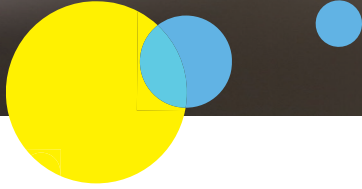


A stylized graphic of a human head profile in light blue, facing right. Inside the head, there are several overlapping, organic shapes in shades of blue and yellow, representing the brain. The shapes are layered, with a dark blue shape on the left, a medium blue shape in the center, and a yellow shape on the right. The overall design is clean and modern.

GLIOBLASTOMA (GBM)

An educational resource for people newly diagnosed with GBM and their caregivers



Glioblastoma (GBM)

This educational resource was created to help support you and your loved ones as your healthcare team guides you through treatment.

Use the Table of Contents links below to find the information you're looking for.

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This resource should not replace medical advice. If you have any questions about your disease, contact your healthcare provider.

ABOUT GBM

GBM is the most common type of cancer in the brain. It's an aggressive disease, so your healthcare team will work with you to create an aggressive treatment plan.

Depending on a person's needs, a doctor treating GBM may recommend some or all of the following FDA-approved treatments for newly diagnosed GBM:

- Surgery
- Radiation therapy
- Chemotherapy
- Tumor Treating Fields (TTFields)

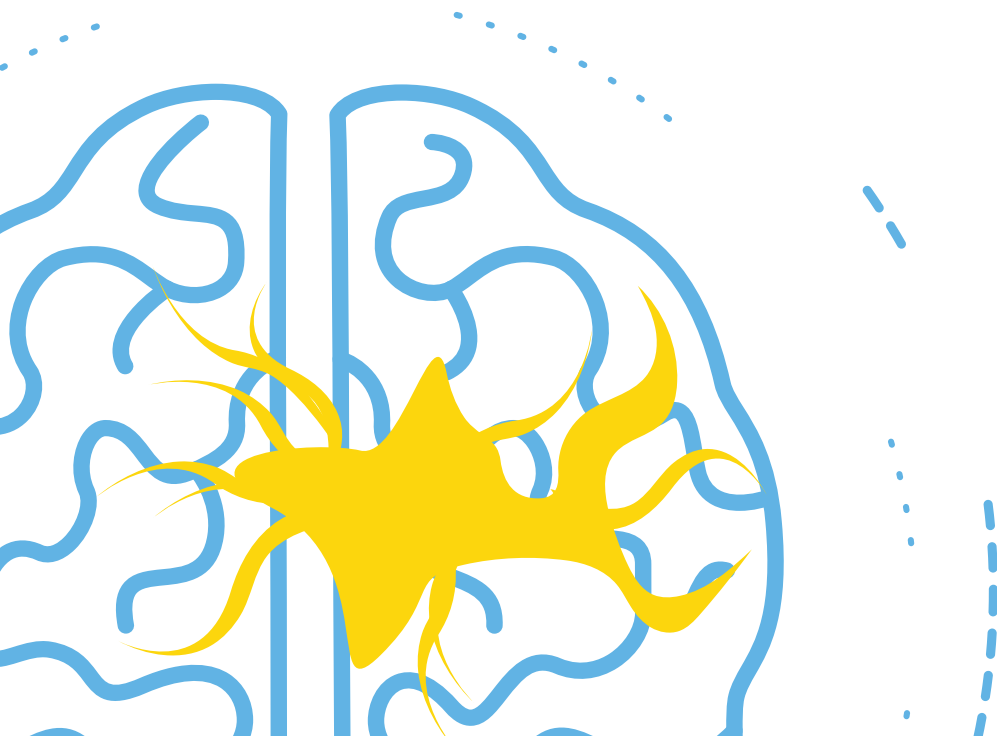
You and your doctor will work out a treatment plan for treating your GBM.

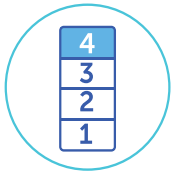
[Learn more about treatment choices for GBM.](#)

TUMOR LOCATION

GBM begins and usually stays in the brain. This is different from other types of tumors, which may start somewhere else in the body and then spread to the brain. The location of the tumor will determine what functions it impacts. These could include your reading, thinking, and speech abilities. It could also include your muscle movement and emotions.

