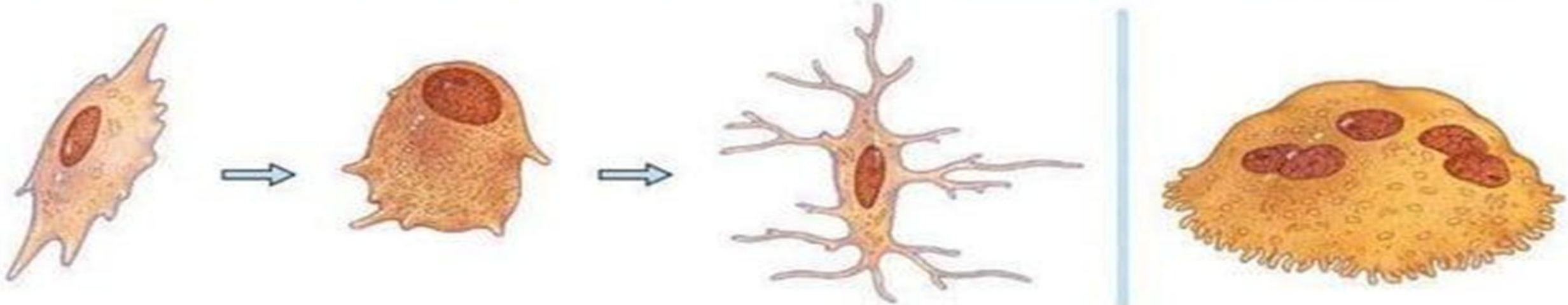
PRESENTED BY

DR. FADHIL SAHIB

# BONE

- 206 bones
- Types of cells : osteoclasts, osteocytes & osteoblasts



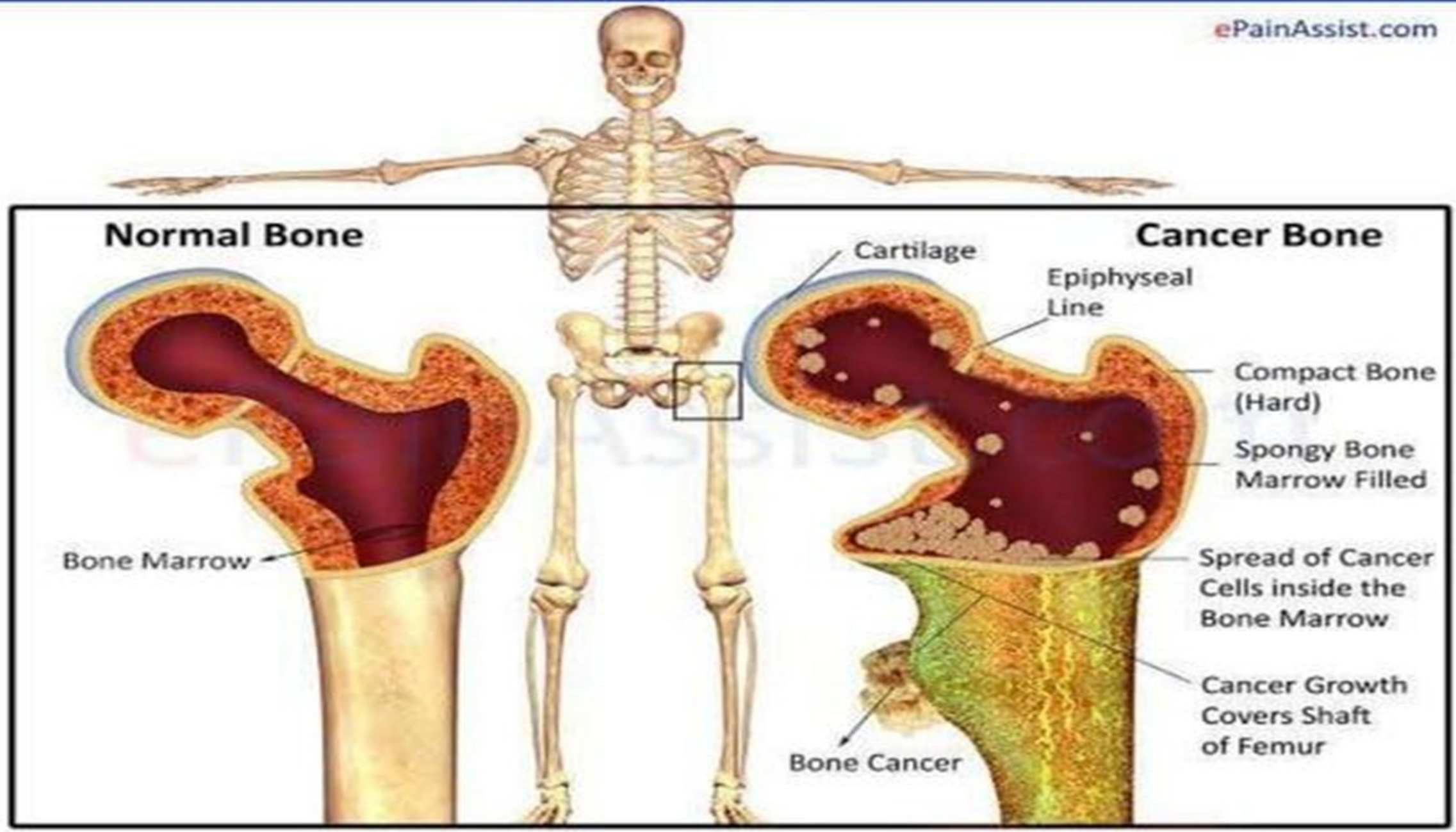
Osteogenic cell
(develops into an osteoblast)

Osteoblast
(forms bone matrix)

Osteocyte
(maintains bone tissue)

Osteoclast
(functions in resorption, the breakdown of bone matrix)

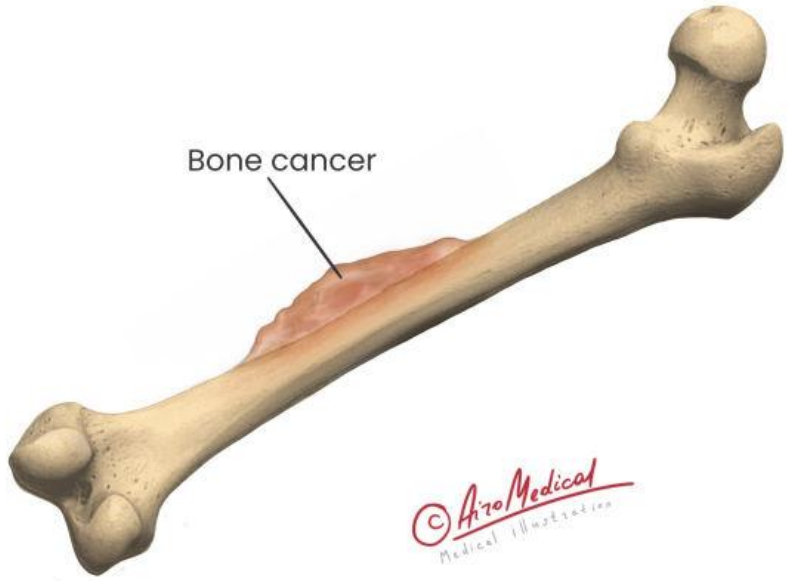
# Bone Cancer


ePainAssist.com
Normal Bone
Cancer Bone
Cartilage
Epiphyseal Line
Compact Bone (Hard)
Spongy Bone Marrow Filled
Bone Marrow
Spread of Cancer Cells inside the Bone Marrow
Cancer Growth Covers Shaft of Femur
Bone Cancer

