CONDITION

# Brain tumor - primary - adults

Learn about primary brain tumors in adults, including possible symptoms, diagnosis, treatment options, complications, and follow-up care.

**WHAT IT IS**
Growth beginning in the brain or nearby tissues

**BODY SYSTEM**
Nervous system

**MAIN SYMPTOMS**
Headaches, seizures, one-sided weakness, speech or vision changes

**WHAT CAUSES IT**
Usually unknown, rarely inherited

**HOW IT IS DIAGNOSED**
MRI, biopsy and neuropathology

**MAIN TREATMENT**
Surgery, radiation, drug treatment, or active monitoring

**CAN IT BE CURED?**
Sometimes - complete removal may be possible

**IS IT AN EMERGENCY?**
Sometimes - prolonged seizure or sudden stroke-like symptoms

**LONG-TERM OUTLOOK**
Varies; some tumors recur or continue growing

## Overview

A primary brain tumor is a growth that begins in the brain or nearby tissues. It differs from a metastatic brain tumor, which is cancer that has spread to the brain from another part of the body.

Primary brain tumors include many conditions. Some grow slowly and remain limited to one area; others grow quickly or spread into nearby brain tissue. A tumor may be nonmalignant or malignant , but either type can cause serious problems by pressing on important structures or blocking the normal flow of fluid around the brain.

Common groups include gliomas, meningiomas, and pituitary tumors. Gliomas include astrocytomas, oligodendrogliomas, and glioblastomas. Doctors classify tumors by their microscopic appearance and, increasingly, by changes in their genes or proteins. These

molecular features can clarify the diagnosis, help predict behavior, and guide treatment.

Treatment depends on the tumor's type, grade, molecular features, size, location, and effects, as well as the person's health and preferences. Care often involves neurosurgery, neurology, oncology, radiation oncology, pathology, rehabilitation, and supportive-care specialists.

## Symptoms

Symptoms vary according to the tumor's location, growth rate, and whether it causes swelling or increased pressure inside the skull. Some slow-growing tumors are found during imaging for another reason.

Possible symptoms include:

These symptoms can have many causes and do not necessarily indicate a brain tumor, but they require medical assessment.

A first seizure needs prompt evaluation. Call emergency services for a seizure lasting more than five minutes, repeated seizures without recovery, serious injury, breathing difficulty, or a seizure in water.

Sudden weakness, facial drooping, trouble speaking, severe confusion, loss of consciousness, or a sudden extremely severe headache is also an emergency. These symptoms may indicate stroke, bleeding, or another urgent condition. Gradually developing symptoms, such as persistent headaches or worsening balance, generally require a timely medical appointment.

- New or changing headaches, particularly with other neurological symptoms
- A first seizure or a change in an existing seizure pattern
- Weakness, numbness, or poor coordination on one side
- Problems with speech, understanding, memory, concentration, or behavior
- Changes in vision, hearing, balance, or walking
- Persistent nausea or vomiting without another clear cause
- Unusual sleepiness or reduced alertness
- Hormone-related changes from a pituitary or nearby tumor

## Causes and risk factors

For most adults, the cause of a primary brain tumor is unknown. Tumors develop when cells

acquire changes that allow abnormal growth and survival. Most of these changes occur during life and are not inherited.

Exposure to ionizing radiation, including previous radiation therapy to the head, is an established risk factor. Medical imaging also uses ionizing radiation, but clinicians balance the small potential risk against the benefit of a needed scan.

A small proportion of tumors are associated with inherited syndromes such as neurofibromatosis, tuberous sclerosis, Li-Fraumeni syndrome, and von Hippel-Lindau disease. Genetic evaluation may be appropriate for an unusual tumor type, diagnosis at a young age, multiple related tumors, or a strong family history.

Primary brain tumors can occur at any adult age, although specific types are more common in certain age groups. Research has not established ordinary mobile phone use as a cause. These tumors are not contagious and are not caused by stress, everyday activities, or a person's attitude.

## Diagnosis

Evaluation usually begins with a medical history and neurological examination. The clinician may assess strength, sensation, reflexes, coordination, walking, speech, vision, hearing, memory, and alertness.

MRI is the main imaging test for most suspected brain tumors. It uses a strong magnet and radio waves rather than ionizing radiation. Contrast material may be injected into a vein to improve detail. Tell the imaging team beforehand about implanted devices, metal in your body, pregnancy, kidney disease, allergies, or previous contrast reactions. Some devices or conditions may make MRI or contrast unsafe or require special precautions.