GBM can grow rapidly and has tiny, finger-like tentacles that it uses to spread across the brain. These tentacles make it difficult to remove GBM completely.





GRADING OF BRAIN TUMORS

All brain tumors are grouped from Grade 1 to Grade 4. Grade 1 tumors are generally benign (not cancerous), and Grade 4 tumors are the most aggressive. All GBM tumors are Grade 4. GBM may sometimes come from lower grade tumors that an oncologist—a doctor who specializes in cancer treatment—found at an earlier time.



WHO GETS GBM?

An estimated 15,000 cases of GBM—or tumors that may progress to GBM—are diagnosed in the US every year. More than 23,000 adults are living with the disease. GBM isn't generally passed down from parents. Changes in DNA, our genetic makeup, may contribute to the development of GBM. There may be other causes as well.

GBM is most common in:

- Adults who are 65 years of age and older
- Men compared to women



THE SIGNS OF GBM

The signs and symptoms are different from person to person and usually depend on where the tumor is located. If there is edema—swelling caused by increased fluid around the tumor—then symptoms may also develop.

Some common symptoms of GBM are:

- Headaches
- Nausea and vomiting
- Tiredness (fatigue)
- Seizures
- Weakness or changes in feeling in the face, arms, or legs
- Problems with vision, speech, memory, or decision-making

LOOKING FORWARD

Today, there are several FDA-approved treatment choices for people with GBM. You and your doctor will work together and decide on a treatment plan.

3 STEPS TO DIAGNOSING GBM



STEP 1: NEUROLOGIC EXAM

Often the first step to diagnose GBM is to take a neurologic (neuro) exam. This will be done by a neurologist, a doctor who specializes in the nervous system.

A neuro exam often tests your sense of:

- Sight
- Hearing
- Smell
- Taste
- Feeling

It also tests:

- Reflexes
- Movement
- Coordination
- Balance



STEP 2: IMAGING TESTS

Next, you may be asked to receive an imaging test to learn more about the specific tumor. Here, a machine will be used to create images of the tumor. Each machine uses a different type of technology to help create the images.

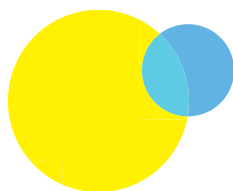
Some types of imaging tests include:

- **Magnetic resonance imaging (MRI)** uses radio waves and magnets to see images of the brain
- **Computed tomography scan (CT or CAT scan)** uses X-rays to create images of the brain



STEP 3: BIOPSY

After imaging tests, a surgeon may do a surgical biopsy as part of the diagnosis. This is when they take a small sample of the tumor tissue to evaluate. Depending on the location of the tumor, the doctor may try to remove as much of it as possible.



TREATMENT CHOICES

The next few pages discuss FDA-approved treatments for newly diagnosed GBM.

Use the links below to learn more about the treatment choices available.

- [Surgery](#)
- [Chemotherapy](#)
- [Radiation](#)
- [TTFields + chemotherapy](#)

SURGERY

The size and location of the tumor will help determine if surgery should be the first step in treatment. The goal of surgery is to remove as much of the tumor as possible, without damaging the surrounding healthy areas of the brain. This will be done by a neurosurgeon, a surgeon who specializes in surgery on the nervous system. They will use high-tech tools to help find and remove tumor tissue.

Some common side effects of surgery are pain, swelling, and scarring.

Surgery can relieve pressure on the brain and help reduce symptoms, like headaches, caused by the tumor.

What to expect during surgery:



To prevent damage to brain function, you may be kept awake during surgery to answer the surgeon's questions. This is possible using local anesthesia because there are no pain receptors in the brain.



During surgery, the surgeon may take a tissue sample to learn more about your type of cancer. This is called a biopsy.



The surgery usually requires a hospital stay of about 4 days.

RADIATION

Radiation therapy uses beams of energy to attack cancer cells and is administered by an oncologist who specializes in radiation. They are called radiation oncologists.

