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About Bone Cancer

Get an overview of bone cancer and the latest key statistics in the US.

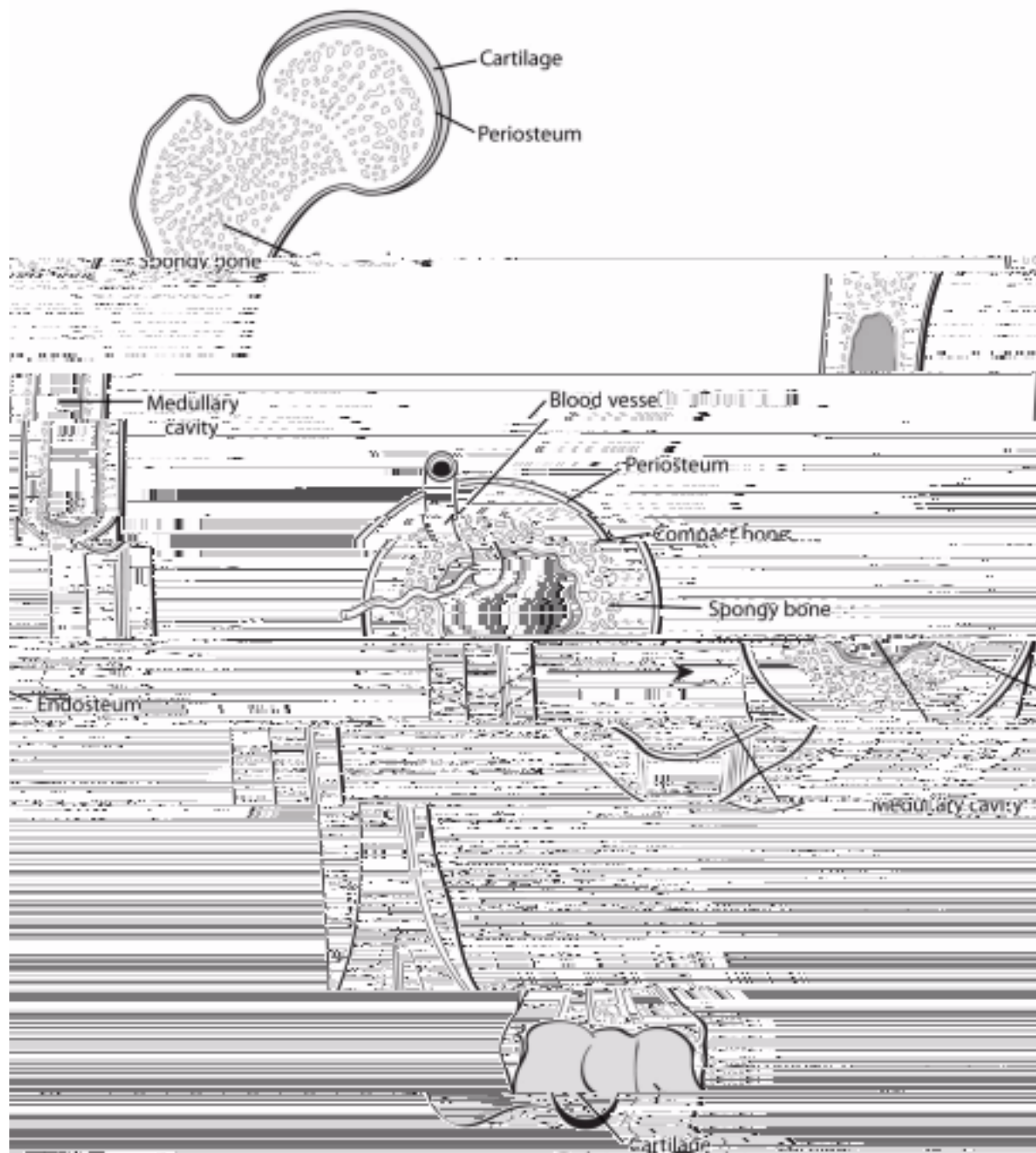
Overview and Types

If you have been diagnosed with bone cancer or are worried about it, you likely have a lot of questions. Learning some basics is a good place to start.

[What Is Bone Cancer?](#)

What Is Bone Cancer?

