

### Introduction

Bone cancer is a rare type of cancer. It accounts for much less than 1 percent of all cancers.

Bone cancer can begin in any type of bone tissue. The earlier bone cancer is detected and treated, the more likely are the chances of a successful treatment.

This reference summary will help you better understand what bone cancer is and what treatment options are available.



### Bones

Bones are made up of different kinds of tissue. The different kinds of tissue that make up bone are:

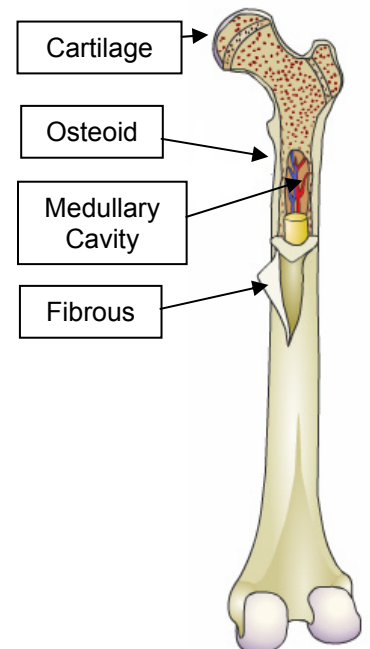
- Osteoid
- Cartilaginous
- Fibrous

Osteoid tissue is compact. It forms the hard, outer layer of bone.

A tough, flexible tissue called cartilage is found at each end of a bone and acts as a cushion.

Fibrous tissue is threadlike. It covers the outside of the bone.

Long bones have a space in the middle. This space is called the medullary cavity. Bones are also made up of bone marrow. Bone marrow is soft, spongy tissue. It is found in the center of most bones in the medullary cavity.



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Some bone marrow contains cells that create red blood cells, white blood cells, and platelets.

Two types of cells are found in the bone: the osteoblasts and the osteoclasts. The osteoblast cells create new bone while the osteoclast cells break down old bone. This process is constantly happening in our bodies.

## **Bone Cancer**

The body is made up of very small cells. Normal cells in the body grow and die in a controlled way. Sometimes cells keep dividing and growing in an uncontrolled way, causing an abnormal growth called a tumor.

If the tumor does not invade nearby tissues and body parts, it is called a benign tumor, or non-cancerous growth. Benign tumors are usually not life threatening.

If the tumor invades nearby tissues and body parts, it is called a malignant tumor or cancer. Cancerous cells spread to different parts of the body through blood vessels and lymph channels.

Lymph is a clear fluid produced by the body that drains waste from cells. It travels through special vessels and bean-shaped structures called lymph nodes. Cancer that moves from one tissue to other body parts is known as metastatic cancer. For instance, a bone tumor may grow through the bone's outer layer and nearby tissues over time.

Cancers in the body are given names, depending on where the cancer started. Cancer that begins in the bone will always be called bone cancer, even if it spreads to other places.

There are three types of bone cancer:

- Osteosarcoma - develops in growing bones, usually between ages 10 and 25
- Chondrosarcoma - starts in cartilage, usually after age 50
- Ewing's sarcoma - begins in nerve tissue in the bone marrow of young people, often after treatment of another condition with radiation or chemotherapy



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Usually, when people talk about ‘bone cancers’ they are talking about a tumor that has invaded the bones from another organ. This is an example of metastatic cancer. The most common cancers that invade bones include prostate, lung and breast cancers.

## **Risk Factors**

It is usually impossible to specify the cause of cancer in an individual patient. However, we do know what causes cancer in general. Healthcare providers also know “risk factors” that can increase the chances of getting cancer.

People who have had high-dose radiation therapy or treatment with certain anticancer drugs are at an increased risk for developing bone cancer. This is especially true for children.

A small number of bone cancers are due to heredity. Children who have had hereditary retinoblastoma are at a higher risk of developing bone cancer. Hereditary retinoblastoma is an uncommon cancer of the eye. It usually happens in children that are younger than 5 years of age.

Another type of hereditary defect that increases the risk for bone cancer is Li-Fraumeni syndrome. Though extremely rare, Li-Fraumeni syndrome greatly increases a person’s risk for developing many different types of cancer, including bone cancer.

