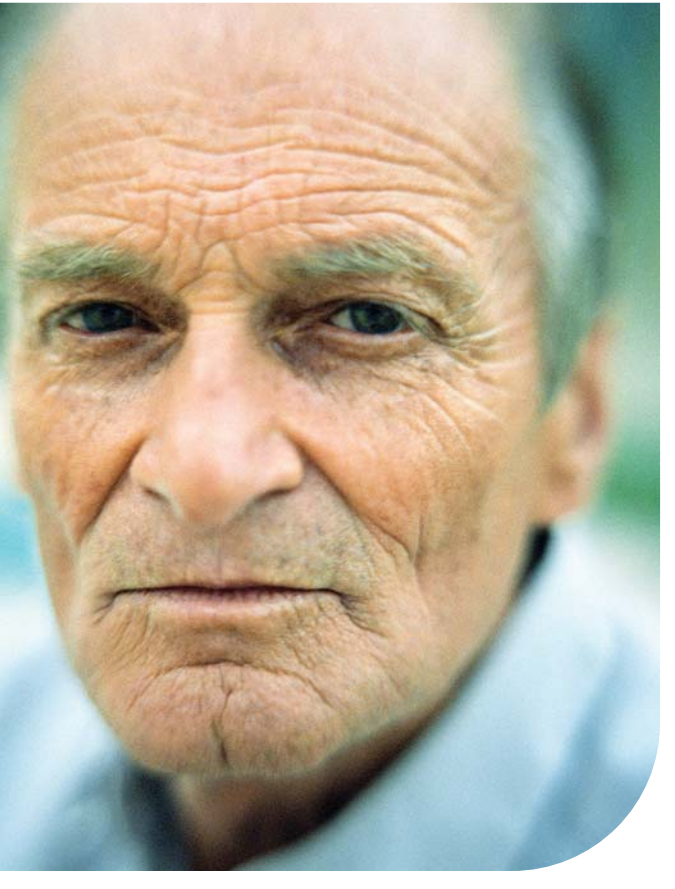
Canadian Cancer Society
Société canadienne du cancer

Brain Tumours

Understanding your diagnosis



Let's Make Cancer History

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Brain Tumours
Understanding your diagnosis

When you first hear that you have a brain tumour you may feel alone and afraid. You may be overwhelmed by the large amount of information you will have to take in and the decisions you will need to make.

The introductory information in this brochure can help you and your family take the first step in learning about primary malignant brain tumours (cancer that starts in the brain).* A better understanding may give you a sense of control and help you work with your healthcare team to choose the best care for you.

* The information in this brochure is about *primary malignant* brain tumours in adults. For information about benign brain tumours, secondary (*metastatic*) brain cancer and brain tumours in children, contact our *Cancer Information Service* at 1 888 939-3333.

What is cancer?

Cancer is a disease that starts in our cells. Our bodies are made up of millions of cells, grouped together to form tissues and organs such as muscles and bones, the lungs and the liver. Genes inside each cell order it to grow, work, reproduce and die. Normally, our cells obey these orders and we remain healthy.

But sometimes the instructions in some cells get mixed up, causing them to behave abnormally. These cells grow and divide uncontrollably. After a while, groups of abnormal cells form lumps, or tumours.

Tumours can be either *benign* (non-cancerous) or *malignant* (cancerous). Benign tumour cells stay in one place in the body. Malignant tumour cells are able to spread to nearby tissues.

What are brain tumours?

A brain tumour is a group of abnormal cells in the brain. Primary brain tumours start in the brain and can be either benign or malignant.* In most parts of the body, a benign tumour is not as serious as a malignant tumour. In the brain, both benign and malignant tumours can be serious and possibly life-threatening.

Benign brain tumours do not contain cancer cells. They don't invade nearby tissues, but they can press on certain parts of the brain, causing serious health problems.

Primary malignant brain tumours contain cancer cells. They tend to grow quickly, increasing pressure in the brain. They can also spread to other parts of the brain or to the spinal cord. These tumours are very serious and are often life-threatening.

The brain

The brain is a soft, spongy mass of tissue. It is the control centre of your body. Three main parts of the brain control the different activities you do:

- You use the *cerebrum* to see, feel, think, speak and move. The cerebrum receives messages from your senses to tell you what is going on and how to respond. It also controls thinking and memory. The cerebrum is the largest part of the brain. It is made up of two halves, called *hemispheres*.

* Cancerous tumours that have started in another part of the body and have spread to the brain are called *secondary* brain tumours. They may also be called metastatic brain tumours or brain metastases.

The right side of the brain controls the left side of your body and the left side of the brain controls the right side of your body. Each hemisphere is divided into sections, or lobes.

