Bone tumors and tumor-like lesions

UD MHSc
Department of Orthopaedics

Bone tumors

- Rare tumors. (less 1% of malignant tumors of the human body)
- Their treatment shuold be done in specified centers.(with adequate knowledge/experience and multiple facilities –bone bank,chemotherapy, irradiation, osteosynthesis etc.)
- Bone and joint involvment requires orthopaedic treatment.

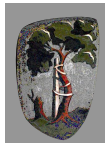
Etiology

I. Primary bone tumors : - etiology unknown

II. Secondary bone tumors: A previously exisiting bone tumor undergoes malignant transformation

- enchondromatosis → chondrosarcoma
- familiaris retinoblastoma → osteosarcoma
- osteochondroma → chondrosarcoma
- intermedier tumor → maligant transf.

(giant cell tumor, Paget –disease, etc).



Localisation

Different tumors have (more or less) predominant localisation.

BUT

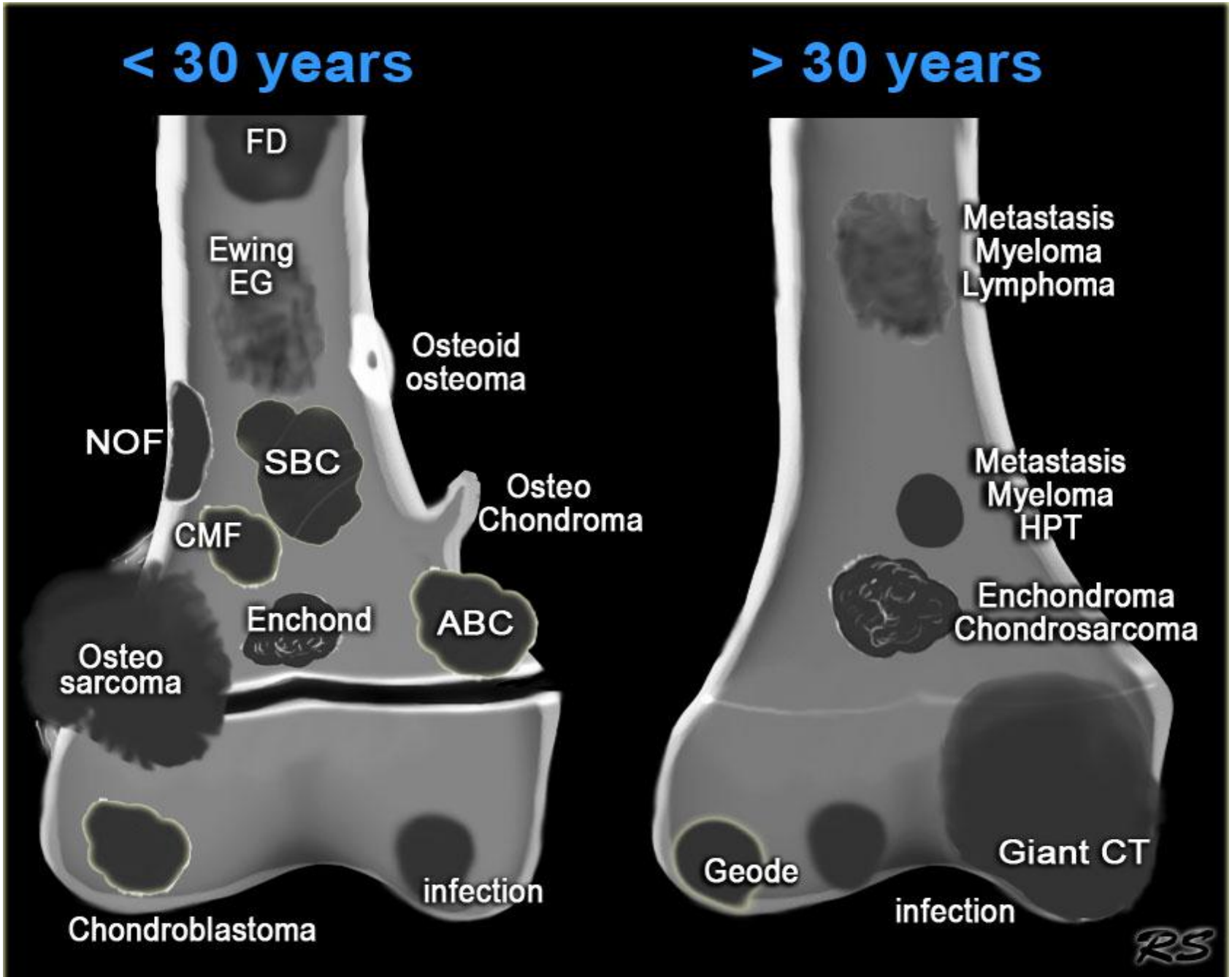
Every tumor can occur anywhere!! (no tumors can be ruled out based on localisation!!)