Another risk factor for bone cancer is Paget disease. Paget disease is a chronic, or ongoing, condition in which the breakdown and regrowth of bone are increased. Paget disease affects the normal cycle of bone development in the body.

Age is also a risk factor for certain types of bone cancer. After age 40, the risk for bone cancer increases with advancing age.

Children are also at risk for bone cancer. This is because some types of bone cancer may be related to rapid bone growth. Boys are affected by bone cancer more often than girls.

Not everybody who has risk factors for bone cancer develops bone cancer. Some people who have no risk factors for bone cancer can still develop the cancer.



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## Symptoms

Pain is the most common symptom of bone cancer. However, not all bone cancers cause pain.

Persistent or unusual swelling in or near a bone is another possible symptom of bone cancer. However, this may also be caused by other conditions.

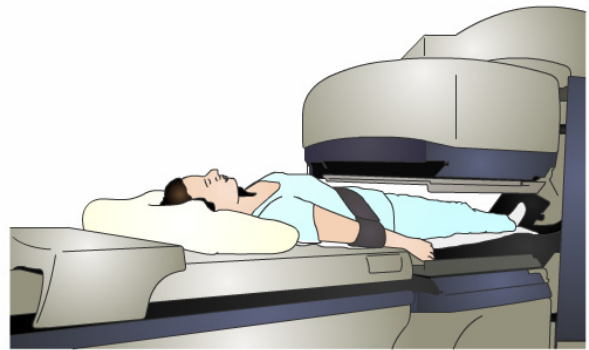
## Diagnosis

If you have symptoms of bone cancer, your healthcare provider will try to find out if bone cancer is the cause of your symptoms or if there is another cause.

Your healthcare provider will ask you about your family medical history in addition to your own. You may also have blood tests or other lab tests to rule out other causes of your symptoms. A physical exam will be performed.

X-rays of the bones are helpful in showing the location, size, and shape of a bone tumor. An x-ray is a type of high-energy beam that can go through the body and onto film. This makes a picture of areas inside the body.

A bone scan is another test that may be used to diagnose bone cancer. During this test, a small amount of radioactive material is injected into a blood vessel. This makes the bones easier to see.



Other tests that may be used to diagnose bone cancer include:

- CT scan - A CT, or Computed Tomography, scan is an x-ray machine linked to a computer. A CT scan takes a series of detailed pictures of the inside of the body. You may be given contrast material by mouth or injection to make abnormal areas easier to see.
- MRI - MRI, or Magnetic Resonance Imaging, uses strong magnets to create images of the inside of the body. You may receive contrast material by injection to make abnormal areas easier to see.

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- PET scan - PET scan stands for Positron Emission Tomography. For this test, a small amount of radioactive sugar is injected into a vein. Cancer cells use more glucose than regular cells. The scanner can show which cells are using more glucose.
- Angiogram - An angiogram is an x-ray of the blood vessels after a dye has been injected in the arteries.

Blood tests that measure a certain enzyme, called alkaline phosphatase, can also be used in diagnosing bone cancer. A large amount of this enzyme is present in the blood when bone tissue is very active, such as when cancer is present. However, it is not always reliable since high levels are normal in growing children.

A biopsy may be performed to diagnose bone cancer. A biopsy is a removal of cells or tissue for examination by a pathologist. The pathologist uses a microscope to look for cancer cells. A biopsy is the only sure way to know if cancer cells are present.

## Staging

If you have bone cancer, your healthcare provider will determine the stage of the cancer. Staging is an attempt to find out if the cancer has spread and, if so, to which parts of the body.

Stages are usually described using the numbers 1 - 4. A lower number indicates an earlier stage. Staging is helpful in deciding the best course of treatment.

When staging bone cancer, healthcare providers want to find out:

- The size, shape, and location of the tumor
- Whether the cancer invades nearby tissues
- Whether the cancer has spread, and if so, to what parts of the body

If bone cancer has spread to nearby lymph nodes, it can spread to other areas of the body. Most often, if bone cancer spreads, it spreads to the lungs.