- Types of primary bone cancers
[REDACTED] at are not cancer



[What Is Cancer?](#) ⁴

Cancer starts when cells in the body begin to grow out of control. Cells in nearly any part of the body can become cancer cells. Learn more here.

[Anatomy Gallery: Skeletal System](#) ⁵

Explore our 3D interactive tour of the skeletal system.

Bone is the supporting framework for your body. The hard, outer layer of bones is made of compact (cortical) bone, which covers the lighter spongy (trabecular) bone inside. The outside of the bone is covered with fibrous tissue called **periosteum**.

Some bones have a space inside called the **medullary cavity**, which contains the soft, spongy tissue called **bone marrow** (discussed below). The tissue lining the medullary cavity is called **endosteum**.

Most bones start out as a softer, more flexible form of tissue called **cartilage**. Cells in the body then lay calcium down onto the cartilage to form bone. After the bone is formed, cartilage may remain at the ends to act as a cushion between bones. This cartilage, along with ligaments and other tissues connect bones to form a **joint**. In adults, cartilage is mainly found at the end of some bones that are part of a joint.

Cartilage can also be found in other parts of the body, such as on the ends of the ribs, in parts of the nose and ears, and in the trachea (windpipe) and larynx (voice box).

Bone itself contains 2 kinds of cells.

- **Osteoblasts** are cells that lay down new bone.
- **Osteoclasts** are cells that dissolve old bone.

Bone often looks as if it doesn't change much, but it's actually very active. New bone is always forming while old bone is dissolving. This helps keep the bones strong.

In some bones the **marrow** is only fatty tissue. In other bones it contains blood-forming cells. These cells make new red blood cells, white blood cells, and blood platelets. There are other cells in the bone marrow, too, such as **plasma** cells and **fibroblasts**.

Any of these bone cells can develop into cancer.

Primary bone cancers versus bone metastasis

Cancers that start in the bones are called **primary bone cancers**. These types of cancers aren't very common.

Most of the time when an adult with cancer is told they have cancer in the bones, the doctor is talking about a cancer that started somewhere else and then spread to the

bones. This is called **bone metastasis**. It can happen with many different types of [advanced cancer](#)⁶, like [breast](#)⁷ cancer, [prostate](#)⁸ cancer, and [lung](#)⁹ cancer. When the cancer cells in the bone are looked at under a microscope, they look like the cancer cells in the organ they came from.

So, if someone has lung cancer that has spread to bone, the cancer cells in the bone look and act like lung cancer cells, not bone cancer cells, so they need treatments that are used for lung cancer.

To learn more about cancer that has spread to the bones, see [Bone Metastasis](#)¹⁰.

Types of primary bone cancers

Primary bone cancers (cancers that start in the bone itself) are also known as **bone sarcomas**. (Sarcomas are cancers that start in bone, muscle, fibrous tissue, blood vessels, fat tissue, as well as some other tissues. They can develop anywhere in the body.)

There are many kinds of primary bone cancer. Some are rare.

Osteosarcoma

Osteosarcoma (also called **osteogenic sarcoma**) is the most common primary bone cancer. It starts in an early form of bone cells. It most often occurs in young people between the ages of 10 and 30, but about 1 in 10 osteosarcomas develop in people older than 60. It's rare in middle-aged people, and is more common in males than females. These tumors develop most often in bones of the arms, legs, or pelvis.

This type of cancer is not discussed further on our Bone Cancer pages. For more information on it, see [Osteosarcoma](#)¹¹.

Ewing tumor (Ewing sarcoma)

Ewing tumors are the second most common type of primary bone cancer in children, teens, and young adults, and the third most common type of bone cancer overall. These tumors are rare in adults older than 30. They occur most often in white people and are rare among African Americans and Asian Americans.

Most Ewing tumors develop in bones, but they can start in other tissues and organs. The most common sites for this cancer are the hip (pelvic) bones, the bones in the chest wall (such as the ribs or shoulder blades), the bones of the spine, and the long

adults and grows faster than most other chondrosarcomas.

- **Mesenchymal chondrosarcomas** tend to develop in younger adults. They often grow quickly, and they are more likely to come back after treatment.
- **Clear cell chondrosarcomas** are rare and tend to grow slowly. They seldom spread to other parts of the body unless they have already come back several times in the original location.

