

GBM (English)

What is Glioblastoma?

Glioblastoma or glioblastoma multiforme is one of the most common brain tumors accounting for approximately 12 to 15 percent of all brain tumors. The name of the tumor is commonly abbreviated to GBM. While GBM is the most common malignant brain cancer, it is a relatively rare occurrence compared to other cancers such as colon or lung cancer. The cells in glioblastoma resemble astrocytes- cells that normally nourish and support neurons as well as respond to injury of brain tissue. It is thought that a stem cell or immature astrocyte is the cell of origin that acquires a genetic abnormality and ultimately grows into an entire population of cancerous glioblastoma cells. This population can grow quickly and also spread through the brain while mingling with and overrunning normal brain cells.

How is GBM classified according to the WHO Grading System?

According to the WHO grading system, grade I tumors are low grade- the least malignant- while grade IV tumors are the most malignant, with potential to grow quickly and behave aggressively. The World Health Organization classifies GBM as a grade IV astrocytoma.

What risk factors pertain to GBM?

Risk factors for glioblastoma are largely unknown. However, research has shown that men are more frequently diagnosed with glioblastoma than women. The occurrence of GBM in a male to female ratio is around 1.6 to 1. Incident rates peak between the ages of 50 and 84 years, with less than 10 percent of cases occurring in children. GBM rates are highest in non-Hispanic whites followed by Hispanics. Non-Hispanic blacks and Asian/Pacific Islanders tend to have the lowest rates of this brain cancer. Constant exposure to ionizing radiation, chemicals, and polyvinyl chloride may increase the chance of developing GBM. Diet, smoking, and the use of cell phones have not been definitively linked to GBM. The vast majority of GBM patients have sporadic tumors- that is, they probably did not inherit a gene that significantly predisposed them to the cancer. Furthermore, these patients' children are not more likely to get GBM. However, there are rare cases of familial GBM where the risk for GBM can be transmitted to descendants.

What are some signs and symptoms of GBM?

The signs and symptoms of GBM vary depending on the tumor's size, location, and rate of growth. Some common signs of glioblastoma include headaches, vomiting, confusion, weakness, numbness, dizziness, seizures, and loss of balance. If you are experiencing any of these symptoms, please contact a physician as soon as possible to evaluate the cause. While brain tumors may cause such symptoms, there are many other possible neurologic causes as well.

What is an angiogram? What is an EEG?

Other forms of diagnosis include angiogram, a type of study that shows the brain's blood vessels. It can be helpful for helping surgeons understand how close a brain tumor is crucial blood vessels in the brain. An **electroencephalogram (EEG)** is a test that records the brain's activity by measuring electrical currents and impulses. It can be useful for detecting seizures and other electrical abnormalities of the brain.

The test and imaging studies (e.g. MRI) suggest a brain tumor. What type of doctor should I see?

We suggest seeing a doctor who treats a lot of brain cancers. Such a doctor may be a neuro-oncologist, oncologist, or neurosurgeon. Your personal physician can likely help you find a good brain cancer specialist. Often at brain tumor centers, the neurosurgeons, neuro-oncologists, neuroradiologists, and neuropathologists work closely together as a team to provide a diagnosis and care.

What is the purpose of surgery?

If possible, surgeons attempt to remove all cancerous tissue to relieve pressure on the surrounding brain without damaging neurological functions. In most GBM cases, surgery is quite feasible and effective in combating the tumor. Craniotomy is the most common surgical procedure in which the cranium, or skull, is opened. The neurosurgeon makes an incision in a small section of the scalp, removing a part of skull in order to reach the brain. As much as possible tumor is removed. After the surgical procedure, the scalp is closed with either staples or stitches. Patients are then taken to the intensive care unit (ICU) for recovery.

During surgery, a biopsy and/or resection may be performed. What is a biopsy? What is a resection?

A biopsy is a surgical procedure in which a neurosurgeon takes a small sample of tissue from the tumor and gives it to a pathologist who specializes in examining tissues under a microscope or with genetic tests. The pathologist gives a diagnosis that can help the neurosurgeon and oncologist decide what the next best steps are. Depending on the diagnosis, a resection may be performed. A resection is a surgery where as much as possible of the tumor is cut out.

What happens to the tumor tissue once it has been removed from my brain?

The standard process is to process and store sufficient tumor tissue in blocks of wax that can then be used for a variety of studies to establish with certainty what the diagnosis is. At the time of surgery, if there is tissue left over after enough tissue is given to the pathologist for diagnosis, some tissue can be frozen at very cold temperatures in liquid nitrogen or special freezers. Experimental therapy trials or clinical trials sometimes require 200-400 mg of frozen tissue (0.5 cm³ or pea-sized fragment) for entry. If you are interested in a particular clinical trial, get information from the doctors in charge of the clinical trial well

before surgery and convey that to your neurosurgeon so that they can coordinate with the clinical trial staff.

What kinds of treatments are available for GBM?

