
Brain tumours - gliomas

Summary

- Gliomas are brain tumours that arise from the glial cells of the brain and nervous system.
 - Gliomas are categorised as slow growing (grade I and II) or fast growing (grade III and IV).
 - Definitive diagnosis can only be determined by a biopsy.
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Gliomas are brain tumours associated with the three types of glial cells in the brain, which include astrocytes, oligodendrocytes and the ependymal cells. Glial cells make up the supportive tissue of the brain and, unlike neurons, don't conduct electrical impulses.

If left untreated, any type of glioma may grow and press on other structures within the brain. Pressure on the brain can be harmful as it forces the brain against the skull, causing damage to the brain and hampering its ability to function properly. This reduced function can lead to long-lasting brain damage or, if left untreated, death.

Symptoms of gliomas

The symptoms of glioma depend on the size, grade and location of the glioma, but can include:

- Headaches
- Nausea and vomiting
- Drowsiness
- Seizures
- Changes in personality
- Memory loss
- Changes in speech
- Weakness or loss of feeling in limbs
- Walking difficulties
- Vision changes and abnormal eye movements.

Glial cells explained

Glial cells make up the supportive tissue of the brain. The three types of glial cell are:

- **Astrocytes** – these cells regulate brain activity and control the movement of blood to the brain. They are star-shaped, hence their name 'astro'.
- **Oligodendrocytes** – these cells produce the myelin sheath. This protective sheath surrounds the nerve fibres in the brain and spinal cord, and helps conduct messages along the nerves.
- **Ependymal cells** – these cells line the internal (ventricular) walls of the fluid spaces located inside the brain canal and spinal cord.

Gliomas explained

Gliomas refer to tumours that can originate in glial cells and include:

- **Astrocytomas** – tumours that originate in the astrocytes and make up about 25 to 30 per cent of all gliomas. Astrocytomas can occur anywhere within the brain and are often cystic (cyst-forming).
 - **Oligodendrogliomas** – tumours of the oligodendrocytes, which can occur anywhere there is myelin sheath. This type of tumour is most common in men between 35 to 40 years of age.
 - **Ependymomas** – usually benign and lower grade tumours. However, they can sometimes grow and spread rapidly via the pathways that carry the cerebrospinal fluid (CSF). Ependymomas are more common in
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adolescent males.

Gliomas are graded

Gliomas are graded according to how malignant (cancerous) they are. Classifications developed by the World Health Organization (WHO) are generally used. These classifications are:

- Degree of differentiation – how different the cell looks under a microscope from normal cells
- Cellularity or cell division – how fast the tumour grows
- Endothelial or vascular proliferation – the speed of cell growth and production of new blood vessels
- Presence of necrosis – whether brain cells are dying.

Glioma grades explained

Infiltrating gliomas are graded according to the following characteristics as seen under the microscope:

- **Grade I** – slow-growing tumours with slowly dividing cells. There is no significant necrosis (cell death) or vascular proliferation (increased blood vessel growth – cancerous tumours create extra blood vessels).
- **Grade II** – slow-growing tumours with more rapidly dividing cells. There is no significant necrosis or vascular proliferation.
- **Anaplastic grade III** – these brain tumours can arise from lower grade gliomas and may develop further into higher grade tumours. They are described as having focal or diffuse areas of high cell division and, therefore, show many dividing nuclei (the small sac within the cell that contains the DNA).
- **Glioblastoma multiforme (GBM) grade IV** – these tumours have similar characteristics to grade III gliomas, but have a higher incidence of vascular proliferation and necrosis. This tumour has an average survival time of only around 12 months.

Diagnosis of gliomas

The range of tests used to diagnose glioma include:

- Physical examination
- Medical history
- CT scan
- MRI scan
- Biopsy of the suspect tissue, collected during brain surgery.

Treatment for gliomas

Treatment options for gliomas can include:

- **Surgery** – a craniotomy is a procedure performed by a neurosurgeon. A hole is cut into the skull in order to provide access to the brain. This allows a biopsy of the glioma and the opportunity to remove some of the tumour at the same time. After the operation is finished, the bone is replaced, and the muscle and skin are stitched.
- **Radiotherapy** – small, precise doses of radiation are used to target and destroy cancer cells.
- **Chemotherapy** – the use of cancer-killing drugs.

In brain tumours, all three treatments are often in combination.

When a cure isn't possible

If a glioma has been diagnosed in its later stages, the cancer may have spread to the point where a cure is no longer possible. Treatment then focuses on improving quality of life by relieving the symptoms. This is called 'palliative' treatment and may include using medications to relieve pain, nausea and vomiting.

Where to get help

- Your doctor
- Neurologist
- Neurosurgeon

Things to remember

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