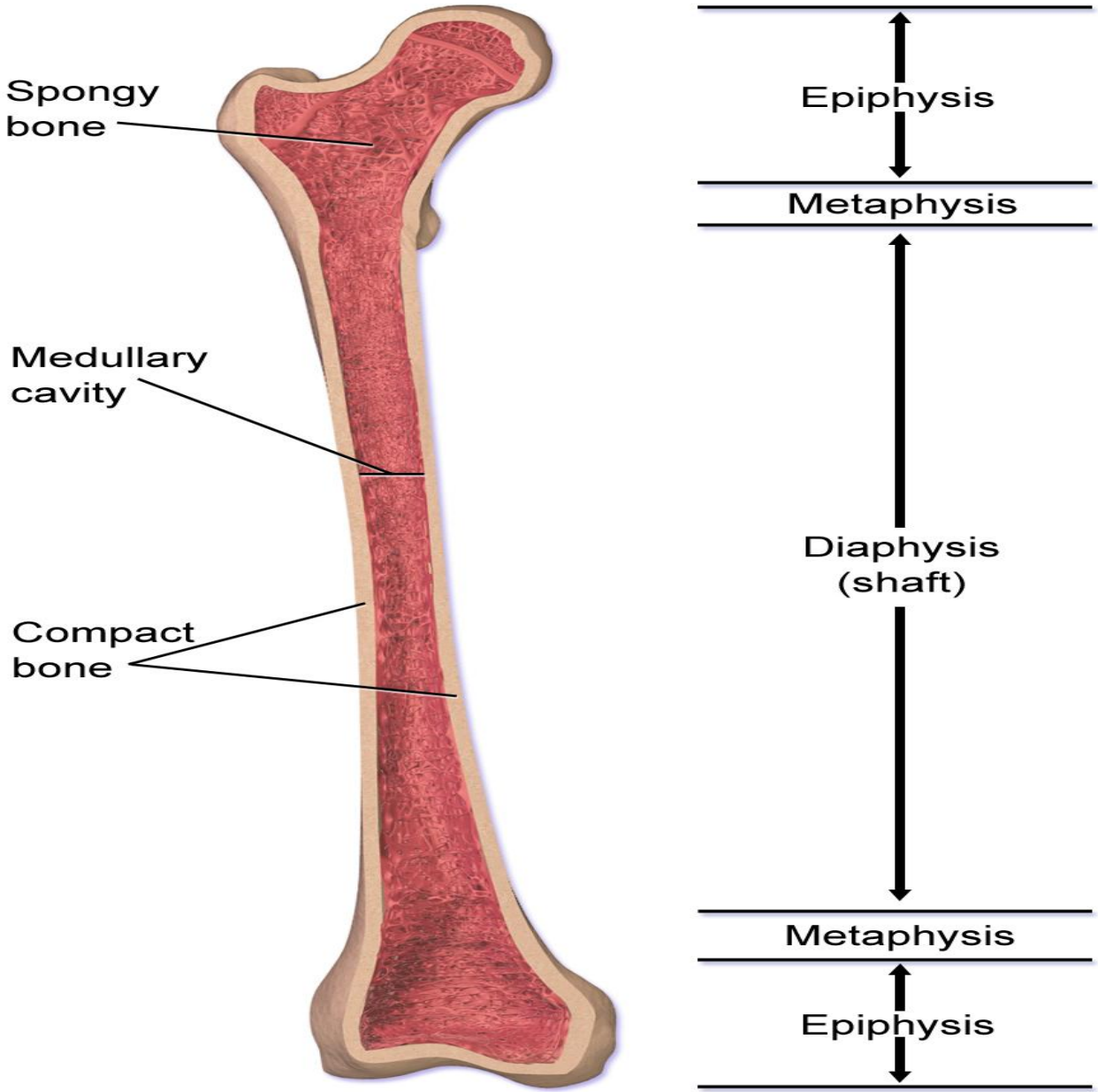
# Bone Tumours

Bone tumors are growths of abnormal cells in bones.

Bone tumors may be noncancerous(benign) or cancerous and primary or metastatic.

# Structure of a Long Bone



# Classification

is based on recognition of the dominant tissue in the lesion, though this is not necessarily the tissue of origin.

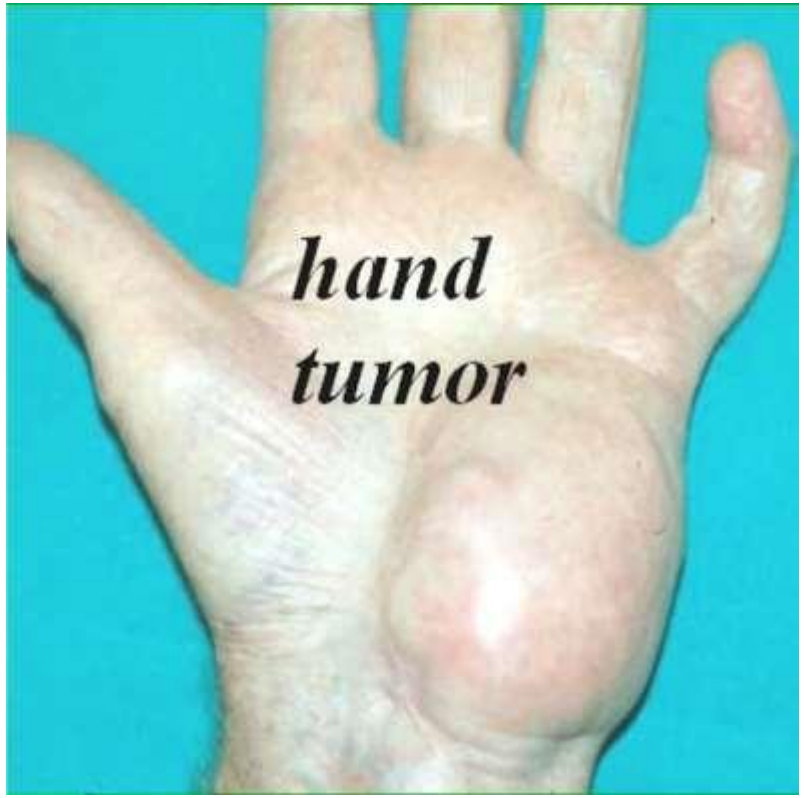
**Classification of primary bone tumours:**

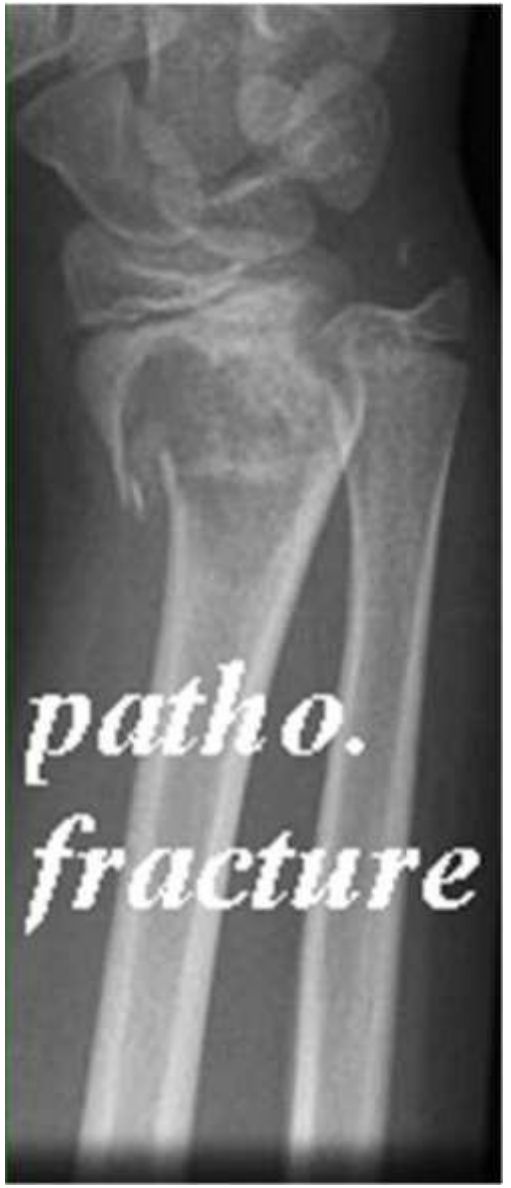
| Cell type | Benign | Malignant |
|---|---|---|
| Bone | Osteoid osteoma | Osteosarcoma |
| Cartilage | Chondroma | Chondrosarcoma |
| | Osteochondroma | |
| Fibrous tissue | Fibroma | Fibrosarcoma |
| Marrow | Haemangioma | Angiosarcoma |
| Uncertain | Giant cell tumour | Malignant gaint cell tumor |

