

Cancer Association of South Africa (CANSA)



Fact Sheet on Bone Cancer

Introduction

Bones are rigid organs that constitute part of the endoskeleton of vertebrates. Bone tissue is a type of dense connective tissue.

[Picture Credit: Skeleton]



Bone Cancer

Bone cancer is the uncontrolled growth of bone cells.

A *primary* bone tumour starts in the bone itself. It can develop anywhere in the body.



[Picture Credit: Bone Cancer]

There are several different types of bone tumours. Their names are based on the area of bone or surrounding tissue that is affected and the kind of cells forming the tumour.

Redondo, A., Bagué, S., Bernabeu, D., Ortiz-Cruz, E., Valverde, C., Alvarez, R., Martinez-Trufero, J., Lopez-Martin, J.A., Correa, R., Cruz, J., Lopez-Pousa, A., Santos, A., Garcia Del Muro, X. & Martin.Broto, J. 2017.

“Primary malignant bone tumors are uncommon and heterogeneous malignancies. This document is a guideline developed by the Spanish Group for Research on Sarcoma with the participation of different specialists involved in the diagnosis and treatment of bone sarcomas. The aim is to provide practical recommendations with the intention of helping in the clinical decision-making process. The diagnosis and treatment of bone tumors requires a multidisciplinary approach, involving as a minimum pathologists, radiologists, surgeons, and radiation and medical oncologists. Early referral to a specialist center could improve patients' survival. The multidisciplinary management of osteosarcoma, chondrosarcoma, chordoma, giant cell tumor of bone and other rare bone tumors is reviewed in this guideline. Ewing's sarcoma will be the focus of a separate guideline because of its specific biological, clinical and therapeutic features. Each statement has been accompanied by the level of evidence and grade of recommendation on the basis of the available data. Surgical excision is the mainstay of treatment of a localized bone tumor, with various techniques available depending

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on the histologic type, grade and location of the tumor. Chemotherapy plays an important role in some chemosensitive subtypes (such as high-grade osteosarcoma). In other subtypes, historically considered chemoresistant (such as chordoma or giant cell tumor of bone), new targeted therapies have emerged recently, with a very significant efficacy in the case of denosumab. Radiation therapy is usually necessary in the treatment of chordoma and sometimes of other bone tumors.”

Mechri, M., Riahi, H., Sboui, I., Bouaziz, M., Vanhoenacker, F. & Ladeb, M. 2018.

“Primary malignant tumors of the spine are rare and mainly include chordoma, chondrosarcoma, Ewing sarcoma or primitive neuroectodermal tumor, and osteosarcoma. The final diagnosis is based on the combination of patient age, topographic and histologic features of the tumor, and lesion pattern on computed tomography (CT) and magnetic resonance (MR) imaging. Imaging evaluation includes radiography, CT, bonescintigraphy, and MR imaging. CT is more useful than radiography for evaluating location of the lesion and analyzing bone destruction and matrix, whereas MR has unmatched ability to assess soft tissue extension. This pictorial review provides an overview of the most prevalent primitive malignant tumors of spine.”

Types of Bone Tumours

Bone tumours comprise of:

- Osteosarcoma: osteosarcoma (also called *osteogenic sarcoma*) is the most common primary bone cancer. This cancer starts in the bone cells.
- Chondrosarcoma: chondrosarcoma is a cancer of cartilage cells.
- Ewing’s tumour: Ewing’s tumour is the third most common primary bone cancer, and the second most common in children, adolescents, and young adults. Malignant fibrous histiocytoma
- Fibrosarcoma This is another type of cancer that develops more often in ‘soft tissues’ than it does from bones. Fibrosarcoma usually occurs in elderly and middle-aged adults - leg, arm, and jaw bones are the ones most often affected.
- Giant cell tumour of bone
- Chordoma

Palmerini, E., Picci, P., Reichardt, P. & Downey, G. 2019.

BACKGROUND: Primary and recurrent giant cell tumor of bone is typically benign; however, rarely giant cell tumor of bone can undergo malignant transformation. Malignancy in giant cell tumor of bone may be primary (adjacent to benign giant cell tumor of bone at first diagnosis) or secondary (at the site of previously treated giant cell tumor of bone). Malignant giant cell tumor of bone has a poor prognosis; it is important to distinguish malignant from benign lesions to facilitate appropriate management. The true incidence of malignant giant cell tumor of bone is not known, probably owing to inaccurate diagnosis and inconsistent nomenclature. We have analyzed current data to provide a robust estimate of the incidence of malignancy in giant cell tumor of bone.