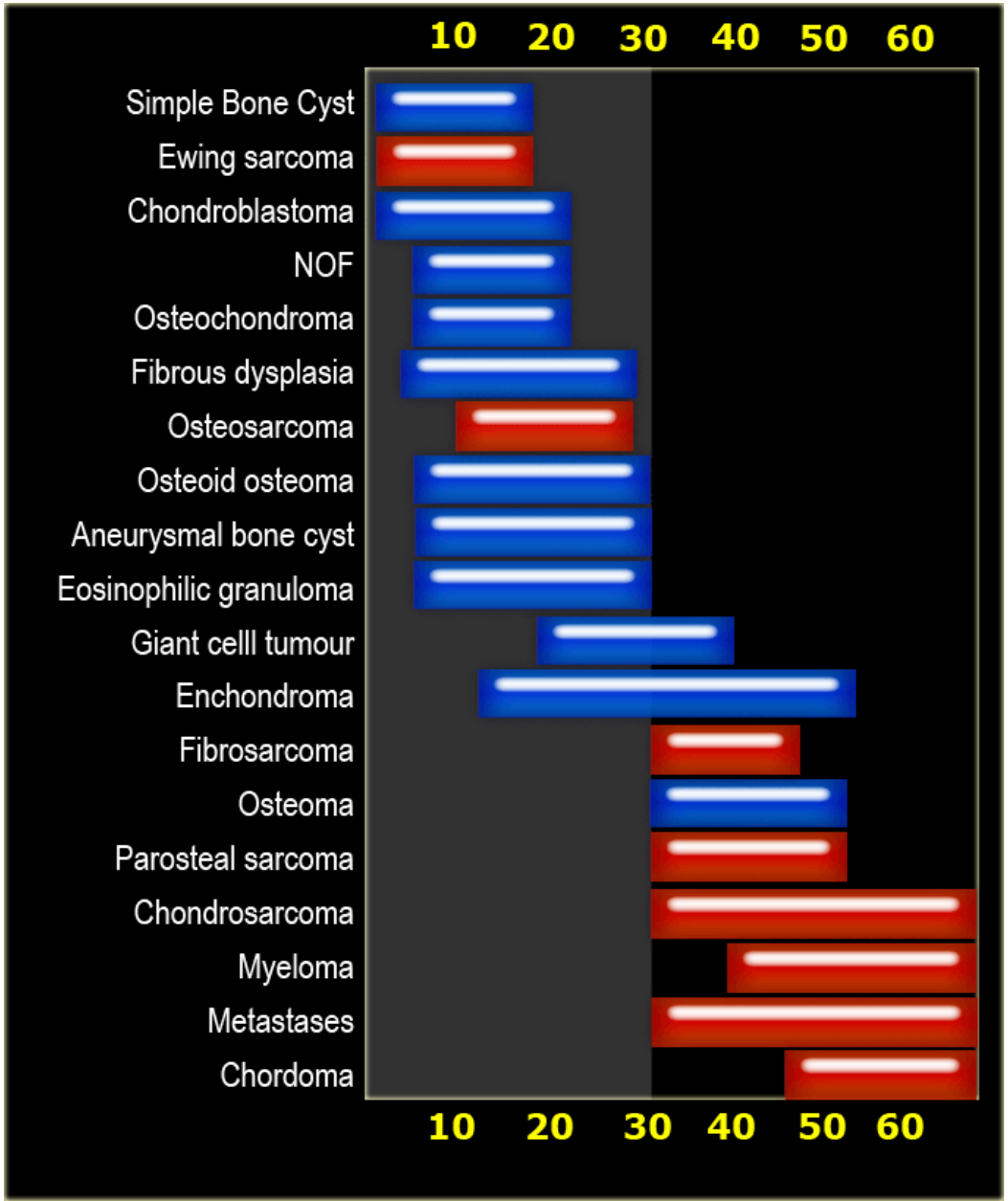
BUT

Specific (characteristic) localisation:

• Juvenile bone cyst: humerus prox. metaphysis
• Chondroblastoma, osteoclastoma: epiphysis
• Adamantimoma, ossificalo csontfibroma: tibia

Localisation




10
20
30
40
50
60
Simple Bone Cyst
Ewing sarcoma
Chondroblastoma
NOF
Osteochondroma
Fibrous dysplasia
Osteosarcoma
Osteoid osteoma
Aneurysmal bone cyst
Eosinophilic granuloma
Giant celll tumour
Enchondroma
Fibrosarcoma
Osteoma
Parosteal sarcoma
Chondrosarcoma
Myeloma
Metastases
Chordoma
10
20
30
40
50
60

Clinical course

- Deeply located pain at night!!

(unresponsive to NSAIDs)