## Diagnosis:

### 1-History &examination:

Age
asymptomatic
pain
Swelling or lump
History of trauma
Neurological symptoms
pathological fracture



## Imaging:

**x-ray:** site of the lesion/cyst (diaphysis, metaphysis or bone end),
central or eccentric or cortical,
size, single or multiple,
margins (welldefined &sharp or sclerotic =benign or
ill-defined &hazy=malignant),
contents (calcified =cartilage tumor).
Cortical destruction leading to spread of tumor outside the bone with periosteal new bone formation is suggestive of malignant tumor

**Computed tomography(CT):** is excellent to show cortical erosion, #, tumor extension in &outside the bone, spine &pelvic tumors &pulmonary metastasis

**MRI:** to assess tumor spread &it's relation to neurovascular structures. It is the best for soft tissue tumor assessment

**99mTc-bone scan:** useful in detecting small tumor, skip lesion &'silent' secondaries

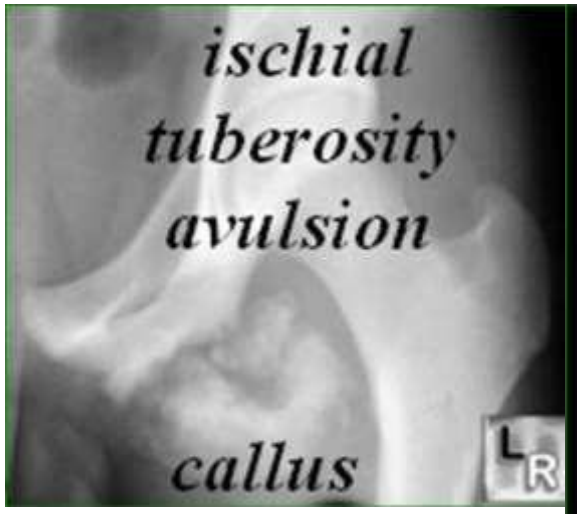
**PET scan**

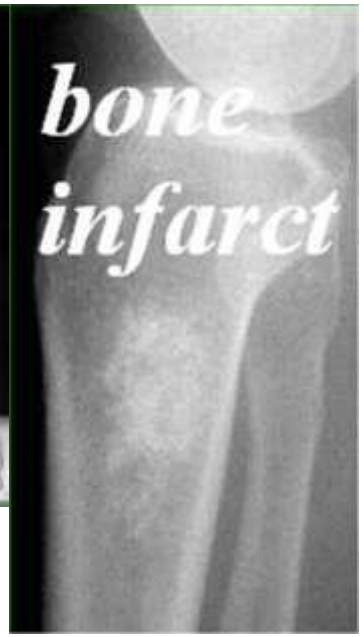
**3 -Laboratory tests:**
help to exclude infection &metabolic disorder.
Malignant tumor may have ↑ESR, ↓HB, ↑S. alkaline phosphatase

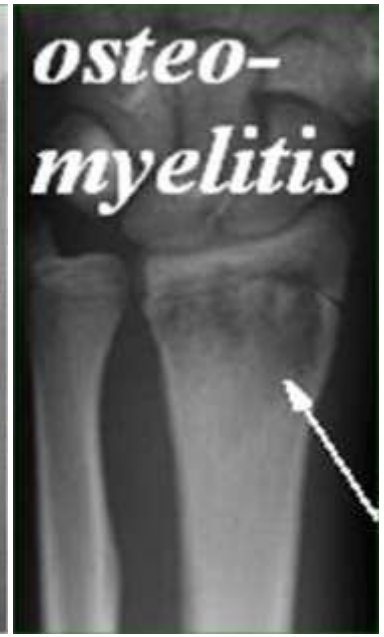
**4-Biopsy:** is essential for definite diagnosis .
Needle biopsy (large-bore needle) is less reliable, though useful in inaccessible sites.
**Open biopsy** is better:
**Incisional biopsy**: expose part of tumor, take several tissue blocks from tumor boundary (normal tissue, capsule &abnormal tissue), ensure hemostasis &close without drain.
**Excisional biopsy:** used for benign tumor (remove the entire lesion).

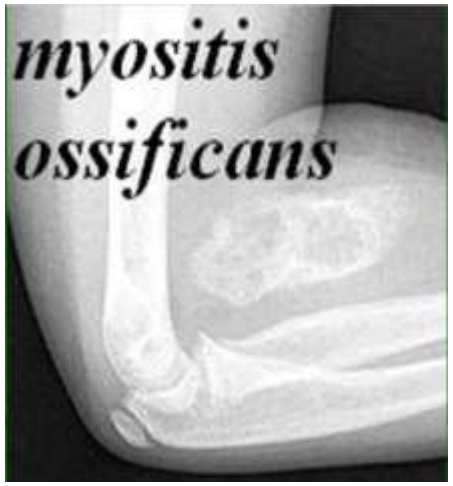
**Differential diagnosis:**

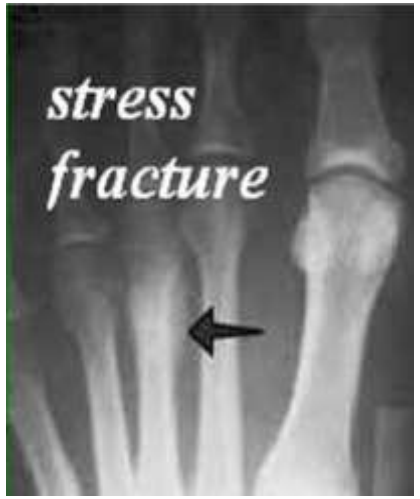
1-soft tissue hematoma
2-myositis ossificans
3-stress fracture
4-tendon avulsion
5-bone infection
6-gout
7-non-neoplastic lesion e.g. fibrous cortical defect &bone infarct may mimic tumor