High-grade undifferentiated pleomorphic sarcoma (UPS) of bone

This cancer was previously known as **malignant fibrous histiocytoma (MFH) of bone**. Undifferentiated pleomorphic sarcoma (UPS) most often starts in soft tissues (connective tissues such as ligaments, tendons, fat, and muscle). It's rare in bones, but when it does occur, it usually affects the legs (often around the knees) or arms. This cancer most often occurs in elderly and middle-aged adults. It's rare in children. It tends to grow locally, but sometimes it can spread to distant parts of the body, like the lungs.

Fibrosarcoma of bone

Fibrosarcoma is another type of cancer that develops more often in soft tissues than it does in bones. It usually occurs in middle-aged adults. Bones in the legs, arms, and jaw are most often affected.

Giant cell tumor of bone

This type of primary bone tumor can be either benign (not cancer) or malignant. The benign form is more common. These tumors are most common in people in their 20s and 30s.

Giant cell bone tumors typically affect the legs (usually near the knees) or arms. They don't often spread to distant parts of the body, but after surgery they can come back (even more than once) in the place where they started. With each recurrence, the tumor becomes a bit more likely to spread to other parts of the body (most often to the lungs). Rarely, a malignant giant cell bone tumor spreads to other parts of the body without first recurring locally.

Chordoma

This uncommon type of bone tumor occurs in the bones of the spine, most often at the

older than 30. It's about twice as common in men as in women. Rarely it can develop in children, as well.

Chordomas tend to grow slowly and often do not spread to other parts of the body. They often come back in the same area if they are not removed completely. If they do spread, they most often go to the lymph nodes, lungs, or liver.

Primary bone tumors that are not cancer

Some tumors that start in the bones are benign (not cancer).

Leukemias

Leukemias start in the blood-forming cells of the bone marrow, not in the bone itself. There are many types of leukemia. Most of these are cancers of early forms of white blood cells, but they can also start in other types of blood cells.

For more on this type of cancer, see [Leukemia](#)¹⁴.

Non-Hodgkin lymphomas

Non-Hodgkin lymphomas start in early forms of white blood cells called lymphocytes. Most often these cancers develop in lymph nodes or in other parts of the body that contain lymph tissue. But in rare cases, a lymphoma can show up first in the bones. This is known as a **primary non-Hodgkin lymphoma of bone (PLB)**. It can affect one or many bones.

PLB is treated based on the [type of lymphoma](#)¹⁵ it is. (Most PLBs are diffuse large B-cell lymphomas.) The outlook is generally similar to other lymphomas of the same type and stage.

For more information on the treatment of lymphoma, see [Non-Hodgkin Lymphoma](#)¹⁶.

Hyperlinks

1. www.cancer.org/cancer/types/osteosarcoma.html
2. www.cancer.org/cancer/types/ewing-tumor.html
3. www.cancer.org/cancer/managing-cancer/advanced-cancer/bone-metastases.html
4. www.cancer.org/cancer/understanding-cancer/what-is-cancer.html
5. www.cancer.org/cancer/understanding-cancer/anatomy-gallery/skeletal-system.html
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7. www.cancer.org/cancer/types/breast-cancer.html
8. www.cancer.org/cancer/types/prostate-cancer.html
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14. www.cancer.org/cancer/types/leukemia.html
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Key Statistics About Bone Cancer

- [How common is bone cancer?](#)
- [What types of bone cancer are most common?](#)
- [What is the prognosis for people with bone cancer?](#)

How common is bone cancer?

The American Cancer Society's estimates for primary cancer of the bones and joints for 2024 are:

- About 3,970 new cases diagnosed (2,270 in males and 1,700 in females)
- About 2,050 deaths (1,100 in males and 950 in females)

This includes cancers in both children and adults.

Primary bone cancers (cancers that start in the bones) are uncommon, accounting for less than 1% of all cancers. In adults, cancers that spread to the bones from other organs (known as [bone metastasis](#)¹) are much more common than primary bone cancers.

What types of bone cancer are most common?