METHODS: A literature search was performed to source published reports of primary and secondary cases of malignant giant cell tumor of bone. Studies that reported a denominator were used to estimate the incidence of malignancy.

RESULTS: We identified 4 large series of patients with malignant giant cell tumor of bone that provided data on 2315 patients with giant cell tumor of bone. Across these studies, the cumulative incidence of malignancy was 4.0%; the cumulative incidence of primary malignancy was 1.6% compared with 2.4% for secondary malignancy. Our analyses confirmed that most malignant giant

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cell tumor of bone is secondary and occurs following radiation. In addition, data from 8 small series showed that 4.8% of patients with giant cell tumor of bone who received radiation therapy developed secondary malignancy.

CONCLUSIONS: Malignant giant cell tumor of bone is rare, and its identification is hindered by a lack of clear diagnostic criteria. For optimal care of patients with giant cell tumor of bone, we recommend: comprehensive histologic sampling to ensure accurate diagnoses; watchful follow-up, particularly for patients treated with radiation; and timely treatment of local recurrence.

Incidence of Bone Cancer in South Africa

According to the outdated National Cancer Registry (2016), known for under reporting, the following number of cases of bone cancer was histologically diagnosed in South Africa during 2016:

Group - Males 2016	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All males	112	1:2 608	0,29%
Asian males	6	1:1 168	0,61%
Black males	66	1:3 993	0,50%
Coloured males	16	1:1 849	0,35%
White males	24	1:1 138	0,12%

Group - Females 2016	Actual No of Cases	Estimated Lifetime Risk	Percentage of All Cancers
All females	84	1:3 697	0,20%
Asian females	2	1:4 265	0,16%
Black females	50	1:5 953	0,24%
Coloured females	13	1:1 957	0,28%
White females	19	1:1 538	0,11%

N.B. ‘Histologically diagnosed’ means that a biopsy (removal of a specimen of tissue) was performed and that a diagnosis of Bone Cancer was confirmed by a qualified pathologist.

The frequency of histologically diagnosed cases of bone cancer in South Africa for 2016 was as follows (National Cancer Registry, 2016):

Group - Males 2016	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All males	47	20	15	9	9	10	9	1
Asian males	3	1	0	1	0	0	1	0
Black males	29	19	3	3	8	4	0	0
Coloured males	5	0	7	2	0	2	0	0
White males	10	0	1	3	2	5	3	0

Group - Females 2016	0 – 19 Years	20 – 29 Years	30 – 39 Years	40 – 49 Years	50 – 59 Years	60 – 69 Years	70 – 79 Years	80+ Years
All females	28	15	10	5	10	6	4	2
Asian females	2	0	0	0	0	0	0	0
Black females	19	12	3	7	6	2	0	1
Coloured females	4	3	0	1	1	1	2	1
White females	3	0	2	6	3	3	2	0

N.B. In the event that the totals in any of the above tables do not tally, this may be the result of uncertainties as to the age, race or sex of the individual. The totals for ‘all males’ and ‘all females’, however, always reflect the correct totals.