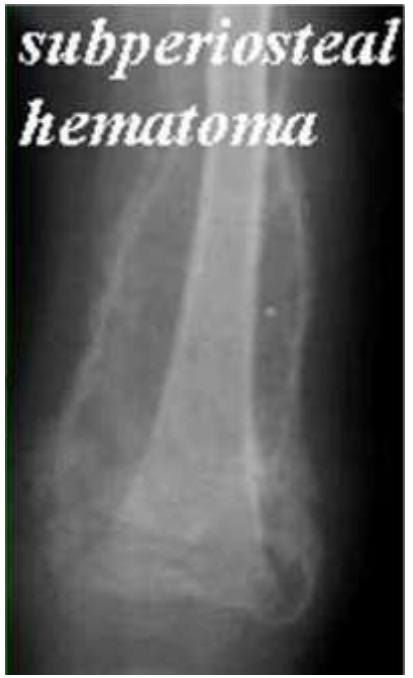


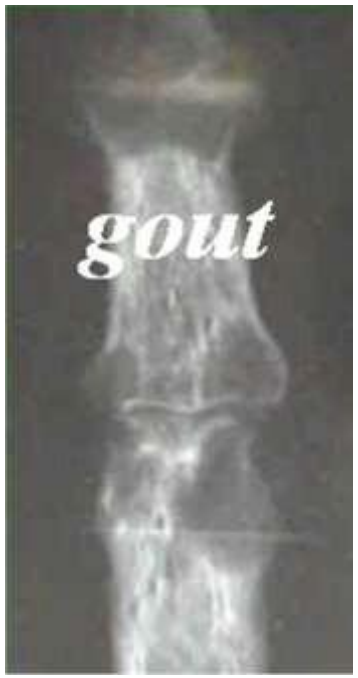



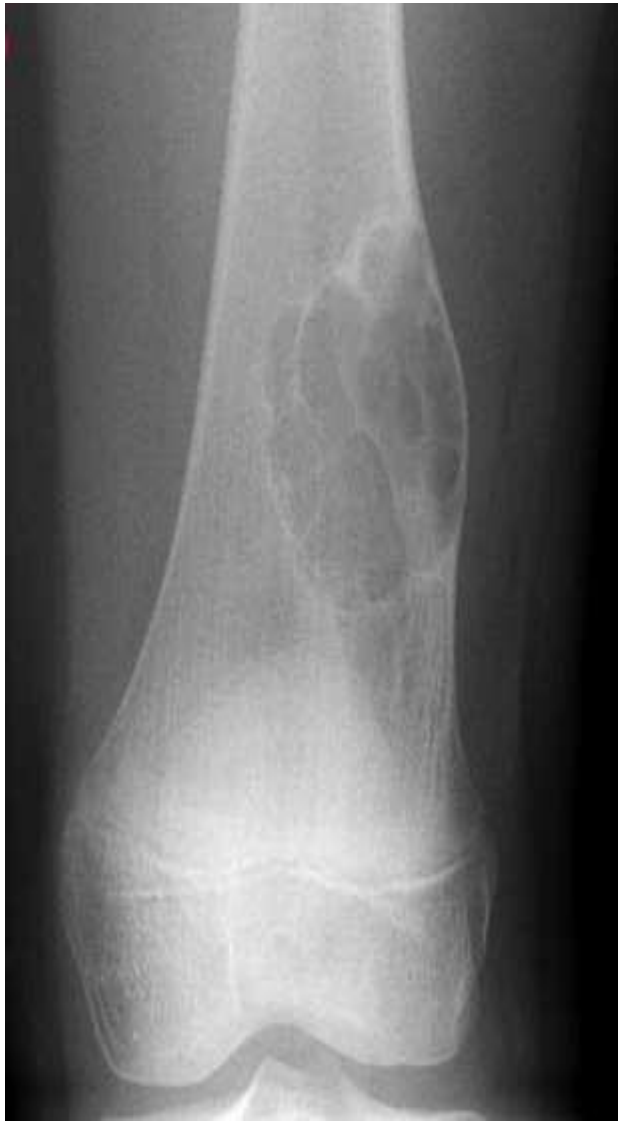



# Some common types of benign bone tumors

- Non-ossifying fibroma
- Unicameral (simple) bone cyst
- Osteochondroma
- Giant cell tumor
- Enchondroma
- Fibrous dysplasia
- Chondroblastoma
- Aneurysmal bone cyst
- Osteoid osteoma

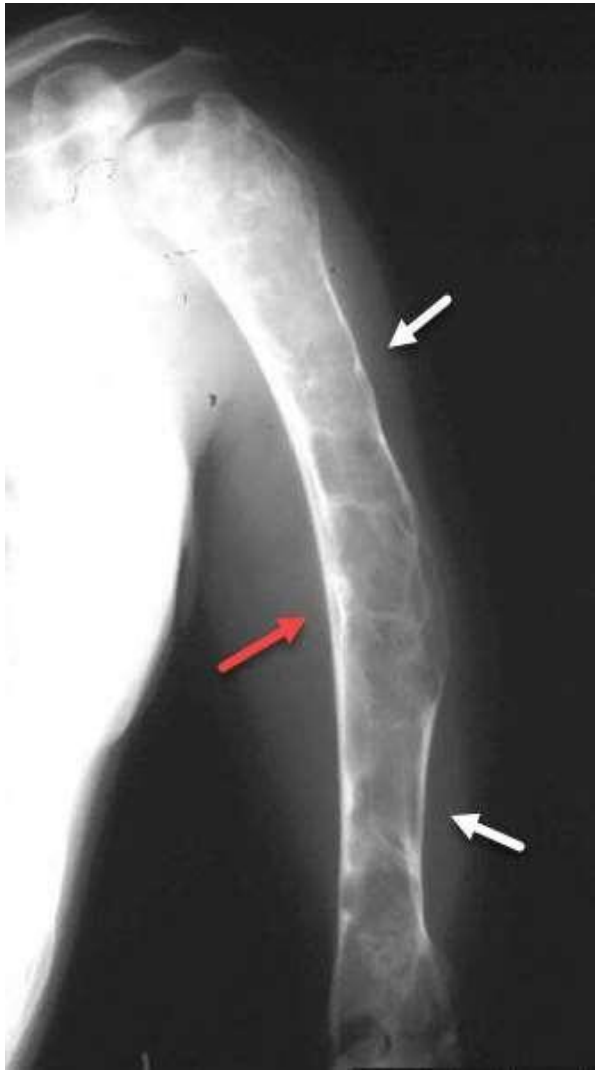
# Non ossifying Fibroma

is the commonest. It is a developmental defect
**CF:** asymptomatic &discovered accidentally.
**Age:** children.
**Site:** long bone metaphysis
**X-ray:** eccentric(within cortex) oval lytic lesion surrounded by thin sclerosis.



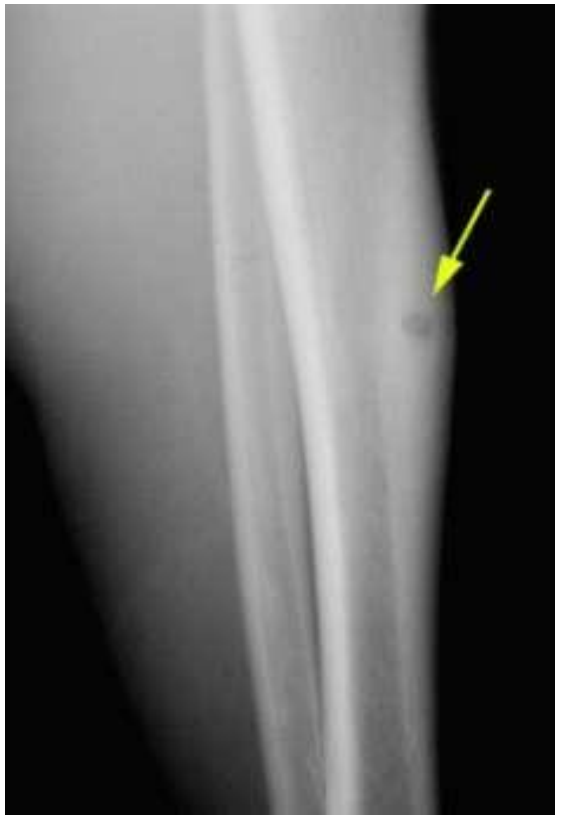
# Fibrous Dysplasia

is also developmental disorder
**CF:** small lesion is asymptomatic while large one may cause pain, deformity, #.
**Age:** appears in childhood
**Site:** metaphysis or diaphysis.
**X-ray:** lytic lesions with 'ground glass' appearance.
A classic deformity is the 'Shepherd's crook'.