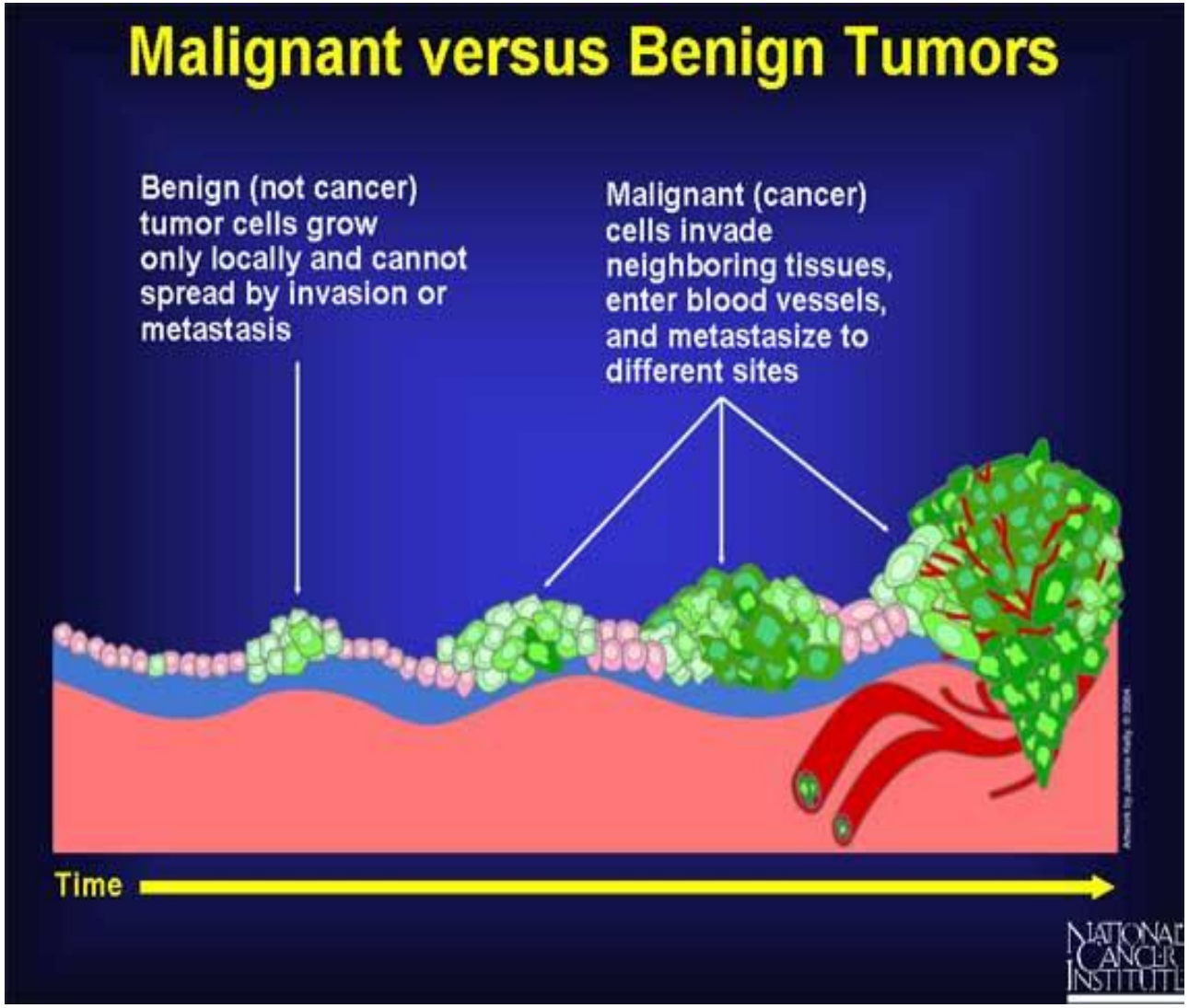
- Swelling
- Pathologic fracture

Growing characteristics

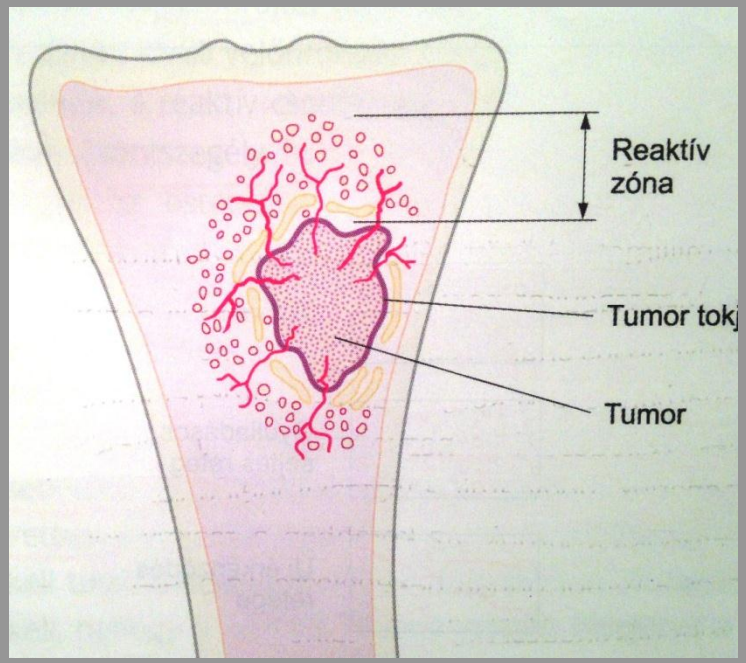
- Pseudocapsule, capsule formation

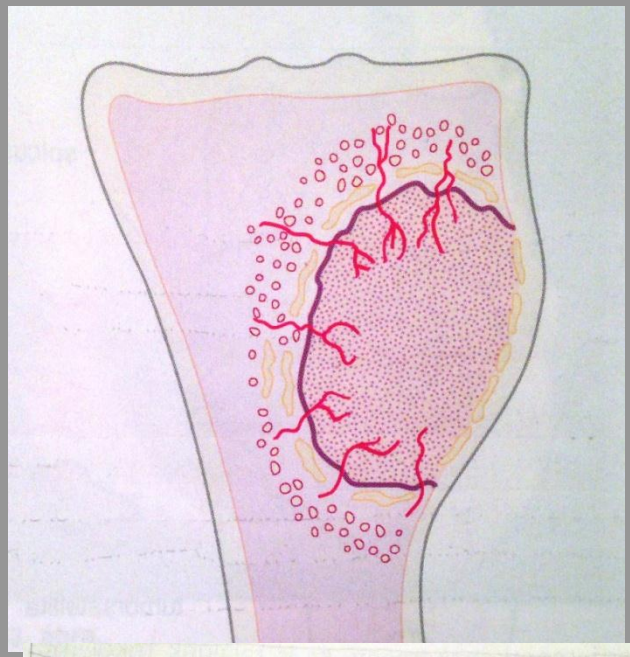
(of connective tissue origin)

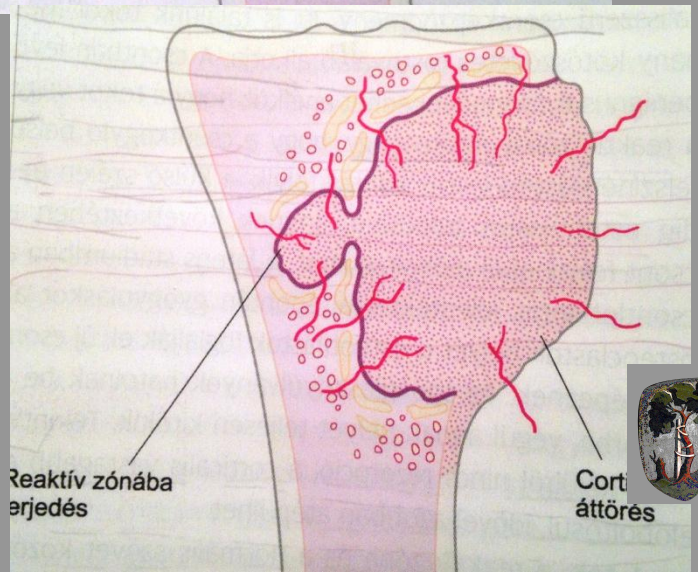
- Reactive zone (between the capsule and the normal tissue)
  - Mesenchymal proliferation
  - Neovascularisation
  - Gyulladásos sejtek rétege


Malignant versus Benign Tumors
Benign (not cancer) tumor cells grow only locally and cannot spread by invasion or metastasis
Malignant (cancer) cells invade neighboring tissues, enter blood vessels, and metastasize to different sites
Time
NATIONAL CANCER INSTITUTE

Growth of benign tumors



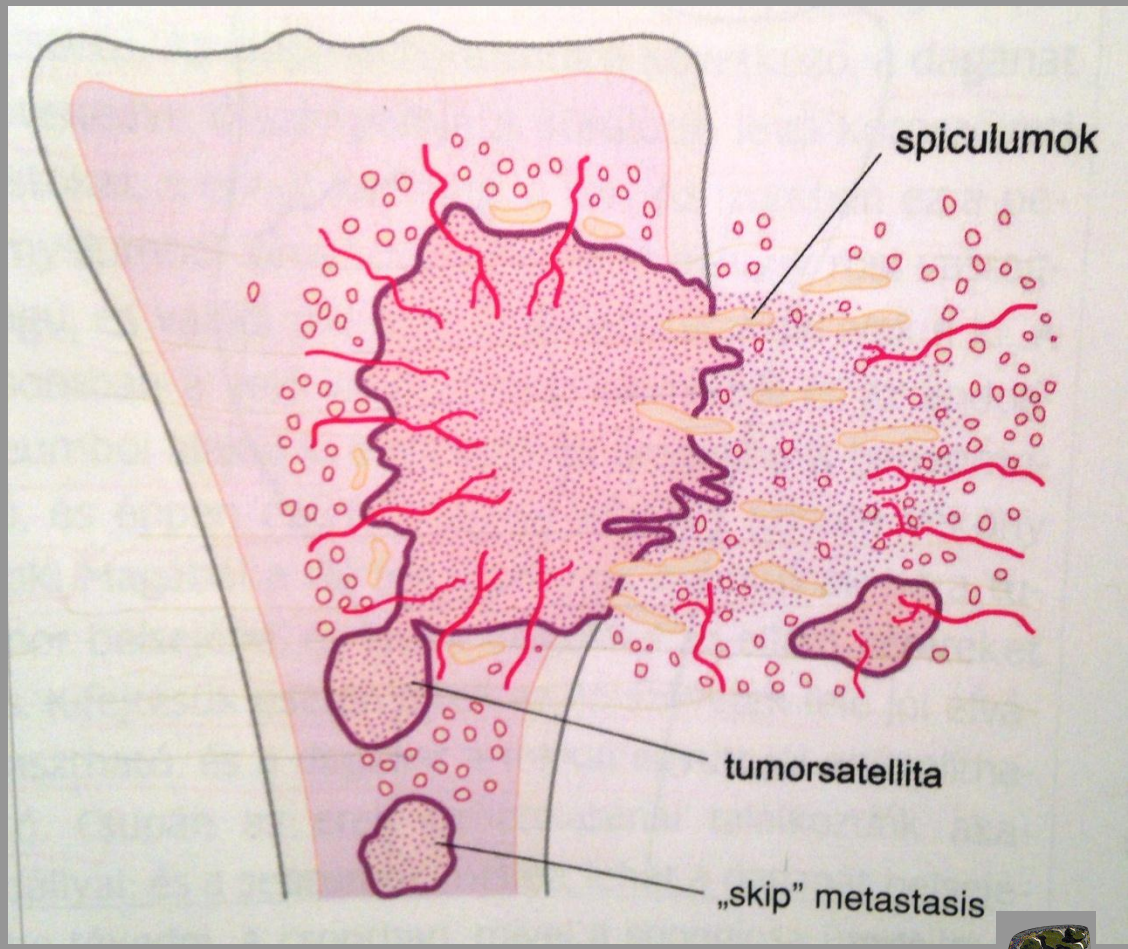




Well-defined border toward surrounding tissues (on x-ray: sclerotic rim).