With today's technological advances, new treatments are offering hope to many individuals fighting the battle against glioblastoma, the most aggressive brain tumor. Typical therapy for glioblastoma patients includes surgery, followed by radiation and chemotherapy. However, sometimes radiation or chemotherapy may be omitted as not everyone can tolerate all the therapies. In addition to standard treatment, vaccinations and molecular targeted therapies are being tested in clinical trials across the country. A neuro-oncologist can provide you on information regarding such trials. The website www.ClinicalTrials.gov has a tool to search for glioblastoma trials throughout the country and in your specific city.

What is Important to know about radiation?

After tumor has been removed using craniotomy, the surrounding area of the brain is usually treated with radiation. Radiation therapy uses high-energy x-rays (ionizing radiation) to stop cancer cells from dividing. It can slow or stop the growth of the remaining tumor, as ionizing radiation damages a cell's DNA.

What are the different types of radiation therapy?

Conventional radiation therapy delivers an external beam of radiation to the region of the brain containing the tumor. Typically patients receive around 30 radiation treatments, over the course of six weeks. A typical dose of therapy is 1.8-2.0 Gy (Gray), with the total treatment amounting to 50-60 Gy. The actual radiation doses may depend on the proximity of the tumor in the brain to vulnerable brain structures and also the patient's . For example, very elderly patients may not be able to tolerate some radiation regimens. **Stereotactic Radiosurgery (SRS)** may also be available in some cases. During SRS, a single dose of radiation is targeted at the tumor, attempting to kill all cancerous cells in that area.

What are the effects of radiation?

Common short-term side effects of radiation therapy are loss of appetite, fatigue, and nausea. Short-term memory loss, skin reactions, and hair loss may also occur. Long-term side effects may include problems with coordination, reasoning, and thinking. Because constant ionizing radiation exposure is linked to the formation of GBM tumor, later recurrences of tumor may arise.

What is chemotherapy?

After surgery and radiation, chemotherapy may be administered by a neuro-oncologist. Chemotherapy is a type of treatment that uses drugs to inhibit or destroy cancerous cells. Chemo is given in cycles, which

vary depending on the drugs used. It is often given orally or through injection in veins. The most common chemotherapy drugs are temozolomide (Temodar), lomustine (CCNU), and carmustine (BCNU).

Should I enter a clinical trial?

It is important to know that standard therapies have established efficacy for a period of time. Many if not most GBM patients do enter clinical trials eventually but please understand that the experimental therapies in these trials may or may not work. In any case, the clinical trials often provide very valuable information that may help others in the future. Also, one can enter some clinical trials once the standard therapies aren't working. The decision to enter or not to enter a trial can be discussed with your doctor and your family. Your physician, oncologist, and friends in support groups may be able to help you understand what a clinical trial is and whether to participate.

What happens after treatment?

Once treatment is over, patients are checked by physicians (neurological examinations) and receive MRI or CT scans to check for tumor recurrence.

I've found a doctor but where can I get more information and support?

The **National Brain Tumor Society** provides a wide range of information and other resources. Their website is www.braintumor.org/. Their link for brain tumor support groups is at www.braintumor.org/patients-family-friends/find-support/. Support groups are composed of brain tumor patients and their families, friends, and sometimes health care providers. They typically meet regularly and appreciate what you may be going through. They can share with you what they've been through- providing moral and practical support. Brain tumor programs at major medical centers may also have their own support groups. The Brain Tumor Society also has an excellent free booklet called "The Essential Guide to Brain Tumors" that you can download at www.braintumor.org/patients-family-friends/about-brain-tumors/publications/essentialguide.pdf. The **Musella Foundation for Brain Tumor Research and Information Inc.** provides a downloadable PDF booklet called "Brain Tumor Guide for the Newly Diagnosed" at <http://www.virtualtrials.com/faq/PatientGuide2010.pdf>. The **Pediatric Brain Tumor Foundation** provides information for families with children suffering from brain cancers at <http://www.pbtfus.org/about/>.

I am a general practitioner or other health care provider and want more information- Where can I go?

An oncologist at your medical center is a good place to start. For additional information, neuro-oncologists at a nearby or distant major medical center are often happy to talk with you and provide advice. The neuro-oncologists are often listed under Brain Tumor Program or Neuro-oncology on the medical center websites. The brain tumor guides above also are helpful. The Central Brain Tumor Registry of the United States provides detailed statistics on brain tumors including survival of different tumor types stratifying by age and ethnicity.

As a health care provider, I would like to get educational materials for my underserved or minority patients - where can I go?

Intercultural Cancer Council (ICC): The ICC provides cancer fact sheets to health care providers regarding minorities including for African-Americans, Latinos, Hawaiians/Pacific Islanders, Native Americans. Please visit www.iccnetwork.org

Redes En Acción: The National Latino Cancer Research Network is a National Cancer Institute-funded initiative to combat cancer among Latino patients. They provide training and resources to providers. Please visit www.redesenaccion.org

IMPORTANT:

The information provided in this blog is intended to educate. Please see a licensed physician in the state where you are seeking care for specific guidance on your medical situation.