Osteosarcoma Causes, Risk Factors, and Prevention

Learn about the risk factors for osteosarcoma and if there are things that might help lower risk.

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 osteosarcoma.

- Osteosarcoma Risk Factors
- What Causes Osteosarcoma?

Prevention

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 osteosarcoma.

Most known risk factors for osteosarcoma cannot be changed. Other than radiation therapy, there are no known lifestyle-related or environmental causes of osteosarcoma, so at this time there is no known way to protect against or prevent most of these cancers.

Osteosarcoma Risk Factors

Race/ethnicity

In the United States, osteosarcoma is slightly more common in African American, Hispanics, and Latino children than in White children.

Radiation to bones

People who were treated with radiation therapy for another cancer appear to have a higher risk of later developing osteosarcoma in the area that was exposed to radiation. Being treated at a younger age and being treated with higher doses of radiation both increase this risk.

It's not clear if imaging tests[1] that use radiation, such as x-rays, CT scans, and nuclear medicine scans (such as PET scans or bone scans), raise the risk of developing osteosarcoma. The amount of radiation used for these tests is many times lower than that used for radiation therapy. If there is any increased risk it is likely to be very small, but doctors try to limit the use of these types of tests whenever possible, especially in children, just in case.

Certain bone diseases

People with certain non-cancerous bone diseases have an increased risk of developing osteosarcoma.

Paget disease of the bone: In this condition, abnormal bone tissue forms in one or more bones. It mostly affects people older than 50. The affected bones are heavy and thick but are weaker than normal bones and are more likely to break. Usually this condition by itself is not life-threatening. But bone sarcomas (mostly osteosarcomas) develop in about 1% of people with Paget disease, usually when many bones are affectedfects people older than 50. The affecteTj 0 th54 or radii disease, usually whei.S52s7, jn non- t

3. www.cancer.org/cancer/types/retinoblastoma.html
4. www.cancer.org/cancer/types/breast-cancer.html
5. www.cancer.org/cancer/types/brain-spinal-cord-tumors-adults.html
6. www.cancer.org/cancer/types/soft-tissue-sarcoma.html

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.

Gorlick R, Janeway K, Marina N. Chapter 34: Osteosarcoma. In: Pizzo PA, Poplack DG, eds. *Principles and Practice of Pediatric Oncology*. 7th ed. Philadelphia Pa: Lippincott Williams & Wilkins; 2016.

Hansen MF, Seton M, Merchant A. Osteosarcoma in Paget's disease of bone. *J Bone Miner Res*. 2006;21 Suppl 2:P58–63.

Mardekian SK, Tuluc M. Malignant sarcomatous transformation of fibrous dysplasia. *Head Neck Pathol*. 2015;9(1):100-103.

Mirabello L, Troisi RJ, Savage SA. Osteosarcoma incidence and survival rates from 1973 to 2004. *Cancer.* 2009;115:1531–1543.

National Cancer Institute. Osteosarcoma and Malignant Fibrous Histiocytoma of Bone Treatment (PDQ). 2020. Accessed at https://www.cancer.gov/types/bone/hp/osteosarcoma-treatment-pdq on July 27, 2020.

Wang LL, Gebhardt MC, Rainusso N. Osteosarcoma: Epidemiology, pathogenesis, clinical presentation, diagnosis, and histology. UpToDate. Accessed at www.uptodate.com/contents/osteosarcoma-epidemiology-pathogenesis-clinical-presentation-diagnosis-and-histology on July 27, 2020.

Last Revised: October 8, 2020

What Causes Osteosarcoma?

and osteosarcoma.
- Inherited changes in the**retinoblastoma** (*RB1*) tumor suppressor gene increase the risk of developing retinoblastoma[3], a type of eye cancer that affects children. Children with this gene change also have an increased risk of osteosarcoma, especially if they are treated with radiation.

If you are concerned you or your child might possibly have an inherited gene change, talk with your doctor about whether genetic testing might be helpful. You can also read more about this in Genetics and Cancer[4].

Acquired gene changes

Most osteosarcomas are not caused by inherited gene mutations, but instead are the result of gene changes acquired during the person's lifetime.

Sometimes these gene changes are caused by radiation therapy used to treat another form of cancer, because radiation can damage the DNA inside cells.

But many gene changes are probably just random events that sometimes happen inside a cell, without having an outside cause. Cells that are dividing quickly are more likely to create new cells with mistakes in their DNA, which increases the risk that a cancer such as osteosarcoma may develop. This may be why some normal situations (such as the teenage growth spurt) and some diseases (such as Paget disease of bone) that cause rapid bone growth increase the risk of osteosarcoma.

Other than radiation, there are no known lifestyle-related or environmental causes of osteosarcoma, so it's important to remember that in most cases people with these cancers could have done nothing to prevent them.

Researchers now understand some of the gene changes that occur in osteosarcomas, but it's not always clear what causes these changes. As we learn more about what causes osteosarcoma, hopefully we will be able to use this knowledge to develop ways to better prevent and treat it.

Hyperlinks

1. www.cancer.org/cancer/types/breast-cancer.html

2. www.cancer.org/cancer/types/brain-spinal-cord-tumors-adults.html
3. www.cancer.org/cancer/types/retinoblastoma.html
4. www.cancer.org/cancer/risk-prevention/genetics.html

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.

Gorlick R, Janeway K, Marina N. Chapter 34: Osteosarcoma. In: Pizzo PA, Poplack DG, eds. *Principles and Practice of Pediatric Oncology*. 7th ed. Philadelphia Pa: Lippincott Williams & Wilkins; 2016.

National Cancer Institute. Osteosarcoma and Malignant Fibrous Histiocytoma of Bone Treatment (PDQ). 2020. Accessed at https://www.cancer.gov/types/bone/hp/osteosarcoma-treatment-pdq on July 27, 2020.

Wang LL, Gebhardt MC, Rainusso N. Osteosarcoma: Epidemiology, pathogenesis, clinical presentation, diagnosis, and histology. UpToDate. Accessed at www.uptodate.com/contents/osteosarcoma-epidemiology-pathogenesis-clinical-presentation-diagnosis-and-histology on July 27, 2020.

Last Revised: October 8, 2020

Can Osteosarcoma Be Prevented?

The risk of many adult cancers can be reduced with certain lifestyle changes[1] (such as staying at a healthy weight or quitting smoking), but at this time there are no known ways to prevent osteosarcoma.

Most known risk factors for osteosarcoma (age, height, race, sex, and certain bone diseases and inherited conditions) cannot be changed. Other than exposure to radiation