CT may be used when MRI is unavailable or unsuitable, or when clinicians need to check quickly for bleeding, pressure, or bone changes. Other imaging methods may help with diagnosis or treatment planning.

Imaging cannot always identify the exact tumor. When safe and useful, a neurosurgeon may remove part or all of it for examination by a neuropathologist. Testing may look for molecular markers such as IDH changes, loss of chromosome regions 1p and 19q, or changes involving the MGMT gene.

Biopsy may not be appropriate if the tumor is in a high-risk location, imaging strongly supports a diagnosis, or the result would not change care. The team should explain the expected benefits, limitations, and risks before surgery or biopsy.

Additional evaluation may include blood or hormone tests, eye or hearing examinations, or

imaging elsewhere in the body. There is no routine screening test for adults without symptoms or a specific inherited risk.

## Treatment and management

Treatment should be individualized by a team experienced in brain tumors. For some small, slow-growing tumors without symptoms, regular MRI scans and clinical review may be preferable to immediate treatment. This is called active monitoring or watchful waiting.

Surgery may establish the diagnosis, relieve pressure, reduce symptoms, and remove as much tumor as safely possible. Complete removal is not always safe because a tumor may blend into normal tissue or be close to areas controlling speech, movement, vision, or other essential functions. Computer-guided navigation, brain mapping, or awake surgery may help protect these functions.

Radiation therapy uses focused, high-energy radiation to damage tumor cells. It may be given after surgery, used when surgery is not possible, or considered if the tumor returns. Stereotactic radiosurgery is a highly focused form of radiation rather than an operation and is suitable only for selected tumors.

Drug treatment depends on the diagnosis. Chemotherapy may be given during or after radiation. Temozolomide is used for certain gliomas but is not suitable for every brain tumor. Molecular results may help predict benefit from particular medicines, including targeted therapies.

Tumor treating fields may be considered for some adults with glioblastoma. Electrical fields are delivered through adhesive arrays on the scalp. Potential benefits, practical demands, skin effects, and effects on daily life should be discussed with the care team.

Supportive treatment is important:

Treatment decisions may also involve fertility preservation, work, driving, and clinical trials. Patients should ask what preparation is required before surgery, imaging, radiation, or medication treatment, including whether to stop eating, adjust medicines, or arrange transportation.

- Corticosteroids like prednisone or hydrocortisone can reduce swelling and improve symptoms but may cause significant side effects. They should be used at the lowest effective dose for the necessary period and should not be stopped suddenly unless a clinician directs it.

- Antiseizure medicines are used after seizures but are not routinely required for every newly diagnosed patient who has never had one. Driving restrictions vary by location.
- Physical, occupational, speech, and cognitive rehabilitation can support recovery and independence.
- Palliative care can help with symptoms, emotional distress, family concerns, and decisions at any stage; it is not limited to end-of-life care.

## Complications

A brain tumor can affect movement, speech, thinking, memory, vision, balance, mood, or independence. Seizures may occur, and increased pressure inside the skull can cause worsening headaches, vomiting, reduced alertness, or vision changes. Blocked cerebrospinal fluid may cause hydrocephalus.

Surgery can result in bleeding, infection, blood clots, seizures, or new neurological problems. Radiation may cause fatigue, hair loss in the treated area, skin changes, swelling, and later effects on thinking or memory. Chemotherapy and targeted therapies have medicine-specific risks that should be reviewed before treatment.

Some tumors return or continue growing. Options may include another operation, radiation, drug treatment, a clinical trial, or care focused on symptoms and quality of life.

## Follow up

Follow-up usually includes neurological examinations and repeat MRI scans. Timing depends on the tumor type, grade, molecular findings, treatment, symptoms, and time since diagnosis. Scans are often more frequent soon after treatment.

MRI changes after radiation or chemotherapy do not always mean that the tumor is growing. Inflammation or tissue injury can resemble progression, so specialists may compare several scans, use advanced imaging, or occasionally recommend another biopsy.

Follow-up should also address seizures, medication side effects, rehabilitation, mood, sleep, memory, hormone function, work, and driving. Report new or worsening symptoms rather than waiting for the next appointment.

Seek urgent medical advice for rapidly worsening headache, repeated vomiting, increasing sleepiness, new weakness, new speech or vision problems, or a major change in behavior or thinking. Call emergency services for a prolonged seizure, loss of consciousness, severe

breathing difficulty, or sudden stroke-like symptoms.

## Sources