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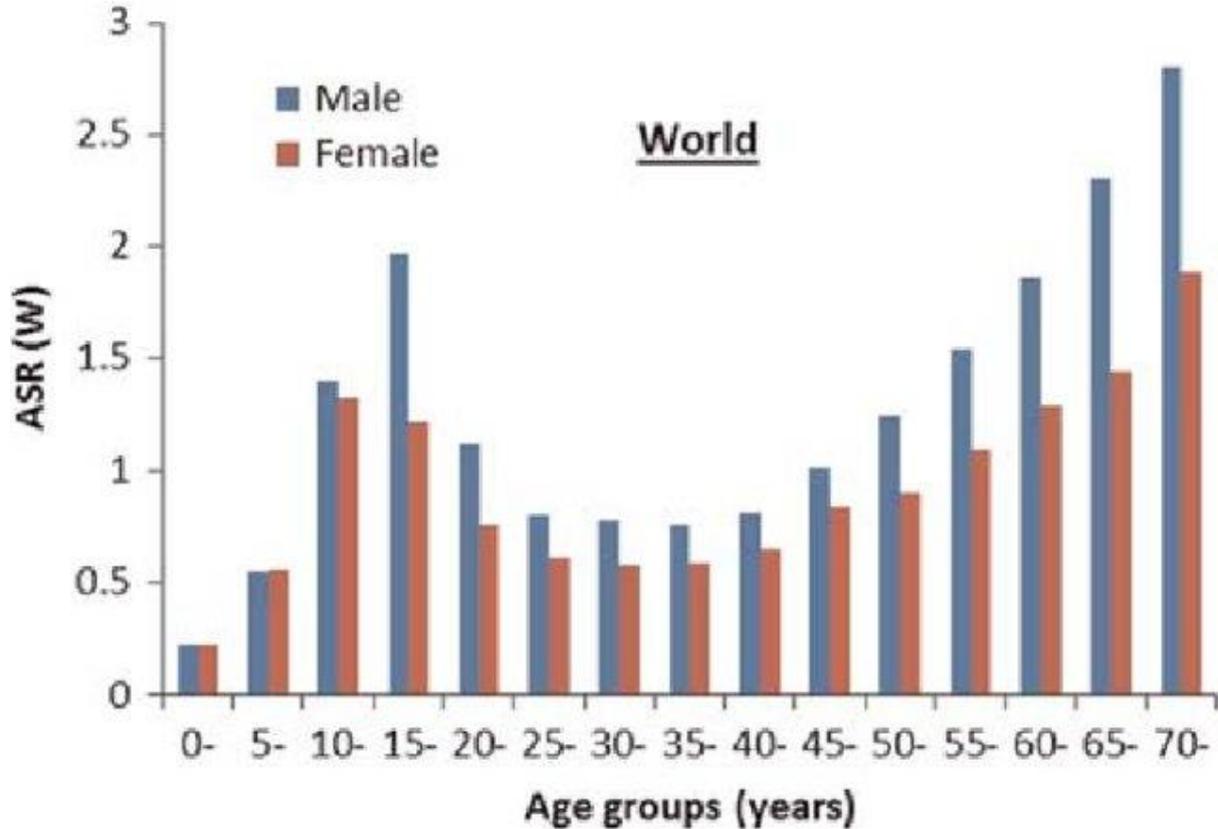
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Global Incidence of Bone Cancer

The incidence of primary malignant bone tumours is relatively low, the mortality related to them is disproportionately high, especially among teenagers and young adults. The currently available incidence figures are based mainly on data collected from more developed countries. Global incidence figures and comparative figures between various regions and continents are not available (Kumar & Gupta, 2016).



Signs and Symptoms of Bone Cancer in Adults

Bone cancer is a rare cancer that occurs in the bone and destroys normal bone tissue. Although it may afflict any bone in the body, bone cancer typically affects long bones such as those found in the arms and legs.

Symptoms of bone cancer may include:

- Swelling in the affected area
- Bone fracture (especially as a result of a minimal injury)
- Bone pain
- Fatigue
- Weight loss

Signs and Symptoms of Bone Cancer in Children

Symptoms of bone cancer in children include:

- The presence of a mass or lump in the affected area

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- Swelling in the affected area
- Fever
- Chills
- Night sweats
- Bone fracture (especially as a result of a minimal injury)
- Bone pain
- Fatigue
- Weight loss without trying

Signs and Symptoms of Bone Cancer in Adults

The Signs and symptoms may include:

- Swelling and tenderness near the affected area
- Broken bone
- Fatigue
- Bone pain
- Unintended weight loss

Diagnosis of Bone Cancer

The following may be used to diagnose bone cancer:

- X-Rays
- Bone scan
- Magnetic Resonance Imaging
- Bone biopsy
 - Core needle biopsy:
 - Surgical biopsy:

Han, S., Li, Y., Li, Y. & Zhao, M. 2019.