Growth of malignant tumors

ill-defined border toward surrounding tissues and extension (invasion) into neighbourhood.



Diagnostics

- Physical examination
- Plain x-ray
- CT, MR
- US
- Isotoe uptake
- Angiography
- Biopsy

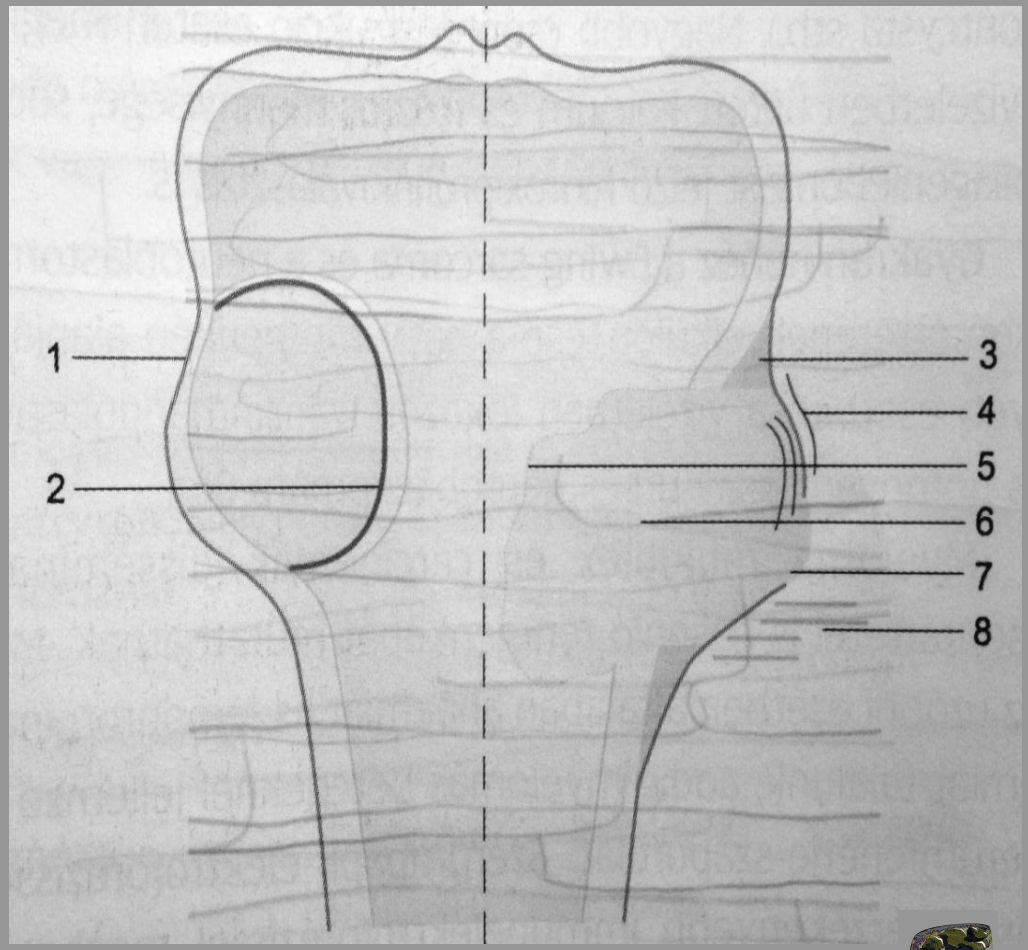
Radiologic characteristics of bone tumors

Benign:

1. Narrowed, bulging cortex
2. Well-defined border toward neighboring tissues surrounded by sclerotic rim.

Malignant:

3. Codman's triangle
4. Lamellar periosteal reaction
5. Ill-defined border toward surrounding tissues
6. Destructed cortex
7. Soft tissue expansion
8. Spiculum formation

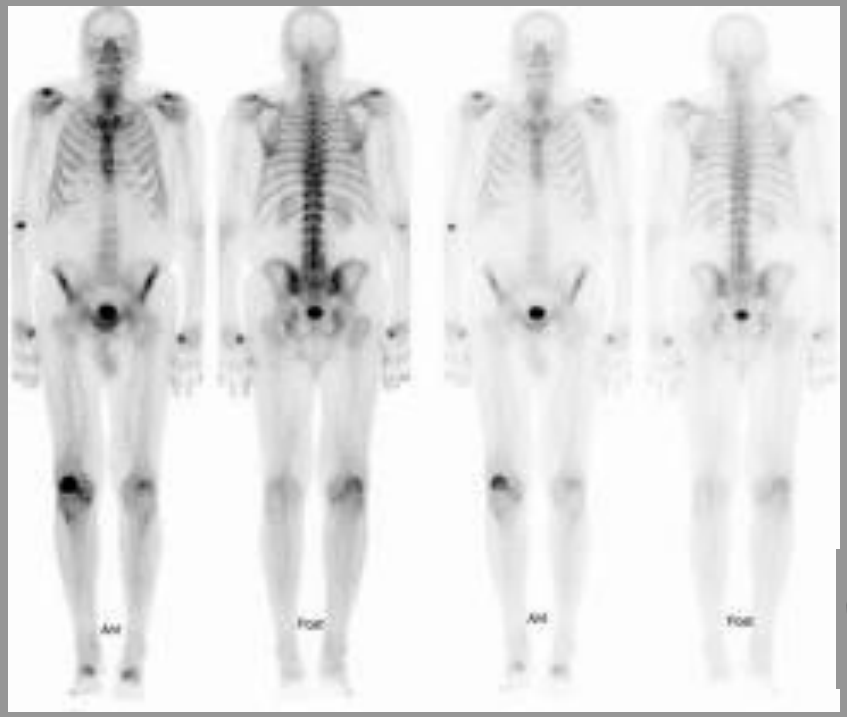


Isotope uptake

- ^{99m}Tc isotope
- Sensitive but not specific

Importance

- determination of tumor
- solitary or multiple tumor?
- effectiveness of chemotherapy
- local recurrence



Angiography

- **Indication**:
  - Diagnostics, determination of vascular invesion and local recurrencies
  - Selective embolisation
  - Therapeutic tool: intraarterial chemotherapy, embolisation

Biopsy

- INDICATION

  Preoperative biposy:

  establishing histologic diagnosis and prognostic factors

  Intraoperative biopsy:

  Dignity of tumor (benign or malignant)?

  Is there tumor at the margin of resection?

  Postoperative biopsy:

  Local recurrence?

  Effectiveness of chemotherapy

Classification

The histologic classification of bone tumors is based on cytologic findings (in particular cell type such as osteocyte/ osteoblast, chondrocyte/chondroblast, osteoclast, etc.), architecture, and type of matrix produced by the tumor.

