remove the tumor, radiation therapy, or chemotherapy. A goal of treatment is to save as much vision as possible. The effect of tumor growth on the child's vision will be closely followed during treatment.

Children with neurofibromatosis type 1 (NF1) may not need treatment unless the tumor grows or signs or symptoms, such as vision problems, appear. When the tumor grows or signs or symptoms appear, treatment may include surgery to remove the tumor, radiation therapy, and/or chemotherapy.

Children with tuberous sclerosis may develop benign (not cancer) tumors in the brain called subependymal giant cell astrocytomas (SEGAs). Targeted therapy with everolimus or sirolimus may be used instead of surgery, to shrink the tumors.

Check the list of NCI-supported cancer clinical trials that are now accepting patients with childhood low-grade...
untreated astrocytoma or other tumor of glial origin. For more specific results, refine the search by using other search features, such as the location of the trial, the type of treatment, or the name of the drug. Talk with your child's doctor about clinical trials that may be right for your child. General information about clinical trials is available from the NCI website.

Recurrent Childhood Low-Grade Astrocytomases

Before more cancer treatment is given, imaging tests, biopsy, or surgery are done to find out if there is cancer and how much there is.

Treatment of recurrent childhood low-grade astrocytoma may include the following:

- A second surgery to remove the tumor, if surgery was the only treatment given when the tumor was first diagnosed.
- Radiation therapy to the tumor only, if radiation therapy was not used when the tumor was first diagnosed. Conformal radiation therapy may be given.
- Chemotherapy, if the tumor recurred where it cannot be removed by surgery or the patient had radiation therapy when the tumor was first diagnosed.
- Chemotherapy and targeted therapy with bevacizumab.

Check the list of NCI-supported cancer clinical trials that are now accepting patients with recurrent childhood astrocytoma or other tumor of glial origin. For more specific results, refine the search by using other search features, such as the location of the trial, the type of treatment, or the name of the drug. Talk with your child's doctor about clinical trials that may be right for your child. General information about clinical trials is available from the NCI website.

Newly Diagnosed Childhood High-Grade Astrocytomases

Treatment of childhood high-grade astrocytoma may include the following:

- Surgery to remove the tumor, followed by chemotherapy and radiation therapy.
- A clinical trial of chemotherapy with or without radiation therapy.

Check the list of NCI-supported cancer clinical trials that are now accepting patients with childhood high-grade untreated astrocytoma or other tumor of glial origin. For more specific results, refine the search by using other search features, such as the location of the trial, the type of treatment, or the name of the drug. Talk with your child's doctor about clinical trials that may be right for your child. General information about clinical trials is available from the NCI website.

Recurrent Childhood High-Grade Astrocytomases

Before more cancer treatment is given, imaging tests, biopsy, or surgery are done to find out if there is cancer and how much there is.

Treatment of recurrent childhood high-grade astrocytoma may include the following:

- Surgery.
- High-dose chemotherapy with stem cell transplant.
- Targeted therapy with a BRAF inhibitor.
- A clinical trial of targeted therapy with dabrafenib.
Check the list of NCI-supported cancer clinical trials that are now accepting patients with recurrent childhood astrocytoma or other tumor of glial origin. For more specific results, refine the search by using other search features, such as the location of the trial, the type of treatment, or the name of the drug. Talk with your child's doctor about clinical trials that may be right for your child. General information about clinical trials is available from the NCI website.

To Learn More About Childhood Astrocytomas

For more information about childhood astrocytomas, see the following:

- What You Need to Know About™ Brain Tumors
- Targeted Cancer Therapies
- Pediatric Brain Tumor Consortium (PBTC)

For more childhood cancer information and other general cancer resources, see the following:

- Childhood Cancers
- CureSearch for Children's Cancer
- Late Effects of Treatment for Childhood Cancer
- Adolescents and Young Adults with Cancer
- Children with Cancer: A Guide for Parents
- Cancer in Children and Adolescents
- Staging
- Coping with Cancer
- Questions to Ask Your Doctor about Cancer
- For Survivors and Caregivers

About This PDQ Summary

About PDQ

Physician Data Query (PDQ) is the National Cancer Institute's (NCI's) comprehensive cancer information database. The PDQ database contains summaries of the latest published information on cancer prevention, detection, genetics, treatment, supportive care, and complementary and alternative medicine. Most summaries come in two versions. The health professional versions have detailed information written in technical language. The patient versions are written in easy-to-understand, nontechnical language. Both versions have cancer information that is accurate and up to date and most versions are also available in Spanish.

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Purpose of This Summary

This PDQ cancer information summary has current information about the treatment of childhood astrocytomas. It is meant to inform and help patients, families, and caregivers. It does not give formal guidelines or recommendations for making decisions about health care.

Reviewers and Updates

Editorial Boards write the PDQ cancer information summaries and keep them up to date. These Boards are made up of experts in cancer treatment and other specialties related to cancer. The summaries are reviewed regularly and changes
Clinical Trial Information

A clinical trial is a study to answer a scientific question, such as whether one treatment is better than another. Trials are based on past studies and what has been learned in the laboratory. Each trial answers certain scientific questions in order to find new and better ways to help cancer patients. During treatment clinical trials, information is collected about the effects of a new treatment and how well it works. If a clinical trial shows that a new treatment is better than one currently being used, the new treatment may become "standard." Patients may want to think about taking part in a clinical trial. Some clinical trials are open only to patients who have not started treatment.

Clinical trials are listed in PDQ and can be found online at NCI's website. Many cancer doctors who take part in clinical trials are also listed in PDQ. For more information, call the Cancer Information Service 1-800-4-CANCER (1-800-422-6237).

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