- The *cerebellum* is found under the cerebrum at the back of the brain. The cerebellum controls balance and coordination.
- The *brain stem* is at the bottom of the brain and connects the brain to the spinal cord. It controls the basic body functions necessary for living, including blood pressure, heartbeat, breathing and reflexes.

The brain is wrapped in three thin membranes called *meninges*. A watery fluid called *cerebrospinal fluid* (CSF) fills the spaces between the meninges and cushions the brain. The brain is protected by the skull.

The brain is made up of two types of cells: nerve cells (*neurons*) and glial cells. The nerve cells form a network that carries messages back and forth between the brain and the rest of the body. Glial cells surround the nerve cells and hold them in place. There are many different types of brain tumours, but most adult brain tumours start in the glial cells. These types of tumours are called *gliomas*.

Causes of brain tumours

Brain tumours can occur at any age, but are most common in adults between ages 50 and 70. Men are more likely than women to develop most types of brain tumours. Factors that increase the risk of developing a brain tumour include:

- previous radiation therapy to the head (such as treatment in adulthood for benign tumours of the pituitary gland or treatment in childhood for leukemia or scalp ringworm)
- having a weakened immune system (for example, from taking drugs after an organ transplant or having a condition such as HIV/AIDS)
- workplace exposure to vinyl chloride (a chemical used to make plastics)
- certain genetic conditions, such as neurofibromatosis type 1 or type 2, tuberous sclerosis or the following syndromes:
  - > Turcot syndrome
  - > Li-Fraumeni syndrome
  - > Wiskott-Aldrich syndrome
  - > von Hippel-Lindau syndrome

Some people develop brain tumours without any of these risk factors.

Symptoms of brain tumours

The signs and symptoms of brain tumours vary depending on where the tumour is in the brain. They may also be caused by pressure on the brain. The skull is hard and can't expand, so as a tumour grows the pressure within the skull can damage or destroy brain cells.

The most common symptom of a brain tumour is a headache. Headaches are often constant and usually worse in the morning. Other symptoms may include:

- muscle jerking or twitching (seizures or convulsions)
- nausea
- loss of appetite
- changes in mood, personality or ability to concentrate
- problems with memory
- changes in speech, hearing or vision
- dizziness or problems with balancing or walking
- sleeping for longer periods at night and napping frequently
- confusion, disorientation
- weakness or paralysis on one side of the body

Other health problems can cause some of the same symptoms. Testing is needed to make a diagnosis.

Diagnosing brain tumours

After taking your medical history and completing physical and neurological examinations, your doctor may suspect you have a brain tumour. To confirm the diagnosis, your doctor will arrange special tests. These tests may also be used to "grade" the tumour. You may have one or more of the following tests.

Imaging studies: Imaging studies allow tissues, organs and bones to be looked at in more detail. Using x-rays, CT scans or MRIs, your healthcare team can get a picture of the size of the tumour and see if it has spread. These tests are usually painless and do not require an anesthetic.

Biopsy: A biopsy is usually necessary to make a definite diagnosis of cancer. Cells are removed from the body and checked under a microscope. If the cells are cancerous, they may be studied further to see how fast they are growing. There are many ways to do a biopsy.

- A ***stereotactic biopsy*** is used for suspected tumours in areas that are difficult to reach. You will be given a local anesthetic (freezing) to numb your scalp. A special frame is fastened to your head. The frame is used to guide a thin needle through a tiny hole to the tumour to remove a small sample of tissue. The surgeon may use MRI or CT pictures on a computer screen to guide the needle.
- A ***lumbar puncture*** (also called a *spinal tap*) is a biopsy that removes a small amount of cerebrospinal fluid to check for cancer cells. A needle is inserted between two vertebrae in the backbone and a small amount of the fluid that surrounds the spinal cord is removed. A local anesthetic is used. A lumbar puncture takes about 30 minutes. You must lie flat for 1 to 2 hours afterward to lessen the chances of getting a headache.
- An ***open biopsy*** is used for tumours that can be easily reached by surgery. A small section of the skull is removed to give the surgeon access to the brain. A needle is placed in the hole to remove tissue samples, or the whole tumour may be removed. You may be given either a local anesthetic (freezing) or general anesthetic (you will be unconscious).

Sometimes a biopsy is not possible. If the tumour is in the brain stem or a tissue sample cannot be removed from the tumour without damaging normal brain tissue, the doctor will use MRI, CT or other imaging tests instead.

Grading

Once a definite diagnosis has been made and your healthcare team has the information it needs, the tumour cells will be given a grade.