How radiation therapy works

Typically, radiation oncologists give radiation in small doses or fractions every weekday for up to 6 weeks. Each treatment session generally lasts 10-20 minutes. Over time, the repeat radiation damages the tumor tissue.

During treatment, the goal is to target the tumor directly and avoid healthy parts of the brain. This may require wearing a special mask during treatment to help keep the radiation targeted on the tumor.

Side effects from radiation therapy differ for each person, but some of the most common side effects are tiredness (fatigue), loss of appetite, and hair loss.

Here are some types of radiation:



Image-guided radiation is used to help confirm where a tumor is before and during treatment. It uses different imaging technologies, like an MRI or CT scan, to accurately deliver radiation to cancer cells.



Intensity-modulated radiotherapy (IMRT) uses multiple beams to deliver high doses of radiation to the tumor while sparing normal tissue.



Most people with newly diagnosed GBM also start a type of chemotherapy called temozolomide (TMZ) at the same time as radiation. [Learn more](#) about TMZ.

CHEMOTHERAPY

If an oncologist suggests you treat with chemotherapy and radiation at the same time, they may call it chemoradiation therapy. Temozolomide (TMZ) is a chemotherapy drug commonly prescribed for people with newly diagnosed GBM.

What is temozolomide?

Temozolomide is a chemotherapy drug that works to damage the DNA in tumor cells so they can't grow and multiply. At first, during radiation, it is taken every day—this is called concurrent therapy.

Then a pill is taken daily for the first 5 days of each treatment cycle. Treatment cycles are 28 days long.

Your doctor will determine the right amount of TMZ for you. Then, you can take TMZ at home as a capsule.

Common side effects of TMZ include nausea, vomiting, hair loss, loss of appetite, headache, constipation, and others.

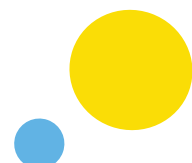


TUMOR TREATING FIELDS (TTFields)



Along with chemotherapy, a medical device can also be used to treat GBM. This wearable, portable device can help slow down or stop cancer cell division by producing low-intensity electric fields, known as Tumor Treating Fields or TTFields. In the clinical trial, people with newly diagnosed GBM began using TTFields with chemotherapy 4 to 7 weeks after radiation was over.

The most common side effects of TTFields when used together with chemotherapy (TMZ) were low blood platelet count, nausea, constipation, vomiting, tiredness, scalp irritation from the device, headache, seizure, and depression.





ADDITIONAL TREATMENT CHOICES



OTHER MEDICATIONS

Other medications may be used to control symptoms of GBM. These include:

- Steroid drugs to decrease swelling around the tumor
- Anti-epilepsy drugs to prevent seizures

GETTING INVOLVED WITH TREATMENT RESEARCH

Researchers are working to find a cure for GBM. In clinical trials, researchers look at how different treatments work to fight GBM. They also pay close attention to side effects. Talk to your doctor about the pros and cons of a clinical trial before considering one.

STAYING POSITIVE: A PERSONAL STORY

An interview with Mark, 59, a patient living with GBM

Mark, what led up to your GBM diagnosis?

I started losing my words. I couldn't come up with a coherent message, and then all of a sudden I couldn't even remember how to spell easy words. We went to the ER, where they did a CAT scan and an MRI. They came back and told me I had a brain tumor. After about 10 days of hospital visits, I had my surgery and then got the results.

What did your doctor tell you after your diagnosis?

She said it was malignant. The surgeon and oncologist met with me daily, so they were going through the diagnosis with us. My oncologist talked to us about radiation, chemo, TTFIELDS, and gave us a ledger to read about glioblastoma.

How did you handle hearing your GBM diagnosis?

When I first heard, it was like, oh no, I have cancer. But I'm not the only person in the world who's got cancer, so I'm not going to sit here and feel sorry for myself. It was just see what the next steps are and go from there. I kept a positive attitude.

Who was your support system?

My wife. She's a nurse. So, she was my confidant and my rock. Whenever the oncologist came in, she was always there to help me ask questions. She would ask the oncologist about treatments and studies—I looked to her as my resource.

How is the relationship with your treatment team?