# Osteoid Osteoma

is a tiny bone tumor.
**CF:** male <30 years, having persistent pain typically relieved by aspirin.
**Site:** any bone except the skull; 50% affecting tibia &femur.
**X-ray:** lytic nidus(<1.5cm) surrounded by dense sclerosis in metaphysis;



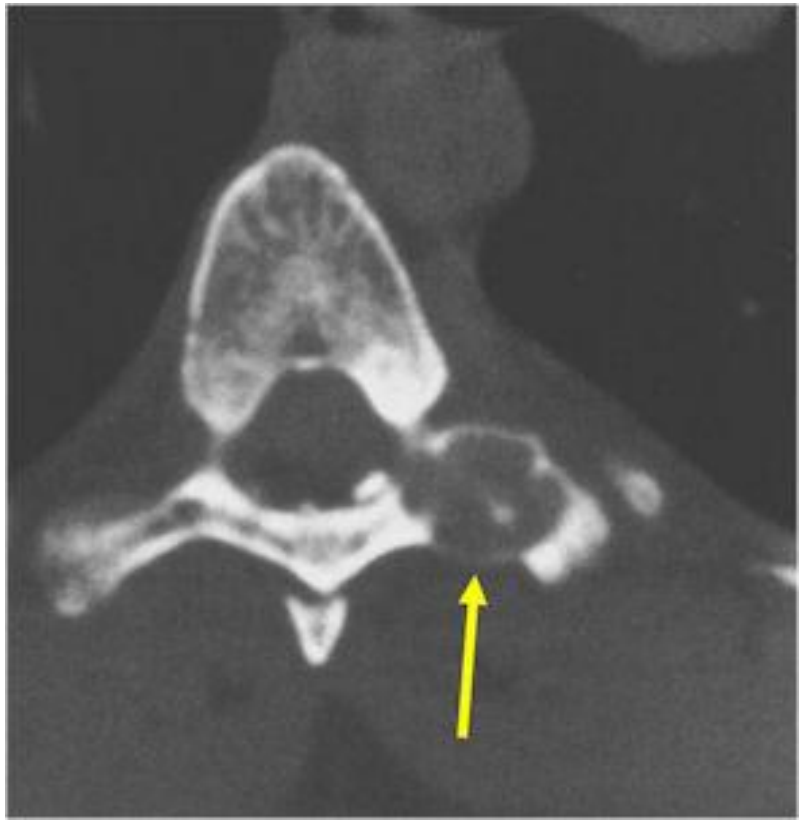
# Osteoblastoma

is similar to osteoid osteoma but more larger &more cellular.

**CF:** young male with pain &muscle spasm.

**Site:** spine &flat bones.

**X-ray:** well-defined lytic lesion surrounded by thin sclerosis.



# Chondroma

## *Enchondroma

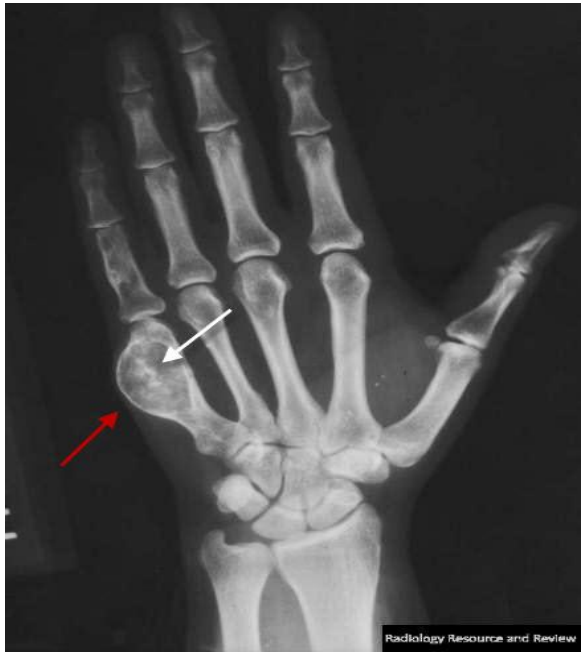
is arising from islands of cartilage that persist in bone metaphysis;

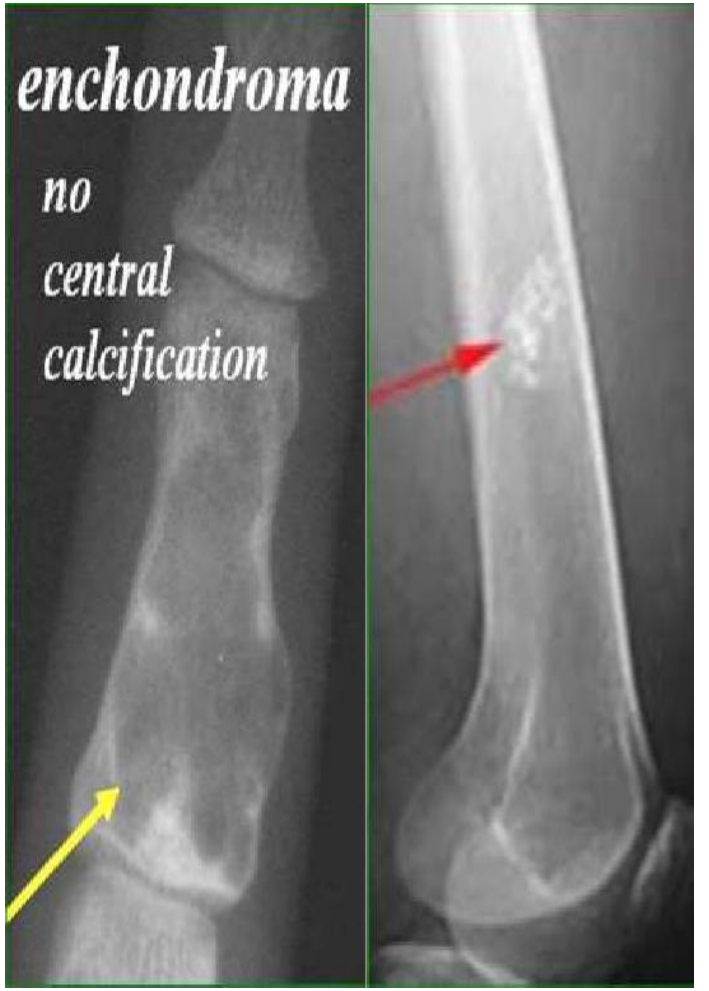
**Age:** young people.

**Site:** any bone but often the tubular bones of hands &feet.

**CF:** asymptomatic &discovered incidentally

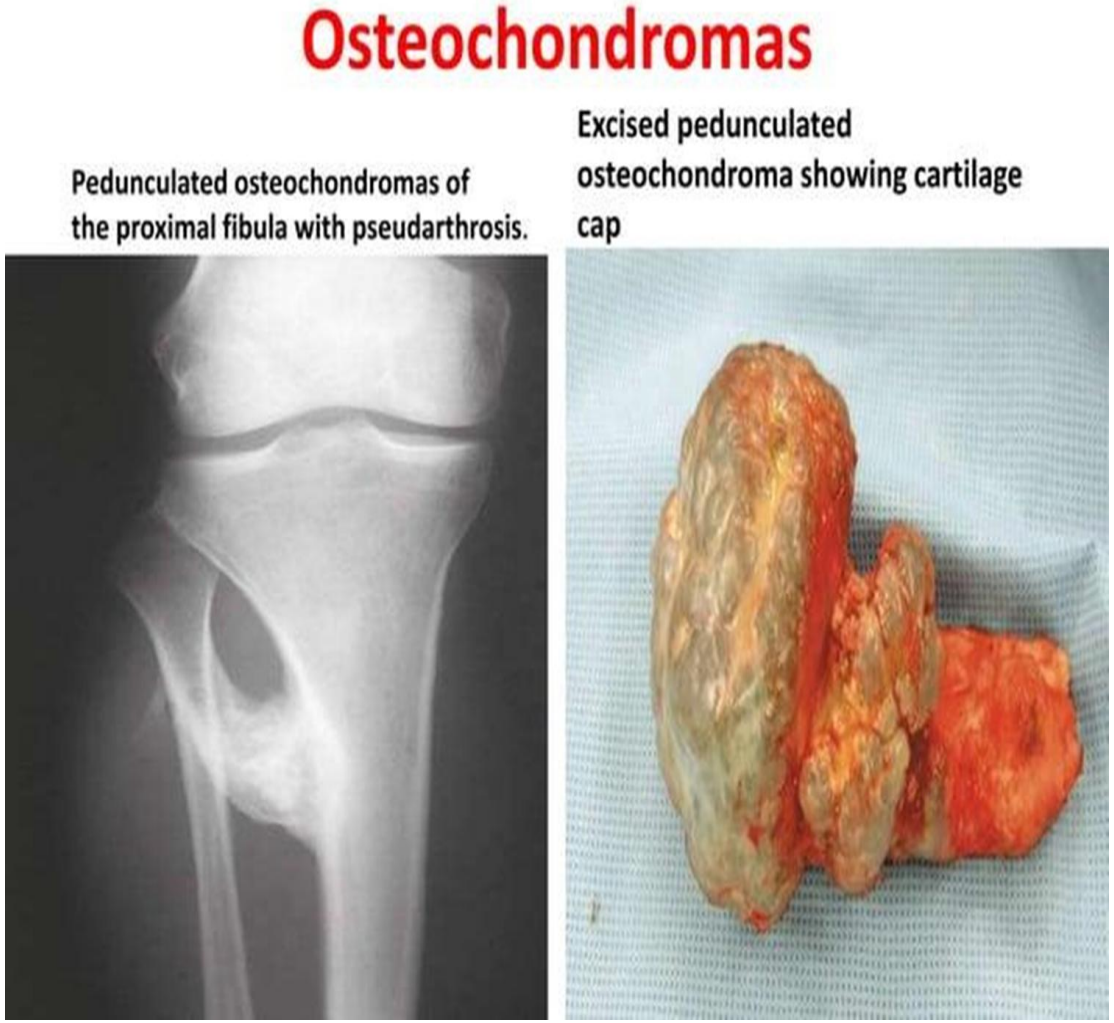
**X-ray:** well-defined central lytic lesion at the junction of metaphysis &diaphysis with pathognomonic central calcification(mature lesion).