To find out the grade of a tumour, the biopsy sample is examined under a microscope. A grade is given based on how the tumour cells look and behave compared with normal cells. This can give your healthcare team an idea of how quickly the tumour may be growing. For brain tumours, there are four grades.

Grade	Description
1	Low grade – The cancer cells are growing very slowly. This grade of tumour may also be called *benign* (non-cancerous).
2	Low to moderate grade – The cancer cells are growing slowly, but faster than grade 1. The tumour is growing into surrounding tissue.
3	Moderate to high grade – The cancer cells are growing faster than grade 2. The tumour is growing into surrounding tissue.
4	High grade – The cancer cells are growing quickly. The tumour is growing deeply into surrounding tissue.

It is important to know the grade of the tumour. This information helps you and your healthcare team choose the best treatment for you.

Treatments for brain tumours

Your healthcare team will consider your general health and the type, grade and position of the tumour to recommend what treatments will be best for you. You will work together with your healthcare team to make the final treatment choices. Talk to them if you have questions or concerns.

Treatments affect everyone in different ways. It's hard to predict which side effects you will have. Your healthcare team will tell you what to expect with each treatment. They will also let you know what side effects you should report right away and which ones you can wait to tell them about at your next appointment. If you notice any side effects or symptoms that you did not expect, talk to a member of your healthcare team as soon as possible.

Patients often worry about cancer treatment, especially brain surgery. Be open with your healthcare team. Tell them your concerns and ask questions. They will help you get the care and information you need.

For brain tumours, you might receive one or more of the following treatments.

Surgery: A decision to have surgery depends on the size of the tumour, where it is and how close it is to important brain function areas. Surgery is done under general anesthetic (you will be unconscious) and you will stay in the hospital for several days after the surgery.

Surgery is the most common treatment for a brain tumour. Surgery to open the skull is called a *craniotomy*. Before surgery begins, the scalp is shaved. The surgeon makes a small cut in the scalp and removes a piece of the skull. All or part of the tumour is removed and then the bone and skin of the scalp are put back in place to heal.

It may take weeks to recover fully from a brain operation. You may have a headache when you wake up. Pain killers can be used to help control pain. Your eyes and face may be swollen and bruised. These side effects are temporary, and should disappear within a few days. A tube may be inserted in the scalp to drain excess blood from the wound but is usually removed a day or two after the operation.

Both tumours and surgery can damage normal brain tissue. Unlike other types of cells, nerve cells cannot replace themselves. Damaged nerve cells may cause different neurological problems (such as changes in movement, memory or speech). Physical therapy, cognitive therapy or speech therapy may help you to overcome some of the neurological problems that existed before treatment or new ones that developed after surgery.

Radiation therapy: Radiation therapy may be given after surgery to treat tumours that could not be completely removed. It may also be used when surgery is not possible or for tumours that have come back after surgery or chemotherapy.

In *external beam radiation therapy*, a large machine is used to carefully aim a beam of radiation at the tumour. The radiation damages the cells in the path of the beam – normal cells as well as cancer cells. A special mask will be made for you. This helps make sure you do not move during treatment and that you are positioned the exact same way for each treatment. Special blocks are used to protect your eyes and the other parts of the brain.

Radiation treatment will make you feel more tired than usual and may give you headaches. These side effects are temporary and often go away after the first few treatments. You will likely lose your hair, but hair usually starts to grow back within a few months. You may notice changes to the skin. Your scalp and ears may become red, dry and tender.

Sometimes, radiation causes the brain to swell during the first few treatments. The swelling is usually prevented or treated with the use of steroid drugs.

Steroid therapy: Steroids are often used to reduce swelling around brain tumours. Steroids do not treat the tumour, but can reduce symptoms and help you feel better. They may be used before or after surgery, or during or after radiation therapy. If you take steroids for several weeks, you may notice temporary swelling of the face and abdomen, weight gain and other side effects. Suddenly stopping steroids may cause serious problems. Your doctor will discuss

with you how the doses can be reduced over time. Side effects will gradually disappear as the steroid dose is lowered.

Chemotherapy: Chemotherapy may be given after surgery or with radiation therapy. Chemotherapy may be given as pills or by injection. Chemotherapy drugs interfere with the ability of cancer cells to grow and spread, but they also damage healthy cells. Although healthy cells can recover over time, you may experience side effects from your treatment like nausea, vomiting, loss of appetite, fatigue, hair loss and an increased risk of infection.

Anticonvulsants: Some brain tumours can cause seizures. Anticonvulsants (anti-seizure medications) are given to prevent further seizures in people with brain tumours who have had a seizure.

