
CANCER FACTS

National Cancer Institute • National Institutes of Health
Department of Health and Human Services

Bone Cancer: Questions and Answers

1. What are bones made of and how do they function?

Mature bones are made up of three types of tissue: compact tissue (the hard outer portion of most bones); cancellous tissue (spongy tissue inside the bones that contains bone marrow, which makes blood cells); and subchondral tissue (smooth bone tissue of the joints). A layer of cartilage covers subchondral tissue to cushion the movement of joints.

Bones support and protect internal organs, act as levers and braces for muscles to produce movement, and produce and store blood cells in the bone marrow.

2. Are all bone tumors cancerous?

Bone tumors may be benign (noncancerous) or malignant (cancerous). Benign bone tumors are more common than malignant ones. Both types may grow and compress healthy bone tissue and absorb or replace it with abnormal tissue. However, benign tumors do not spread and are rarely life-threatening.

Cancer that arises in the bone (primary bone cancer) is not the same disease as cancer that spreads to the bone from another part of the body (secondary bone cancer). Primary bone cancer is rare, with approximately 2,500 new cases diagnosed each year in the United States. More commonly, bones are the site of tumors that result from the spread (metastasis) of cancer from another organ, such as the breasts, lungs, and prostate.

This fact sheet deals with primary bone cancer.

3. What types of cancer arise in the bones?

The most common type of bone cancer is osteosarcoma, which develops in new tissue in growing bones. Another type of cancer, chondrosarcoma, arises in cartilage. Evidence suggests that Ewing's sarcoma, another form of bone cancer, begins in immature nerve tissue in bone marrow. Osteosarcoma and Ewing's sarcoma tend to occur more frequently in children and adolescents, while chondrosarcoma occurs more often in adults (see chart).



Cancers of the Bone

Types of Cancer	Tissue of Origin	Common Locations	Common Ages
Osteosarcoma	Osteoid	Knees, upper legs, upper arms	10–25
Chondrosarcoma	Cartilage	Pelvis, upper legs, shoulders	50–60
Ewing’s Sarcoma	Immature nerve tissue, usually in bone marrow	Pelvis, upper legs, ribs, arms	10–20

4. **What are possible risk factors for bone cancer?**

Although scientists are not certain what causes bone cancer, a number of factors may put a person at increased risk. These cancers occur more frequently in children and young adults, particularly those who have had radiation or chemotherapy treatments for other conditions. Adults with Paget’s disease, a noncancerous condition characterized by abnormal development of new bone cells, may be at increased risk for osteosarcoma. A small number of bone cancers are due to heredity. For example, children with hereditary retinoblastoma (an uncommon cancer of the eye) are at a higher risk of developing osteosarcoma.

5. **What are the symptoms of bone cancer?**

Pain is the most common symptom of bone cancer. However, symptoms may vary depending on the location and size of the cancer. Tumors that occur in or near joints may cause swelling or tenderness in the affected area. Bone cancer can also interfere with normal movements and can weaken the bones, occasionally leading to a fracture. Other symptoms may include fatigue, fever, weight loss, and anemia. None of these symptoms is a sure sign of cancer. They may also be caused by other, less serious conditions. It is important to check with a doctor.

6. **How is bone cancer diagnosed?**

To diagnose bone cancer, the doctor asks about the patient’s personal and family medical history and does a complete medical exam. The doctor may suggest a blood test to determine the level of an enzyme called alkaline phosphatase. A large amount of alkaline phosphatase can be found in the blood when the cells that form bone tissue are very active—when children are growing, when a broken bone is mending, or when disease or a tumor causes production of abnormal bone tissue. Because high levels of this enzyme

can normally be found in growing children and adolescents, this test is not a completely reliable indicator of bone cancer.

X-rays can show the location, size, and shape of a bone tumor. If x-rays suggest that a tumor may be cancer, the doctor may recommend special imaging tests such as a bone scan, a CT (or CAT) scan, an MRI, or an angiogram. However, a biopsy—the removal of a sample of tissue from the bone tumor—is needed to determine whether cancer is present.

The surgeon may perform a needle biopsy or an incisional biopsy. During a needle biopsy, the surgeon makes a small hole in the bone and removes a sample of tissue from the tumor with a needle-like instrument. In an incisional biopsy, the surgeon cuts into the tumor and removes a sample of tissue. Biopsies are best done by orthopedic oncologists—doctors experienced in the diagnosis of bone cancer. A pathologist—a doctor who identifies disease by studying cells and tissues under a microscope—examines the tissue to determine whether it is cancerous.

7. What are the treatment options for bone cancer?

Treatment options depend on the type, size, location, and stage of the cancer, as well as the person's age and general health. Surgery is often the primary treatment. Although amputation of a limb is sometimes necessary, pre- or post-operative chemotherapy has made limb-sparing surgery possible in many cases. When appropriate, surgeons avoid amputation by removing only the cancerous section of the bone and replacing it with an artificial device called a prosthesis.

Chemotherapy and radiation may also be used alone or in combination. Because of the tendency for Ewing's sarcoma to metastasize rapidly, multidrug chemotherapy is often used, in addition to radiation therapy or surgery on the primary tumor.

8. Are new treatments being studied?

To develop new, more effective treatments, the National Cancer Institute is sponsoring clinical trials (treatment studies with cancer patients) in many hospitals and cancer centers around the country. Clinical trials are a critical step in the development of new methods of treatment. Before any new treatment can be recommended for general use, doctors conduct clinical trials to find out whether the treatment is safe for patients and effective against the disease. Various forms of cancer treatments using surgery, radiation therapy, and chemotherapy for bone cancer are being tested in clinical trials.

Patients who are interested in learning more about participating in clinical trials can call the Cancer Information Service or access the clinical trials page of the National Cancer Institute's Web site at http://cancer.gov/clinical_trials on the Internet.

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Sources of National Cancer Institute Information

Cancer Information Service

Toll-free: 1-800-4-CANCER (1-800-422-6237)

TTY (for deaf and hard of hearing callers): 1-800-332-8615

NCI Online

Internet

Use <http://cancer.gov> to reach the NCI's Web site.

LiveHelp

Cancer Information Specialists offer online assistance through the *LiveHelp* link on the NCI's Web site.

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