	Benign	Intermedier	Malignant
Osteogenic	Osteoid osteoma Osteoblastoma		Osteosarcoma
Chondrogenic	Chondroblastoma Chondromixoid Fibroma	Osteochondroma Enchondroma	Chondrosarcoma
Connective tissue origin		Giant cell tumor (osteoclastoma)	
Bone marrow origin			Myeloma multiplex Ewing-sarcoma Malignant lymphoma

WHO classification of bone tumors
Osteogenic tumors

Benign

1. Osteoma

2. Osteoid osteoma

3. Benignus osteoblastoma

Malignant

Different subtypes of osteosarcomas

II. Chondrogenic

Benign

1. Chondroma

2. Osteochondroma

3. Chondroblastoma

4. Chondromyxoid fibroma

Malignant

Different subtypes of chondrosarcomas

III. Osteoclastoma – giant cell tumor

Intermedier — 80 % benign, 20 % malignant, or malignant transformation

IV.Tumors of bone marrow origin

1. Ewing's sarcoma
2. Malignant lymphoma (reticulum sejt sarcoma)
3. Myeloma multiplex

V. Tumors of vascular origin

Benign

1. Haemangioma
2. Lymphangioma
3. Glomus tumor (glomangioma)

Semimalignant

1. Haemangioendothelioma
2. Haemangiopericytoma

Malignant

1. Malignant haemangioendothelioma
2. Malignuanthaemangiopericytoma
3. Angiosarcoma

VI. Other connective tissue origin tumors

Benignus

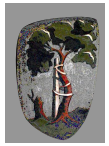
1. Desmoplastic fibroma
2. Lipoma

Malignus

1. Fibrosarcoma
2. Liposarcoma
3. Malignant mesenchymoma
4. Malignant fibrous histiocytoma
5. Undifferentiated cell sarcoma

VII. Other tumors

1. Chordoma
2. Adamantinoma
3. Neurilemmoma (Schwannoma)
4. Neurofibroma



Tumor-like lesions:

1. Juvenile bone cyst

2. Aneurysmal bone cysta

3. Juxtacortical bone cyst (intraosseal ganglion)
4. Metaphyseal fibrous defect (non ossifying fibroma)

5. Eosinophilic granuloma

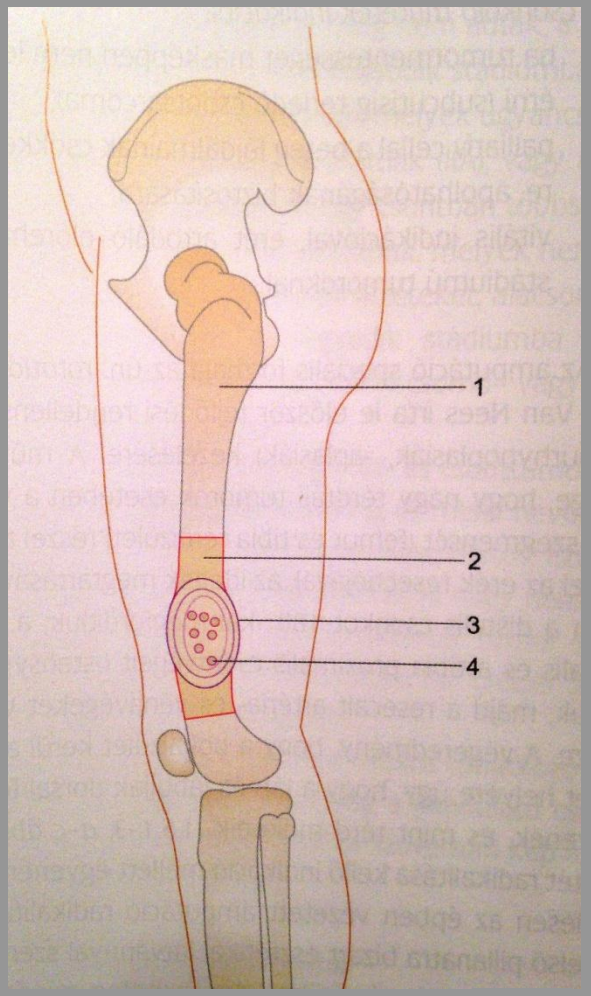
6. Fibrous dysplasia

7. Myositis ossificans

8. Hyperparathyreoidism

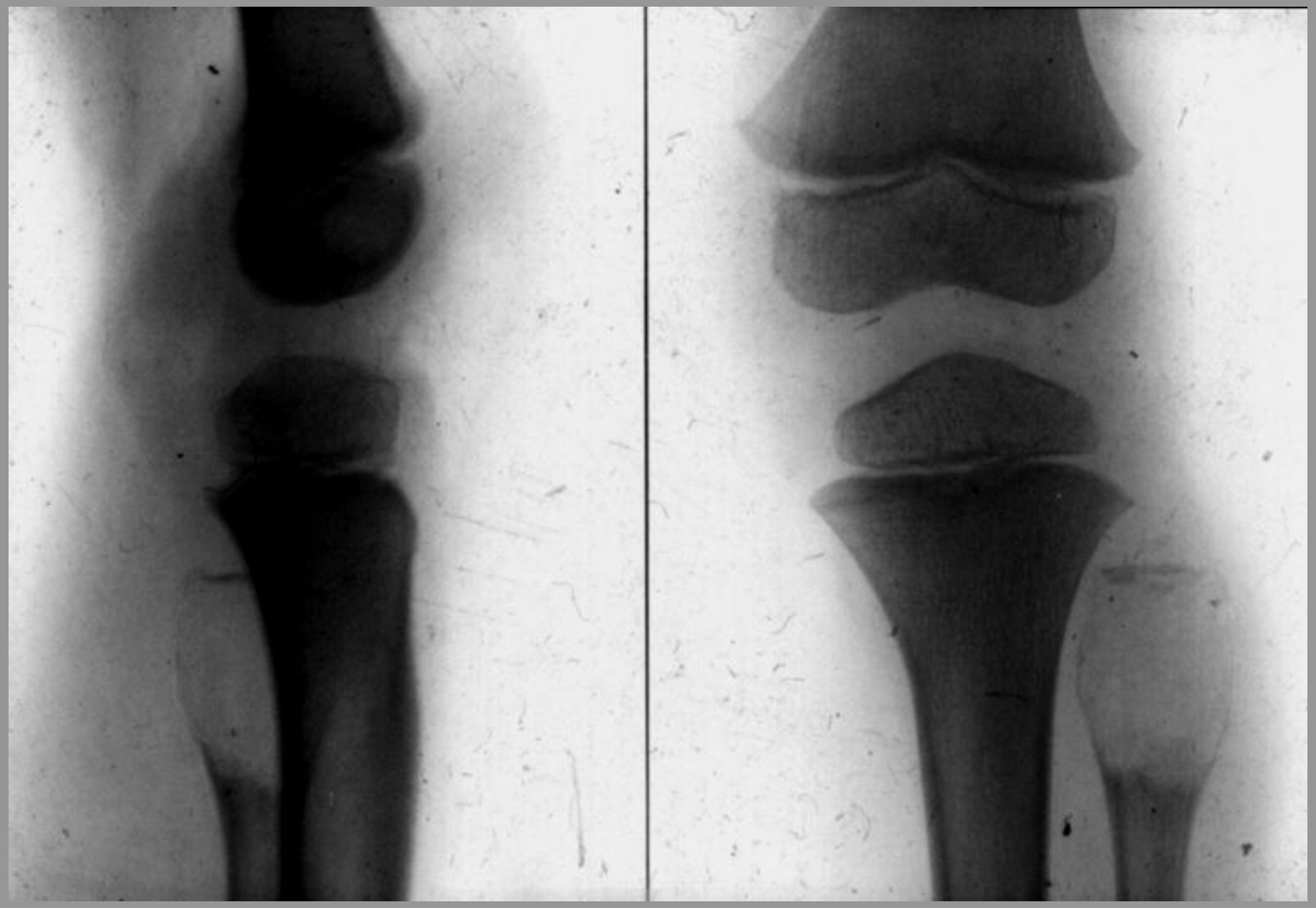