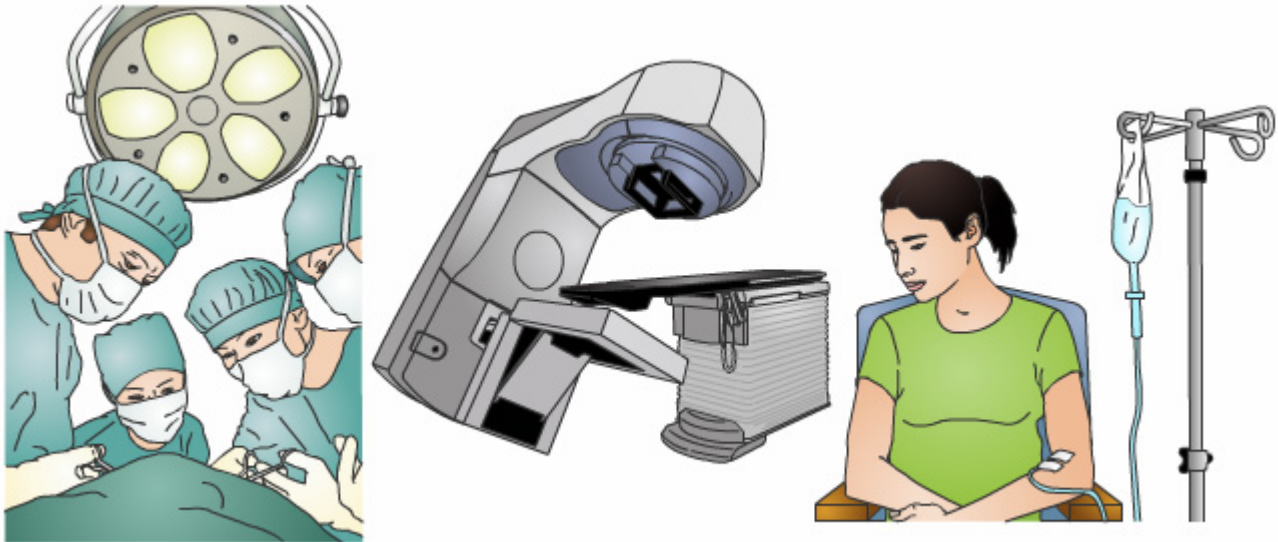
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## Treatment and Supportive Care

The type of treatment used depends on the type, size, location, and stage of the cancer, as well as the age and health of the patient.

Treatment for bone cancer may involve surgery, radiation therapy, chemotherapy, or some combination of these treatments.



Surgery is the usual treatment for bone cancer. The surgeon removes the entire tumor and surrounding tissue.

New improvements in surgical techniques have made it possible for most patients with bone cancer in an arm or leg to avoid removal of the entire limb. However, these patients usually need reconstructive surgery. Reconstructive surgery is surgery that is done to reshape or rebuild a part of the body changed by a previous surgery.

Another type of surgery is cryosurgery. Cryosurgery is the use of liquid nitrogen to freeze and kill cancer cells.

Chemotherapy is the use of drugs to kill cancer cells. Chemotherapy is usually given in the blood stream through an IV. This treatment is used only for certain types of bone cancer.

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Radiation therapy uses high-energy rays to kill cancer cells and stop them from growing and spreading. The radiation that treats the cells comes from a machine that aims the rays at a specific area of the body.

Chemotherapy and radiation therapy may sometimes be done together. These treatments may be used on their own, before surgery or after surgery.

There may be clinical trials available for people with bone cancer. Clinical trials test new medical approaches and treatments.

Bone cancer and its treatment can lead to other health problems. It is important to have supportive care before, during, and after cancer treatment.

Supportive care is treatment to control pain and other symptoms. It is also treatment to relieve the side effects of therapy and to help you cope with emotions.

Supportive care also deals with the pain associated with cancer and its treatments. Your healthcare provider or a pain control specialist can suggest ways to relieve or reduce pain.

## **Summary**

Bone cancer is a rare type of cancer. It accounts for much less than 1 percent of all cancers. Bone cancer can begin in any type of bone tissue. The cancer may spread to other parts of the body over time, especially the lungs.

Treatment options for bone cancer usually include surgery, chemotherapy, radiation therapy, or some combination of these three.

The earlier bone cancer is detected and treated, the more likely are the chances of a successful treatment.



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