

Neurosurgery Department



Glioma



National
Neuroscience Institute

SingHealth

Understanding Gliomas

Glioma is a type of brain tumour that occurs in glial cells. Glial cells support nerve cells (neurons) in the brain.

There are different types of glial cells and the behaviour and aggressiveness of gliomas depend on which type of glial cell is affected. For example, some gliomas grow slowly in one place, while others grow quickly and spread to other parts of the brain or spine.

Gliomas are graded 1 to 4 depending on how fast they are likely to grow. In general, the higher the grade, the more aggressive the tumour. Grade 4 gliomas are known as glioblastomas. These are the most common type of cancerous (malignant) brain tumours in adults.

Signs of Gliomas

Symptoms may vary and present gradually, depending on the location of the tumour.

Common symptoms include:

- Headaches that recur and get worse, especially in the morning
- Nausea and vomiting
- Seizures or fits
- Unexplained drowsiness
- Double vision, blurring or trouble seeing clearly
- Increasing difficulty with speech and hearing
- Increasing weakness in the limbs
- Problems with hearing, balance and coordination
- Marked changes in memory, concentration or alertness

Some of these symptoms can occur with other conditions, so it is important to consult a doctor for an accurate diagnosis.

Risk Factors

The exact cause of gliomas is unknown. There is no clear evidence that injury, chemical exposure, viral infection, mobile phone use, environmental factors or mental stress can cause gliomas.

Diagnosing Gliomas

The doctor will take the patient's history and perform a physical examination. Imaging tests such as a Computed Tomography (CT) scan and/or a Magnetic Resonance Imaging (MRI) may be done.

Sometimes, special tests may also be needed, such as:

- Functional MRI scan to measure brain activity in different parts of the brain by detecting changes in blood flow with brain activity
- MRI Tractography which creates 3D images of nerve tracts

These tests help to detect and pinpoint the tumour's size, location and how close it is to parts of the brain that control key functions such as language. The test results will help a neurosurgeon, a doctor who specialises in the diagnosis and surgical treatment of neurological conditions, to plan for the removal of the tumour.

Depending on the tumour's size, location and if it has spread, the neurosurgeon may take a small sample of the tumour (biopsy), or remove part or as much of the tumour as possible. The tumour sample is then sent to another specialist known as a pathologist, who studies the sample under a microscope to confirm the diagnosis.

The sample will also be examined at the molecular level, to identify the tumour sub-type as some gliomas respond better to certain forms of chemotherapy than others. These additional tests can take several weeks.

Treating Gliomas

Glioma treatment depends on the tumour's size, location, grade, sub-type, how much was removed for testing and the patient's general health.

Treatment involves a multidisciplinary team of specialists, including neurosurgeons, neurologists, neuroradiologist, neuropathologists, oncologists, nurse clinicians and allied health professionals (therapists, social workers, psychologists, dieticians) who work together to develop a management plan personalised to the patient's needs and tumour profile.

For gliomas graded 2 to 4, treatment often aims to control the tumour's growth or relieve symptoms, but it is unable to cure the tumour.

Treatment options include:

- **Surgery**

In most cases, surgery will be recommended to remove as much tumour as possible, with the least harm to other parts of the brain. The tumour may be partially (subtotal resection) or entirely (total resection) removed, depending on its size, location and the risks involved.

A computerised navigation system is used to help the neurosurgeon locate the tumour and navigate critical areas of the brain during surgery.

Some may undergo an awake craniotomy, a surgery that is performed while the patient is conscious and able to respond to simple instructions, but unable to feel any pain. An awake craniotomy reduces the risk of damage to critical brain regions close to the tumour.

The risk of surgery depends on multiple factors including the patient's age, medical history and location of the tumour. These risks may include infection, bleeding, seizures, paralysis and coma.

- **Radiation therapy**

High-energy beams such as x-rays are directed at the tumour to destroy it. Depending on the size and spread of the tumour, and the patient's overall health condition, radiation therapy may be given five days a week for three to six weeks. The first session will usually start within six weeks of the surgery, depending on how well the surgical wound has healed. Prior to radiation therapy, the patient would need to go for a simulation CT scan. During the session, a plastic shell will also be custom made for each patient. This shell will help to hold the head and neck in position during therapy.

Your doctor will discuss potential side-effects and how to cope with them before radiation therapy is started.

Short-term side-effects of radiation therapy can include fatigue, headaches, hair loss and scalp irritation. Longer term side-effects may vary depending on your treatment.

- **Chemotherapy**

Chemotherapy will depend on the patient's health after surgery and the tumour's grade and sub-type. The most common form of chemotherapy for high-grade glioma is Temozolomide, however this medication is only effective in certain sub-types of glioma. Temozolomide is a capsule to be taken orally. The standard treatment is to start Temozolomide at the same time as radiation therapy followed by another six cycles of chemotherapy given over six months.

Side-effects of Temozolomide include fatigue, nausea, liver injury, constipation, decreased white blood cell count or platelet count.

Rehabilitation and Support for Brain Tumour

Recovery depends on the brain's ability to heal from damage caused by the tumour. Therapists such as physiotherapist, occupational therapist and speech therapist may support rehabilitation. Some patients may need to stay at a community hospital for more intensive and targeted rehabilitation.

During rehabilitation, the patient and family should aim to maintain a positive attitude, set realistic goals and work steadily to accomplish each goal.

Brain Tumour Society Singapore

The Brain Tumour Society Singapore (BTSS) is a community of brain tumour patients, caregivers and survivors. The BTSS provides community support and resources such as befrienders, financial assistance and public education. Started by brain cancer survivors, BTSS meets once a month so that members can share experiences and advice on how to cope with the disease.

For more information, visit
www.braintumoursociety.org.sg

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