Surgical treatment of bone tumors

1. Amputation, exartculation
2. Wide resection
3. Marginal resection
4. Excochleation

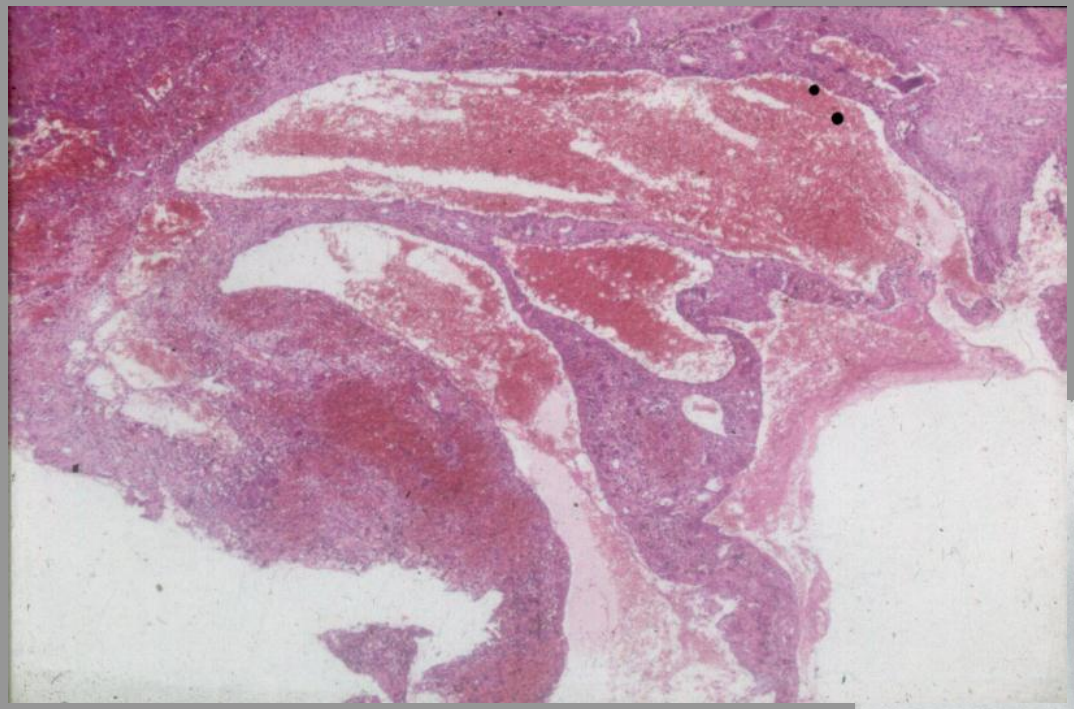


Solitary bone cyst

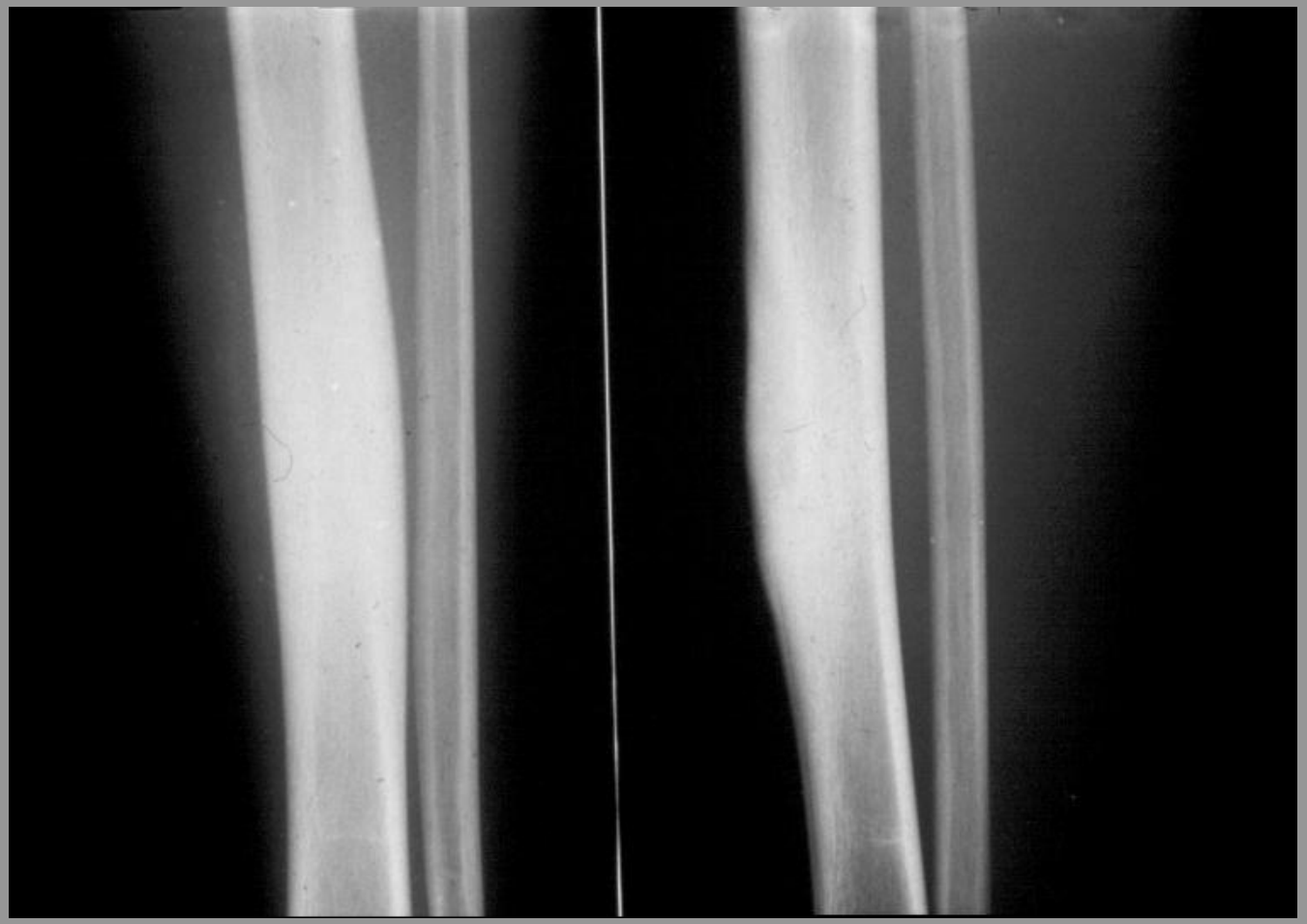
Aneurysmal bone cyst



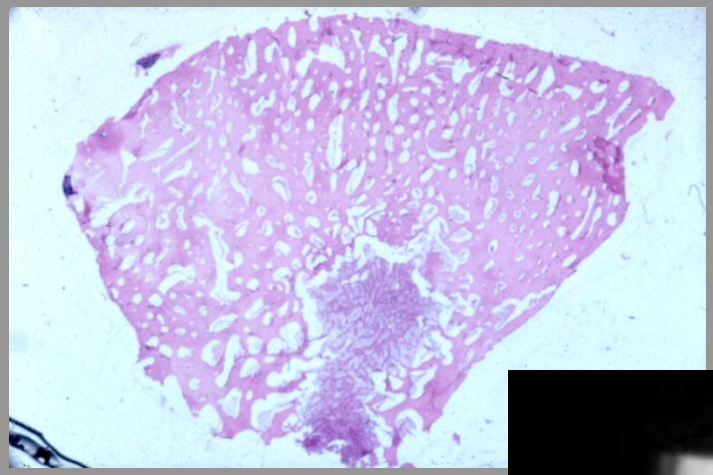
Aneurysmal bone cyst