**Osteochondroma** (cartilage-capped exostosis):

is a common developmental lesion.
**CF:** a teenage or young adult discovers a painless lump.
**Site:** any bone but often around knee, proximal humerus &ilium.
**X-ray:** well-defined metaphyseal exostosis it's base Continuous with the parent bone.



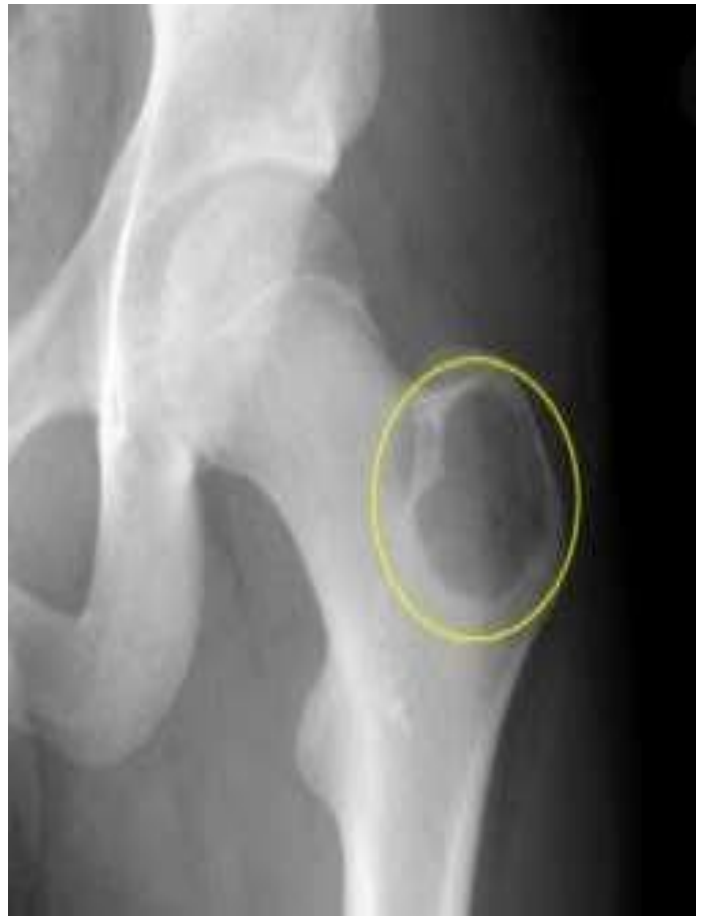
**Simple bone cyst:** is not a tumor. (solitary cyst or unicameral bone cyst)

**Age:** appears in children &heals spontaneously.

**Site:** proximal metaphysis of humerus & femur.

**CF:** discovered accidentally or after pathological #.

**X-ray:** well-defined, central, metaphyseal, uni-or multi-locular lytic lesion extending up to the physis; the cortex may be thinned &the bone expanded.



# Osteosarcoma:

is a highly malignant bone producing sarcoma, arising within bone &spreads rapidly to surrounding soft tissues.

**Age:** children &adolescent.

**Site:** often around knee &proximal humerus.

**CF:** early is constant pain, more at night &increasing in severity. Lump or pathological # are late.

**X-ray**: a poorly defined metaphyseal lesion containing hazy osteolytic &osteoblastic areas. If it breaches the cortex, there often be:

Sunburst effect: bone streaks radiating out from the cortex &

Codman's triangle: reactive new bone at angles of periosteal elevation.

