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Brain and Spinal Cord Tumor in Adults

Risk Factors for Brain and Spinal Cord Tumors

- [Family history](#)
- [Having a weakened immune system](#)
- [Factors with uncertain, controversial, or unproven effects on brain tumor risk](#)

A risk factor is anything that increases your chances of getting a disease such as a brain or spinal cord tumor. Different types of cancer have different risk factors. Some risk factors, like smoking, you can change. Others, like your age or family history, can't be changed.

But having a risk factor, or even several, does not always mean that a person will get the disease, and many people get brain or spinal cord tumors without having any known risk factors.

Many different types of tumors can start in the brain or spinal cord, and while they might have some things in common, these different tumors might not all have the same risk factors.

Most brain tumors are not linked with any known risk factors and have no obvious cause. But there are a few factors that can raise the risk of brain tumors.

Radiation exposure

The best known environmental risk factor for brain tumors is [radiation exposure](#)¹, most often from radiation therapy to treat some other condition. For example, before the risks of radiation were known, children with ringworm of the scalp (a fungal infection) were sometimes treated with low-dose radiation therapy, which was later found to increase their risk of some types of brain tumors as they got older.

Today, most radiation-induced brain tumors are caused by radiation to the head given to treat other cancers. They occur most often in people who received radiation to the brain as children as part of their treatment for [leukemia](#)². These brain tumors most often develop around 10 to 15 years after the radiation, but sometimes they might not appear until decades later.

Radiation-induced tumors are still fairly rare, but because of the increased risk (as well as the other side effects), radiation therapy is only given to the head after carefully weighing the possible benefits and risks. For most patients with other cancers in the brain or head, the benefits of radiation therapy far outweigh the risk of developing a brain tumor years later.

Von Hippel-Lindau syndrome

People with this condition tend to develop benign or cancerous tumors in different parts of the body, including hemangioblastomas (benign blood vessel tumors) in the brain, spinal cord, or retina, as well as tumors of the inner ear, kidney, adrenal gland, and pancreas. It is caused by changes in the *VHL* gene. Most often the gene changes are inherited, but in some cases the changes happen before birth in people whose parents don't have them.

Li-Fraumeni syndrome

even be unique to a particular family.

Having a weakened immune system

People with weakened immune systems have an increased risk of developing [lymphomas](#)⁹ of the brain or spinal cord (known as **primary CNS lymphomas**). Lymphomas are cancers of lymphocytes, a type of white blood cell that fights disease. Primary CNS lymphoma is less common than lymphoma that develops outside the brain.

A weakened immune system can be congenital (present at birth), or it can be caused by treatments for other cancers, treatment to prevent rejection of transplanted organs, or diseases such as [acquired immunodeficiency syndrome \(AIDS\)](#)¹⁰.

Factors with uncertain, controversial, or unproven effects on brain tumor risk

Cell phone use

Cell phones give off [radiofrequency \(RF\) rays](#)¹¹, a form of energy on the electromagnetic spectrum between FM radio waves and those used in microwave ovens, radar, and satellite stations. Cell phones do not give off [ionizing radiation](#)¹², the type that can cause cancer by damaging the DNA inside cells. Still, there have been concerns that the phones, whose antennae are built-in and therefore are placed close to the head when being used, might somehow raise the risk of brain tumors.

Some studies have suggested a possible increased risk of brain tumors or of vestibular schwannomas (acoustic neuromas) with cell phone use, but most of the larger studies done so far have not found an increased risk, either overall or among specific types of tumors. Still, there are very few studies of long-term use (10 years or more), and cell phones haven't been around long enough to determine the possible risks of lifetime use. The same is true of any possible higher risks in children, who are increasingly using cell phones. Cell phone technology also continues to change, and it's not clear how this might affect any risk.

These risks are being studied, but it will probably be many years before firm conclusions can be made. In the meantime, for people concerned about the possible risks, there are ways to lower your exposure, such as using the phone's speaker or an earpiece to move the phone itself away from the head.

For more on this topic, see [Cellular Phones](#)¹³.

Other factors

Other environmental factors such as exposure to vinyl chloride (a chemical used to manufacture plastics), petroleum products, and certain other chemicals have been linked with an increased risk of brain tumors in some studies but not in others.