“Clinical value of PET/CT (positron emission tomography/computed tomography) in the diagnosis of malignant bone tumors (BT) was investigated. Fifty-four patients with BT were first diagnosed by ordinary CT and then by PET/CT. The diagnostic efficacy outcomes and diagnosis of malignant BT by clinical stage of the two methods for BT were observed and recorded, and the diagnostic value of PET/CT in the diagnosis of BT was evaluated. There were 14 cases of benign BT patients, 15 cases of stage I, 10 cases of stage II and 15 cases of stage III in malignant BT patients. The diagnostic coincidence rate of PET/CT was 92.59% and the diagnostic coincidence rate of CT was 72.22%, which showed that the diagnostic coincidence rate of PET/CT was significantly higher than that of CT ($P < 0.05$). The sensitivity, negative predictive value and positive predictive value of PET/CT were 95.00, 85.71 and 95.00%, respectively, which were higher than those of CT ($P < 0.05$). CT and PET/CT were used for the clinical staging and pathological diagnosis of malignant BT; the results showed that the diagnostic accuracy of PET/CT in the clinical stages of malignant BT was also significantly higher than that of CT ($P < 0.05$). The diagnostic efficacy of PET/CT in BT is better than that in CT. PET/CT can diagnose the pathological properties of BT more accurately, and can also effectively diagnose the clinical stage of malignant BT and provide clinical diagnostic basis for follow-up procedures.”

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Staging of Bone Cancer

The stage of a cancer describes its size and whether it has spread.

There are two different staging systems used for bone cancer. This is the Enneking staging system, which is commonly used to stage bone cancers:

Stage 1

The cancer is low-grade and has not spread beyond the bone.

Stage 2

The cancer is high-grade and hasn't spread beyond the bone.

Stage 3

The bone cancer may be any grade and has spread to other parts of the body, such as the lungs.

Treatment of Bone Cancer

Treatment for different types of bone cancer may include:

- Surgery
The type of surgery a person has will depend on the size of the cancer, where it is in the body and whether it has grown into the tissues surrounding the bone. The surgeon may suggest:
 - Removing the bone affected by the cancer
 - Limb sparing surgery
 - Removal of an arm or leg (amputation)
 - Surgery to remove cancer that has spread
- Chemotherapy
- Radiotherapy

Zaiaczkowska, R., Kocot-Kepska, M., Leppert, W. & Wordliczek, J. 2019.

“The skeletal system is the third most common site for cancer metastases, surpassed only by the lungs and liver. Many tumors, especially those of the breast, prostate, lungs, and kidneys, have a strong predilection to metastasize to bone, which causes pain, hypercalcemia, pathological skeletal fractures, compression of the spinal cord or other nervous structures, decreased mobility, and increased mortality. Metastatic cancer-induced bone pain (CIBP) is a type of chronic pain with unique and complex pathophysiology characterized by nociceptive and neuropathic components. Its treatment should be multimodal (pharmacological and non-pharmacological), including causal anticancer and symptomatic analgesic treatment to improve quality of life (QoL). The aim of this paper is to discuss the mechanisms involved in the occurrence and persistence of cancer-associated bone pain and to review the treatment methods recommended by experts in clinical practice. The final part of the paper reviews experimental therapeutic methods that are currently being studied and that may improve the efficacy of bone pain treatment in cancer patients in the future.”

About Clinical Trials

Clinical trials are research studies that involve people. They are conducted under controlled conditions. Only about 10% of all drugs started in human clinical trials become an approved drug.

Clinical trials include:

- Trials to test effectiveness of new treatments

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- Trials to test new ways of using current treatments
- Tests new interventions that may lower the risk of developing certain types of cancers
- Tests to find new ways of screening for cancer

The South African National Clinical Trials Register provides the public with updated information on clinical trials on human participants being conducted in South Africa. The Register provides information on the purpose of the clinical trial; who can participate, where the trial is located, and contact details.

For additional information, please visit: www.sanctr.gov.za/

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Bone Cancer

https://www.google.co.za/search?q=bone+cancer&source=lnms&tbm=isch&sa=X&ei=R1aLUvHNEMrDhAeF3YGgCw&sqi=2&ved=0CacQ_AUoAQ&biw=1366&bih=642#facrc=_&imgdii=_&imgrc=PTPd88tGdsLuM%3A%3BOA7zgXsHkdEgWM%3Bhttp%253A%252F%252Fwww.truthonpot.com%252Fwp-content%252Fuploads%252F2013%252F07%252Fbone-cancer-marijuana-07-24.jpg%3Bhttp%253A%252F%252Fwww.truthonpot.com%252F2013%252F07%252F24%252Fmarijuana-could-treat-pain-from-bone-cancer-research-shows%252F%3B600%3B350

Bone Structure

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Skeleton

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