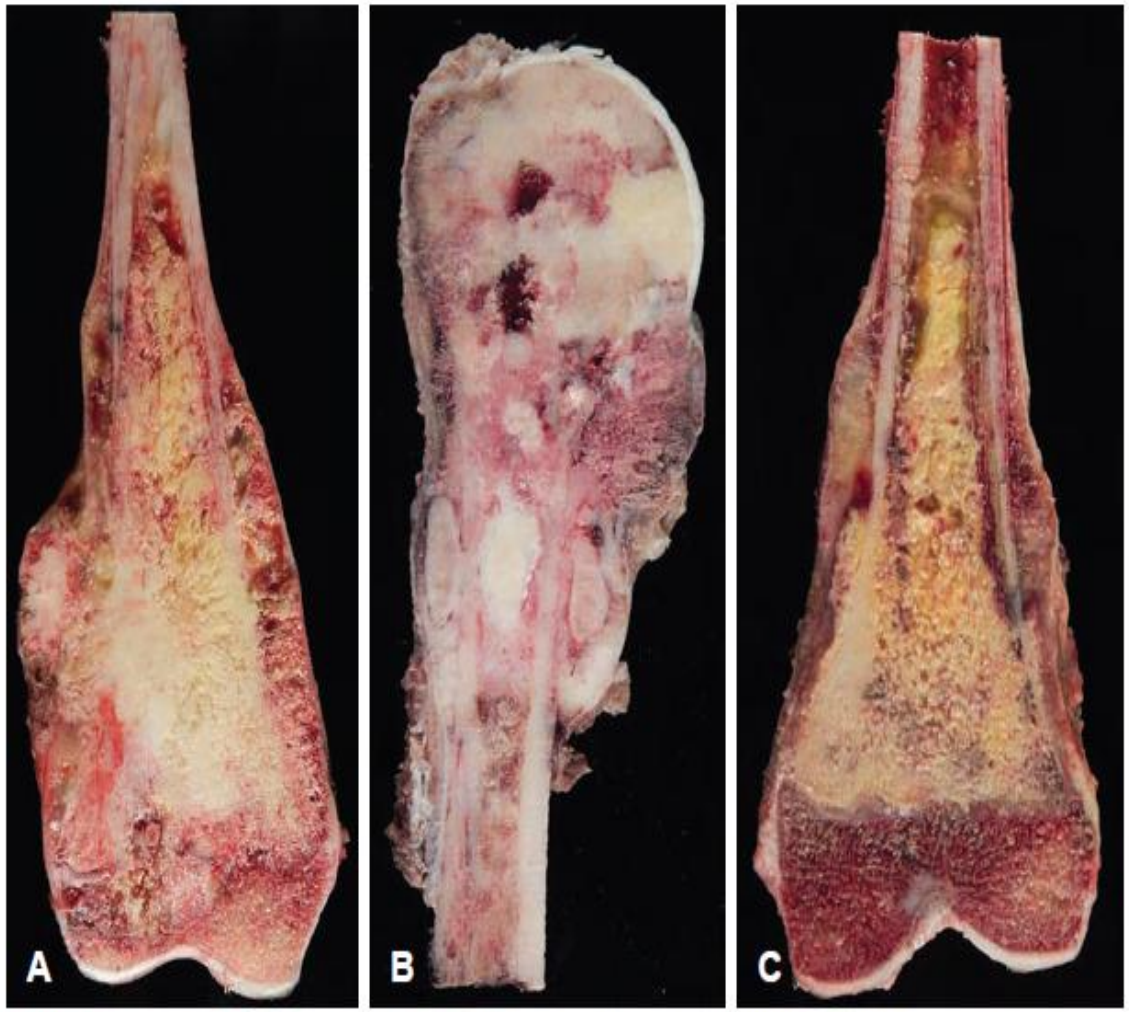
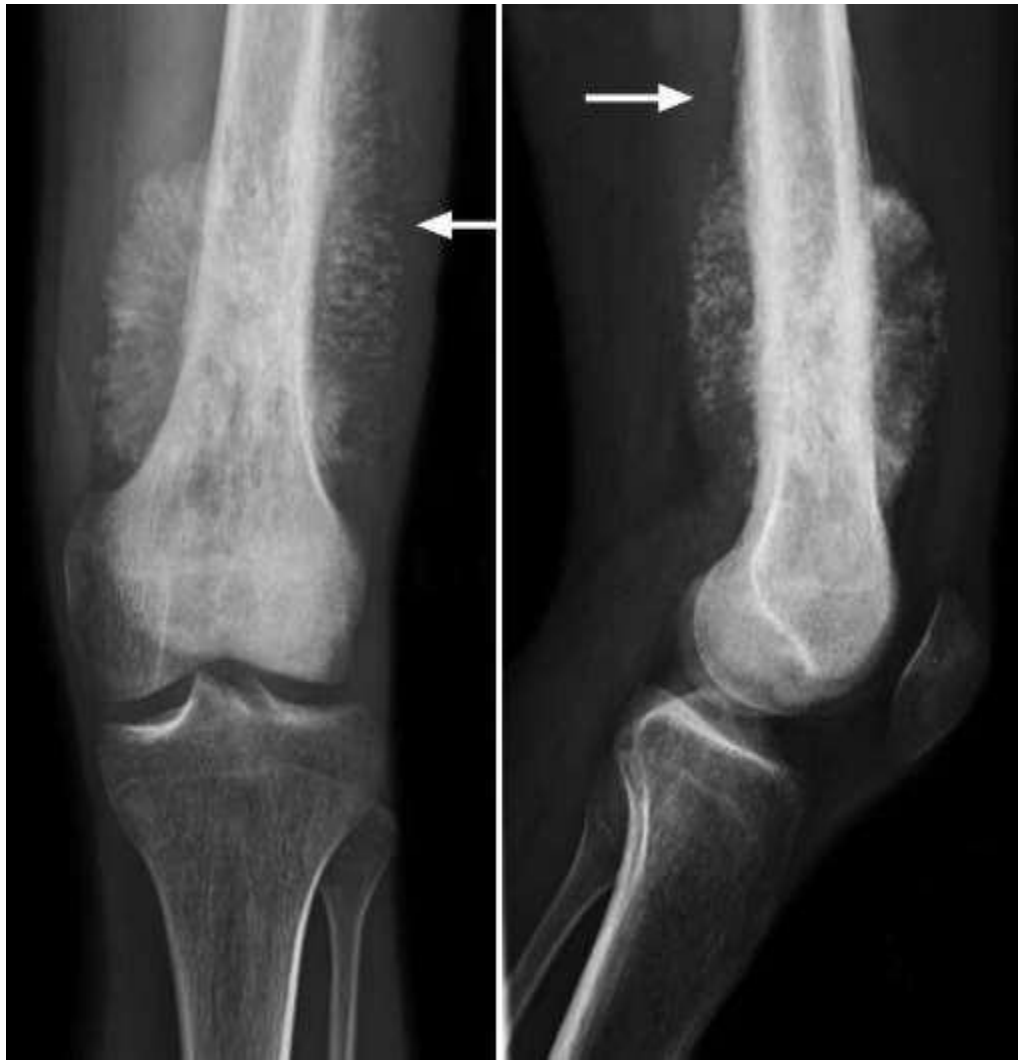
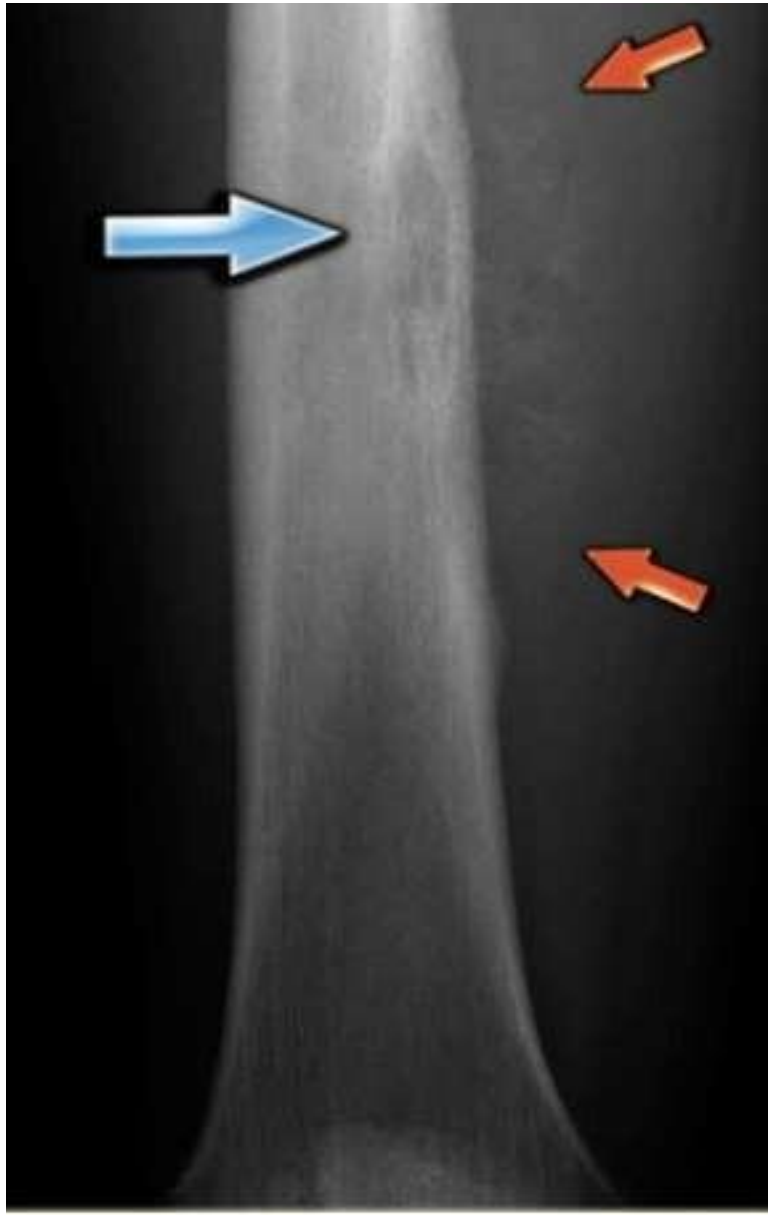



Figure 40.16 Gross appearance of osteosarcoma of the **A,** distal femur, **B,** proximal humerus, and **C,** distal femur. All three lesions extend into soft tissue and cause elevation of the periosteum.



# Ewing's sarcoma:

Arise from endothelial cells in bone marrow.
**Age:** 10-20 yrs.
**Site:** diaphysis of long bone(tibia, fibula or clavicle).
**CF:** pain and warm
**X-ray:** mid-diaphysis area of bone destruction with Codman's Δ, sunray &Onion-peel effect: fusiform layers of new bone around the lesion.
**CT &MRI:** for extra-osseous extension.
**Bone scan:** show multiple lesions(25%).