Exposure to [aspartame](#)¹⁴ (a sugar substitute), exposure to electromagnetic fields from [power lines](#)¹⁵ and transformers, and infection with [certain viruses](#)¹⁶ have been suggested as possible risk factors, but most researchers agree that there is no convincing evidence to link these factors to brain tumors. Research on these and other possible risk factors continues.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/radiation-exposure/x-rays-gamma-rays.html
2. www.cancer.org/cancer/types/leukemia.html
3. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html
4. www.cancer.org/cancer/types/breast-cancer.html
5. www.cancer.org/cancer/types/soft-tissue-sarcoma.html
6. www.cancer.org/cancer/types/leukemia.html
7. www.cancer.org/cancer/types/adrenal-cancer.html
8. www.cancer.org/cancer/types/colon-rectal-cancer.html
9. www.cancer.org/cancer/types/non-hodgkin-lymphoma.html
www.cancer.org/cancer/risk-prevention/infections/hiv-infection-aids.html

16. www.cancer.org/cancer/risk-prevention/infections.html

References

Dorsey JF, Salinas RD, Dang M, et al. Chapter 63: Cancer of the central nervous system. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier; 2020.

Michaud D, Batchelor T. Risk factors for brain tumors. UpToDate. 2020. Accessed at <https://www.uptodate.com/contents/risk-factors-for-brain-tumors> on February 7, 2020.

National Cancer Institute Physician Data Query (PDQ). Adult Central Nervous System Tumors Treatment. 2020. Accessed at www.cancer.gov/types/brain/hp/adult-brain-treatment-pdq on February 7, 2020.

US National Library of Medicine. Genetics Home Reference: Your Guide to Understanding Genetic Conditions. Accessed at <https://ghr.nlm.nih.gov/> on February 10, 2020.

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What Causes Brain and Spinal Cord Tumors in Adults?

- [Inherited gene changes](#)
- [Gene changes acquired during a person's lifetime](#)

Many different types of tumors can start in the brain or spinal cord. These different tumors are unlikely to all have the same causes, but they might share some things in common.

The cause of most brain and spinal cord tumors is not fully understood, and there are

very few well-established [risk factors](#). But researchers have found some of the changes that occur in normal brain cells that may lead them to form brain tumors.

Normal human cells grow and function based mainly on the information in each cell's DNA. Brain and spinal cord tumors, like other tumors, are caused by changes in the DNA inside cells. DNA is the chemical that makes up our **genes**, which control how our cells function. We usually look like our parents because they are the source of our DNA.

tumor types, but there are probably many others that have not yet been found.

Researchers now understand some of the gene changes that occur in different types of brain tumors, but it's still not clear what causes most of these changes. Some gene changes might be inherited, but most brain and spinal cord tumors are not the result of known inherited syndromes. Other than [radiation](#)², no known lifestyle-related or environmental factors are clearly linked to brain tumors. Most gene changes are probably just random events that sometimes happen inside a cell, without having an outside cause.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/genetics/family-cancer-syndromes.html
2. www.cancer.org/cancer/risk-prevention/radiation-exposure.html

References

Dorsey JF, Salinas RD, Dang M, et al. Chapter 63: Cancer of the central nervous system. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier; 2020.

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Can Brain and Spinal Cord Tumors in Adults Be Prevented?

- [Limiting radiation exposure to the head](#)

The risk of many cancers in adults can be reduced with certain lifestyle changes (such as quitting smoking). But other than [radiation exposure](#)¹, there are no known lifestyle-related or environmental [risk factors](#) for brain and spinal cord tumors, so at this time there is no known way to protect against most of these tumors.

Limiting radiation exposure to the head

For most people with other types of cancer in or near the head, [radiation therapy](#)² may be given if doctors feel the benefits of the treatment outweigh the small risk of developing a brain tumor years later. Still, when it is needed, doctors try to limit the dose of radiation as much as possible.

[Imaging tests](#)³ such as x-rays or CT scans use much lower levels of radiation than those used for cancer treatment. If there is any increase in risk from these tests, it is likely to be very small, but to be safe, most doctors recommend that people (especially pregnant women and children) not get these tests unless they are absolutely needed.

Hyperlinks

1. www.cancer.org/cancer/risk-prevention/radiation-exposure.html
2. www.cancer.org/cancer/managing-cancer/treatment-types/radiation.html
3. www.cancer.org/cancer/diagnosis-staging/tests/imaging-tests/imaging-radiology-tests-for-cancer.html

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Dorsey JF, Salinas RD, Dang M, et al. Chapter 63: Cancer of the central nervous system. In: Niederhuber JE, Armitage JO, Doroshow JH, Kastan MB, Tepper JE, eds. *Abeloff's Clinical Oncology*. 6th ed. Philadelphia, Pa: Elsevier; 2020.

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