We work together. We talked about my treatment together. We talked about next steps following surgery and going through 6 weeks of radiation and chemo. We focused on that first. I've been really working with oncologists, and then when I was going through the radiation, I was also meeting with the radiation oncologist regularly. I was basically working closely with my oncologist and her staff. My wife and I feel very comfortable with the care that we've got.

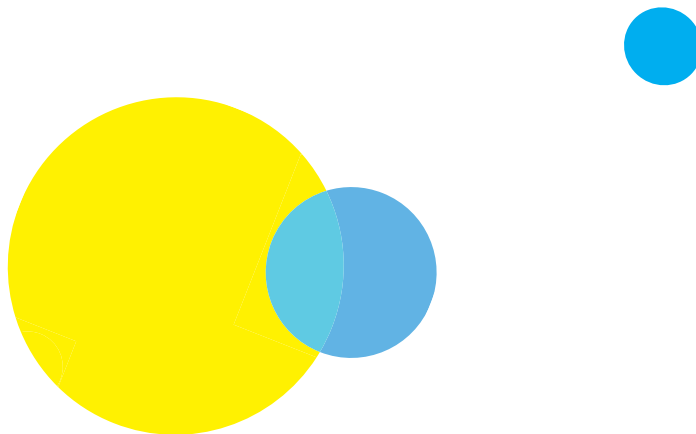
How have things changed since your initial treatments?

After 7 months, I returned to work. I started out working some at home, and some at the office, and now I'm up to working 5 days a week. They thought I wouldn't be able to get back to work. But here I am. The company I work for is great; they let me just go in and do what I can.

How do you stay positive living with GBM?

Exercise really helps. Before my diagnosis, I was using an indoor rowing machine at the gym, and I was doing it like 5, 6, 7 days a week. I told my wife I was going to buy one so I could exercise at home. With the doctor's permission, I still do that. It keeps me thinking, "Hey, I can do this." I also have my wife and some coworkers who are big cheerleaders for me. They all help me stay positive.

// I kept a positive attitude. //



SUPPORT AND RESOURCES

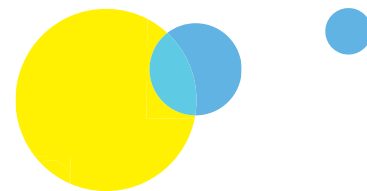
There's a community of support and many resources available for people with GBM and their caregivers. They may help you along every step of your treatment journey.

NATIONAL ADVOCACY ORGANIZATIONS

Click below to get the latest information and research from health organizations that specialize in brain tumors.



GLOSSARY



Here are some definitions of medical terms used in this guide.

Benign—tumors that are not cancer. Often used to describe tumor cells that are similar to other normal cells and are confined to one location.

Biopsy—a procedure in which a sample of cells or tissue is removed and tested for disease.

Chemotherapy—treatment that either kills cancer cells or stops them from growing.

Computed tomography scan (CT or CAT scan)—an imaging technique that uses X-rays and computer analysis to create a picture of body tissues and structures.

Glioblastoma (GBM)—a brain tumor that often grows quickly.

Magnetic resonance imaging (MRI)—an imaging technique that uses radio waves, a magnetic field, and computer analysis to create a picture of body tissues and structures.

Malignant—cancerous cells that can invade and destroy nearby tissue and spread to other parts of the body.

Medical oncologist—a doctor who treats cancers.

Neuro-oncologist—a doctor who specializes in cancers of the nervous system. This includes the brain, spinal cord, and other nerves.

Neurosurgeon—a surgeon who specializes in surgery on the nervous system.

Newly diagnosed GBM—when a doctor first confirms that a tumor is GBM.

Oncologist—a doctor specializing in cancer treatment.

Radiation oncologist—a doctor who specializes in using radiation to treat cancer.

Temozolomide (TMZ)—a chemotherapy drug taken to treat newly diagnosed GBM. It damages the cell's DNA and may kill cancer cells.

Tumor—an abnormal mass of tissue that may be cancerous (malignant) or noncancerous (benign).

Tumor Treating Fields (TTFields) therapy—a treatment for GBM that uses electric fields to help slow down or stop cancer cell division.