## Classical Radiological Features

Onion Peel Appearance → Ewing sarcoma

**Secondary malignant bone tumors**( or metastatic bone disease):

the skeleton is a common site for secondary cancer.

**Age:** >50 yrs.

**Site:** spine, pelvis, proximal humerus, proximal femur.

**Source:** breast, prostate, kidney, lung, thyroid, bladder, &GIT. 10% no primary .

**Spread:** via blood stream; occasionally, direct spread(pelvis &rib).

**CF:** asymptomatic, pain, pathological #.

**X-ray:** osteolytic lesion or moth-eaten or pathological #.

Osteoblastic lesion suggest prostate cancer.

**Tc-bone scan:** is very sensitive for detecting 'silent' metastasis.

# Soft-tissue tumors:

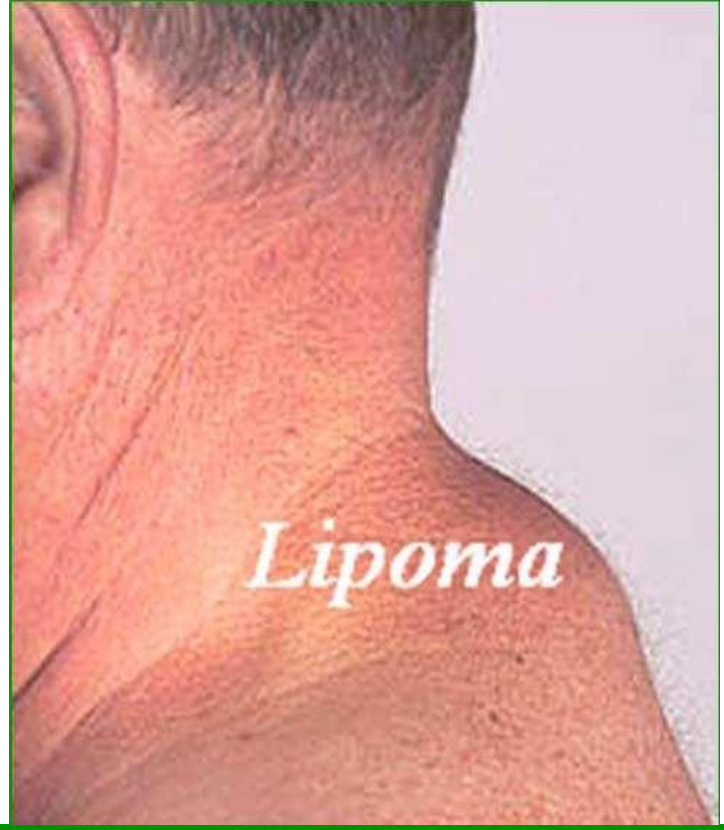
benign ST tumors are common, malig. ones rare.
**Features suggestive of malignancy**: pain in previously Painless lump ,rapid ↑in size &attachment to surrounding structures.
**U/S:** may differentiate malignant from benign tumors.
**Staging:** CT, MRI, CXR &lab tests.

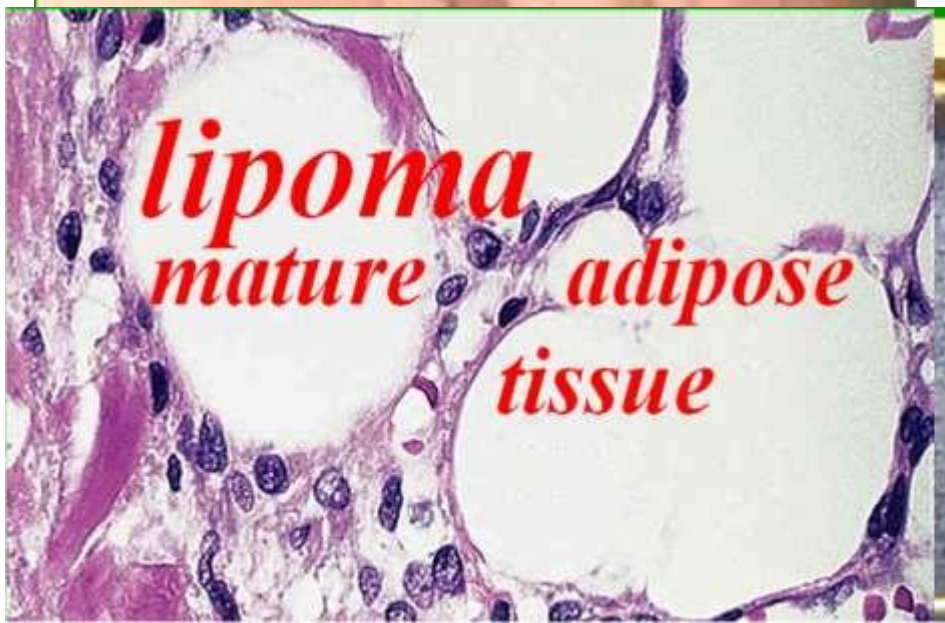
# Fatty tumors:

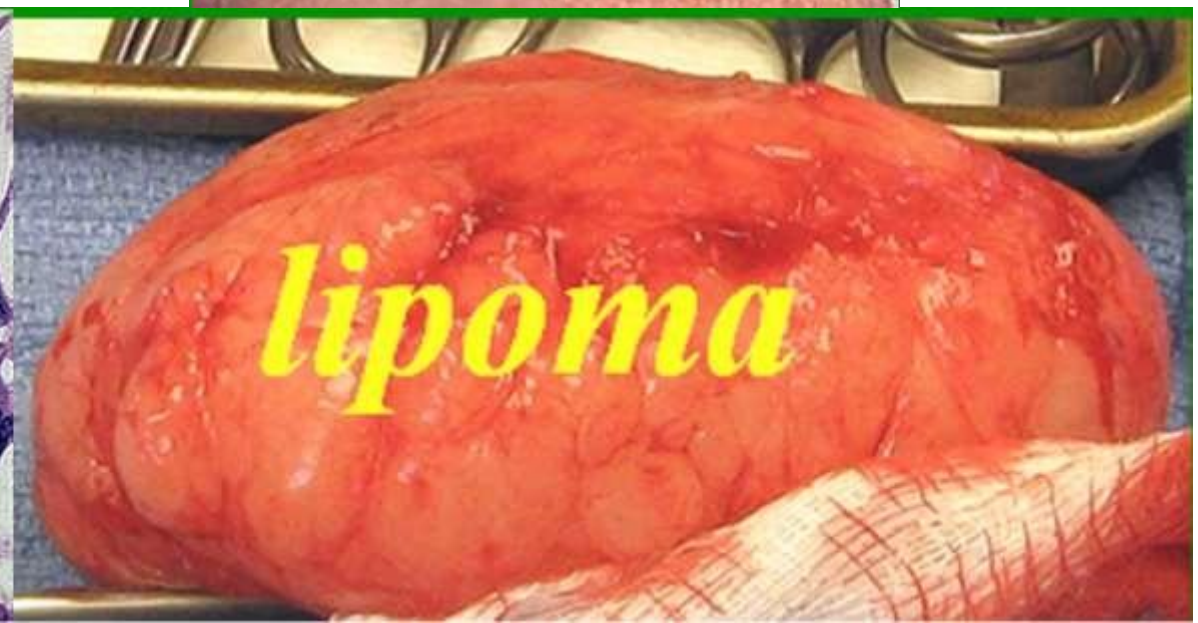
## Lipoma:

lobules of fat in(often)subcutanous layer surrounded by capsule. It is the commonest of all tumors.
**Site:** anywhere &may be multiple.
**CF:** patient over 50 with painless lump.


lipoma


Lipoma


lipoma
mature adipose
tissue


lipoma