Causes, Risk Factors, and Prevention of Ewing Tumors

Learn more about the causes and risk factors for Ewing tumors.

Risk Factors

A risk factor is anything that increases your chances of getting a disease such as cancer. Learn more about the risk factors for Ewing tumors.

- Risk Factors for Ewing Tumors
- What Causes Ewing Tumors?

Prevention

The only known risk factors for Ewing tumors (age, sex, and race/ethnicity) can't be changed. There are no known lifestyle-related or environmental causes of Ewing tumors, so at this time there is no way to protect against these cancers.

Risk Factors for Ewing Tumors

- Race/ethnicity
- Sex
- Age

A risk factor is anything that increases a person’s chances of getting a disease such as cancer. Different cancers have different risk factors.

Lifestyle-related risk factors such as body weight, physical activity, diet, and tobacco and alcohol use play a major role in many adult cancers. But these factors usually take many years to influence cancer risk, and they are not thought to play much of a role in cancers that tend to affect children and teens, including Ewing tumors (Ewing sarcomas).

Studies of children with Ewing tumors haven't found clear links to radiation, chemicals, or any other environmental exposures.

Some types of cancer tend to run in some families. But genetic changes passed down within families do not seem to be an important risk factor for Ewing tumors. Although most of the gene changes that cause Ewing tumors are known (see What Causes Ewing Tumors?), these changes are not inherited from a parent.

Race/ethnicity

Ewing tumors are rare overall, but they are even less common among African Americans and Asian Americans than they are among White individuals (either non-Hispanic or Hispanic). The reason for this is not known, although it might be related to differences in certain genes among different ethnic groups.

Sex

Ewing tumors are slightly more common in males than in females.

Age

People of any age can develop Ewing tumors , but they are most common in older children and teens and are less common among young adults and young children. They are rare in older adults.

References

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What Causes Ewing Tumors?

The causes of Ewing tumors (Ewing sarcomas) are not fully understood, but researchers are learning how certain changes in a cell's DNA can cause the cell to become cancerous. DNA is the chemical in each of our cells that makes up our **genes**.

Genes tell our cells how to function. They are packaged in **chromosomes**, which are long strands of DNA in each cell. We normally have 23 pairs of chromosomes in each cell (one set of chromosomes comes from each parent). We usually look like our parents because they are the source of our DNA. But DNA affects more than how we look.

Some genes control when our cells grow, divide into new cells, and die:

- Genes that normally help cells grow, divide, or stay alive can sometimes change to become **oncogenes**.
- Genes that help keep cell division under control, repair mistakes in DNA, or make cells die at the right time are called **tumor suppressor genes**.

Cancers can be caused by changes in the cell's DNA that turn keep oncogenes turned on, or that turn off tumor suppressor genes.

Researchers have found chromosome changes that lead to Ewing tumors, but these changes are not inherited. Instead, they develop in a single cell after a child is born, for unknown reasons.

Nearly all Ewing tumor cells have changes that involve the *EWSR1* gene, which is

found on chromosome 22. Most often, the change is a swapping of pieces of DNA (called a **translocation**) between chromosomes 22 and 11. Less often, the swap is between chromosomes 22 and 21, or rarely, between 22 and another chromosome. The translocation moves a certain piece of chromosome 11 (or another chromosome) just next to the *EWSR1* gene on chromosome 22, causing the *EWSR1* gene to be turned on all the time. Activation of the *EWSR1* gene leads to overgrowth of the cells and to the development of Ewing tumors, but the exact way in which this happens is not yet clear.

In a very small portion of Ewing tumors, the cells have translocations that involve the *FUS* gene (on chromosome 16) instead of the *EWSR1* gene.

Lab tests can be used to find chromosome translocations in Ewing tumor cells (see Tests for Ewing Tumors[1]). If doctors aren't sure if a tumor belongs to the Ewing family, they can use these tests on tumor samples to look for translocations and confirm the diagnosis.

The gene changes that lead to Ewing tumors are now fairly well known, but it’s still not clear what causes these changes. They might just be random events that sometimes happen inside a cell, without having an outside cause. There are no known lifestyle-related or environmental causes of Ewing tumors, so it's important to remember that at

https://www.cancer.gov/types/bone/hp/ewing-treatment-pdq on October 30, 2020.

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Can Ewing Tumors Be Prevented?

The risk of many adult cancers can be reduced with certain lifestyle changes (such as staying at a healthy weight or quitting smoking), but at this time there are no known ways to prevent most cancers in children and teens.

The only known risk factors for Ewing tumors (age, sex, and race/ethnicity) can't be changed. There are no known lifestyle-related or environmental causes of Ewing tumors, so at this time there is no known way to protect against these cancers.

References

Anderson ME, Dubois SG, Gebhart MC. Chapter 89: Sarcomas of bone. 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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Written by

The American Cancer Society medical and editorial content team

(https://www.cancer.org/cancer/acs-medical-content-and-news-staff.html)

Our team is made up of doctors and oncology certified nurses with deep knowledge of cancer care as well as journalists, editors, and translators with extensive experience in medical writing.

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