[Osteosarcoma](#)² is the most common type of primary bone cancer overall, followed by chondrosarcoma and [Ewing tumors](#)³ (Ewing sarcomas). But this varies by age group.

In adults, the most common primary bone cancer is chondrosarcoma. This is followed by osteosarcomas, chordomas, and Ewing tumors. Other types of bone cancer are much less common.

In children and teens, osteosarcoma and Ewing tumors are much more common than chondrosarcoma or other types of bone cancers.

What is the prognosis for people with bone cancer?

The prognosis (outlook) for people with bone cancer depends on many factors, including the type of bone cancer, the location of the tumor, whether the cancer has spread (metastasized) when it's first found, the person's age and overall health, and how well the cancer responds to treatment. For more on this, see [Survival Rates for Bone Cancer](#)⁴.

Visit the [American Cancer Society's Cancer Statistics Center](#)⁵ for more key statistics.

Hyperlinks

1. www.cancer.org/cancer/managing-cancer/advanced-cancer/bone-metastases.html
2. www.cancer.org/cancer/types/osteosarcoma.html
3. www.cancer.org/cancer/types/ewing-tumor.html

What's New in Bone Cancer Research?

The information here focuses on primary bone cancers (cancers that start in bones) that most often are seen in adults. Information on [Osteosarcoma](#)¹, [Ewing Tumors](#)² (Ewing sarcomas), and [Bone Metastasis](#)³ is covered separately.

Genetics of primary bone cancers

There has been progress in learning about the gene changes in bone cells that lead to different types of bone tumors. Learning more about these changes might lead to better ways to find bone tumors, tell the different types apart, and treat them, based on their gene defects.

Treatment

Primary bone cancers are rare in adults, so it's been hard to study the best ways to treat them. Most experts agree that people with primary bone cancers, especially those with advanced or recurrent cancers, might want to consider enrolling in a [clinical trial](#)⁴ studying new ways to treat these cancers.

There are many clinical trials focusing on treating different types of bone cancer.

Chemotherapy

Some studies are testing new [chemotherapy](#)⁵ (chemo) drugs. Researchers are also looking for new, and maybe better, ways to use the drugs already available. For instance, doctors are studying whether adding a bisphosphonate called zoledronic acid (Zometa) to the bone cement used to fill in the space left after removing a giant cell tumor might decrease the chance that the tumor will come back in that place.

Another area of interest is long-term chemo side effects. Some types of bone cancer

bone cancer cells. Doctors are using what they learn to develop new targeted drugs for some types of bone cancer, as well as to test and use existing targeted drugs that focus on some of these gene changes. These drugs might change the cancer's ability to grow and spread, providing newer and better ways to treat these tumors.

For instance, targeted drugs already exist for several gene and protein changes researchers have found in chordoma cells. Some of these targeted drugs are now options in treating advanced chordomas. Some targeted drugs are now being tested and used against advanced chondrosarcomas as well.

Immunotherapy

[Immunotherapy](#)⁷ drugs help the body's own immune system to recognize and attack cancer cells. There are many types of immunotherapy medicines. Some of these are being studied to see if they can be helpful in treating certain types of bone cancers.

For example, cancer cells sometimes have even more gene and protein changes than typical cancer cells. This makes them even more different from normal cells (and therefore more visible to the immune system). Cancers with these types of changes are more likely to respond to some types of immunotherapy drugs. This includes cancers with high microsatellite instability (MSI-H), with defects in mismatch repair genes (dMMR), or with a high tumor mutational burden (TMB-H). Lab tests of tumor samples can be done to look for these changes.

Unfortunately, only a small proportion of bone cancers have these types of changes. But when they do, immunotherapy drugs called checkpoint inhibitors, such as **pembrolizumab (Keytruda)**, can sometimes be helpful.

Researchers are also studying many other types of immunotherapy for use in treating bone cancers.

Drugs that affect bone cells

Drugs that affect the cells within bones (osteoblasts and osteoclasts) can be helpful in treating some bone tumors. These drugs are more often used for other types of cancer that have spread to the bones, but they might also be helpful in treating some types of primary bone cancers.

For example, **denosumab (Xgeva)** is a type of drug known as a RANKL inhibitor, which affects bone cells called osteoclasts. It can be used to treat some giant cell tumors of bone.

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