Clinical treatment trials: Clinical treatment trials investigate new approaches to treating cancer, such as new drugs, new types of treatments or combinations of existing treatments. They are closely monitored to make sure that they are safe for the participants. Ask your doctor if there is a clinical trial suitable as a treatment option for you. You may benefit and so may future cancer patients.

Complementary therapies: Complementary therapies are used *together with* conventional treatments. More research is needed to understand if these therapies are effective and how they work.

Alternative therapies are used *instead of* conventional treatments. Alternative therapies haven't been tested for safety or effectiveness. It is still unknown whether they will harm you or be effective in the treatment of cancer.

If you are thinking about using a complementary or alternative therapy, it is important to find out as much as you can about the therapy and talk to your healthcare team. It's possible that the therapy might interfere with test results or regular treatments.

After treatment

Follow-up care helps you and your healthcare team monitor your progress and your recovery from treatment. At first, your follow-up care may be managed by one of the specialists from your healthcare team. Later on it may be managed by your family doctor.

The schedule of follow-up visits is different for each person. You might see your doctor more often in the first year after treatment, and less often after that.

The end of cancer treatment may bring mixed emotions. You may be glad the treatments are over and look forward to returning to your normal activities. But you could feel anxious as well. If you are worried about your treatment ending, talk to your healthcare team. They are there to help you through this transition period.

Adjusting to life after cancer treatment is an important part of your care, especially if the brain tumour or its treatment has affected your everyday activities. Before your treatment, your healthcare team will discuss with you what you can expect. They can answer any questions you may have about lifestyle changes and can suggest ways to help you maintain your quality of life. Your healthcare team will plan a rehabilitation program that will be tailored to your specific needs.

Rehabilitation after treatment: Brain tumours and their treatments can affect your normal physical abilities or mental skills. You may have problems thinking, seeing or speaking. Or you may experience personality changes or seizures. These neurological problems may lessen or disappear with time, but sometimes damage to the brain is permanent. You may need physical therapy, cognitive therapy or speech therapy. Recovery is different for each person.

- ***Physical therapy***: Physical therapists can help you regain strength and balance if you experience weakness and problems with balance. If you have paralysis, a physical therapist may be able to help you regain some mobility. Occupational therapists can help you to learn to manage activities of daily living, such as eating, bathing and dressing.
- ***Cognitive therapy***: Professionals trained in cognitive rehabilitation can help you to regain mental skills (such as reason and memory). You may also learn compensation techniques to make up for skills that are lost. Emotional and personality changes are also common in people with brain tumours. You may experience depression, irritability, anxiety and mood swings. Counselling can help you and your family cope with and adjust to the changes.
- ***Speech therapy***: Speech therapists can help if you have trouble speaking, expressing thoughts or swallowing.

Living with cancer

There are many sources of help available for people with cancer and for their caregivers.

Your healthcare team: If you need practical help or emotional support, members of your healthcare team may be able to suggest services in your community or refer you to cancer centre staff or mental health professionals.

Family and friends: Those closest to you can be very supportive. Accept offers of help. When someone says "Let me know how I can help," tell them what they can do. Maybe they can run errands, cook a meal or give you a ride to your doctor's office.

People who have had a similar experience: Consider visiting a support group or talking with a cancer survivor in person, over the telephone or online. Talking with and learning from others who have had similar experiences can be helpful. Try more than one option to see which one suits you best.

Yourself: Try to stay positive. Staying positive is about figuring out how to deal with cancer in the best way that you can – and everyone will do this their own way. It doesn't mean that you must seem happy or cheerful all the time or avoid talking or thinking about the difficulties of having cancer. But it can mean looking after yourself by finding relaxing, enjoyable activities that refresh you mentally, spiritually or physically.

The Canadian Cancer Society
Helping you understand cancer

Now that you have been introduced to the basics of brain tumours, you may want to learn more. Please contact the Canadian Cancer Society for more detailed information. Our services are free and confidential.

To contact the Canadian Cancer Society:

- Call an information specialist toll-free at **1 888 939-3333** Monday to Friday 9 a.m. to 6 p.m.
- E-mail us at **info@cis.cancer.ca**.
- Visit our website at **www.cancer.ca**.
- Contact your local Canadian Cancer Society office.

What we do

Thanks to the work of our volunteers and staff, and the generosity of our donors, the Canadian Cancer Society is leading the way in the fight against cancer. The Canadian Cancer Society:

- funds excellent research for all types of cancer
- advocates for healthy public policy
- promotes healthy lifestyles to help reduce cancer risk
- provides information about cancer
- supports people living with cancer

Contact us for up-to-date information about cancer, our services, or to make a donation.

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