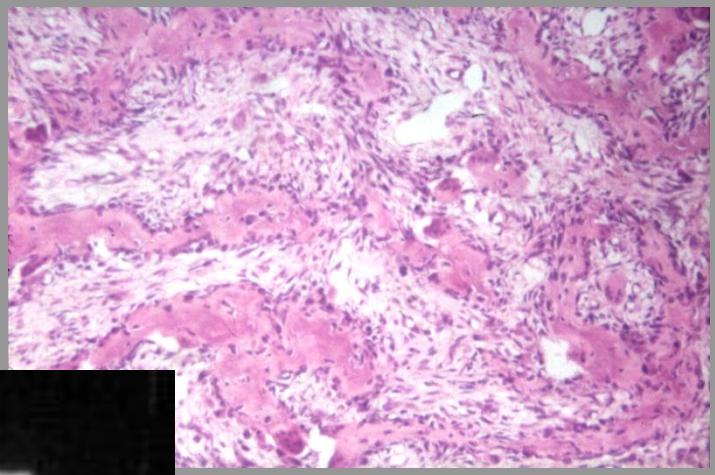


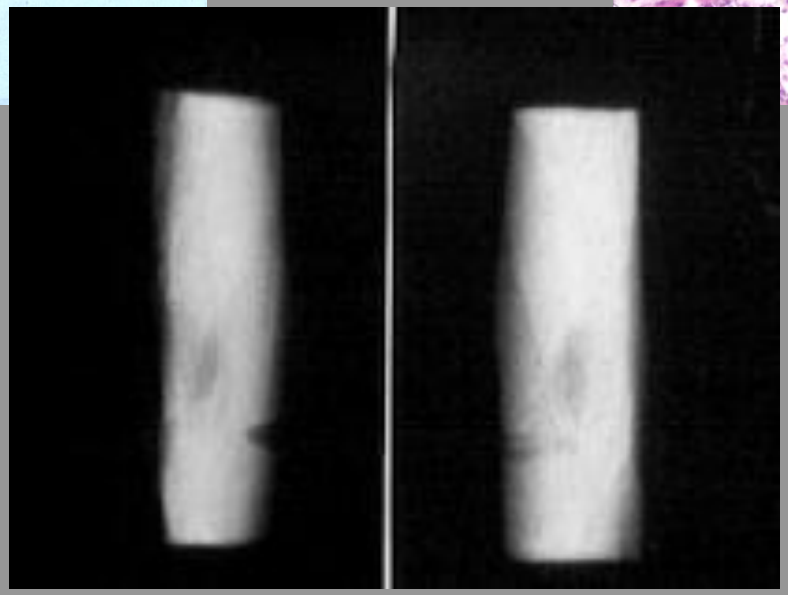
Osteoid osteoma



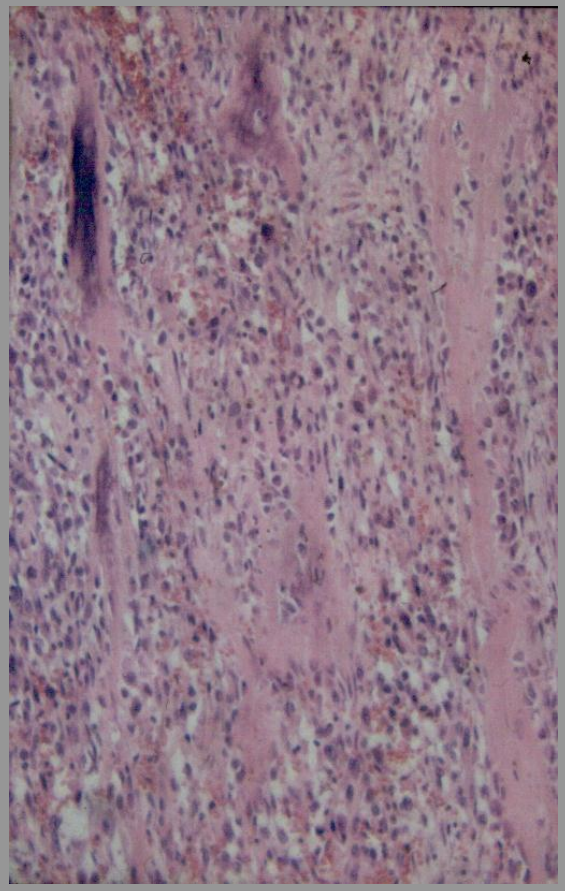
Osteoid osteoma

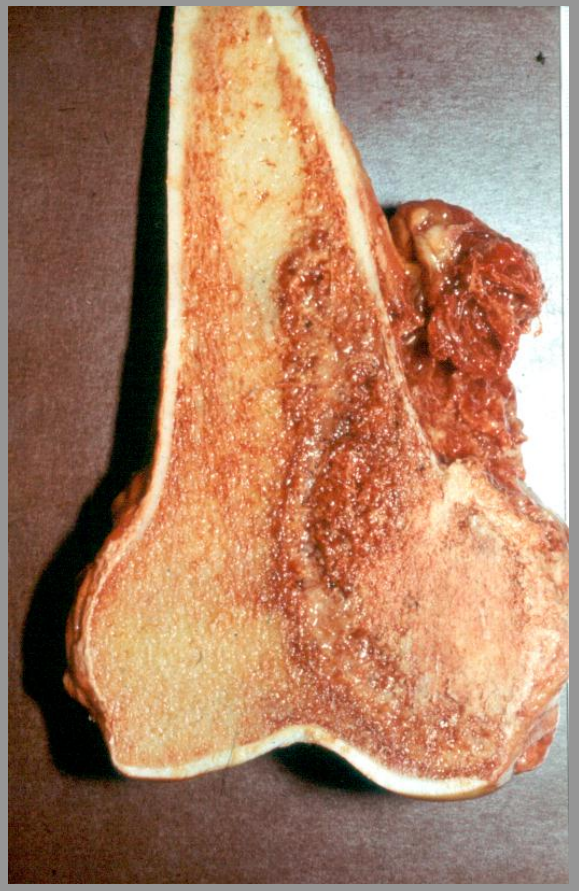






Osteosarcoma

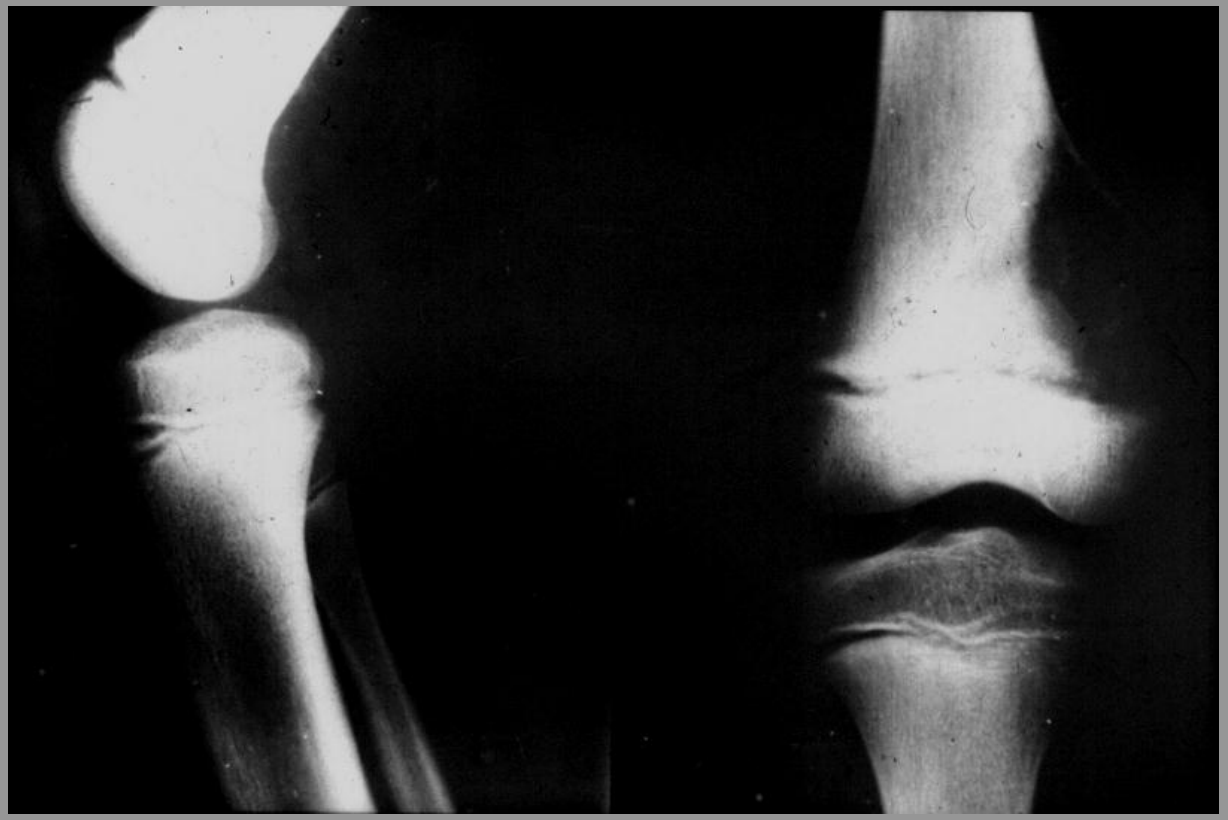




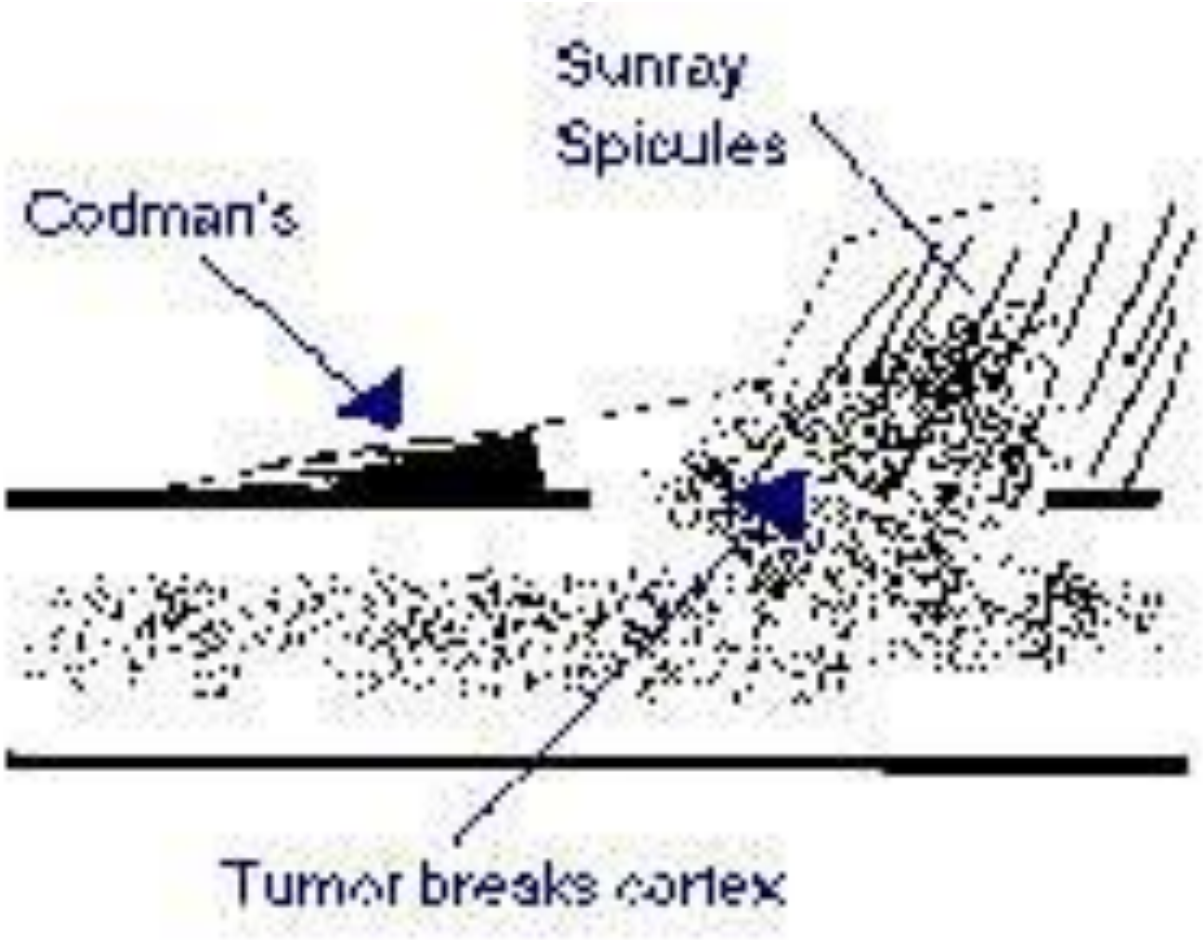
Osteosarcoma

Osteosarcoma

Osteosarcoma

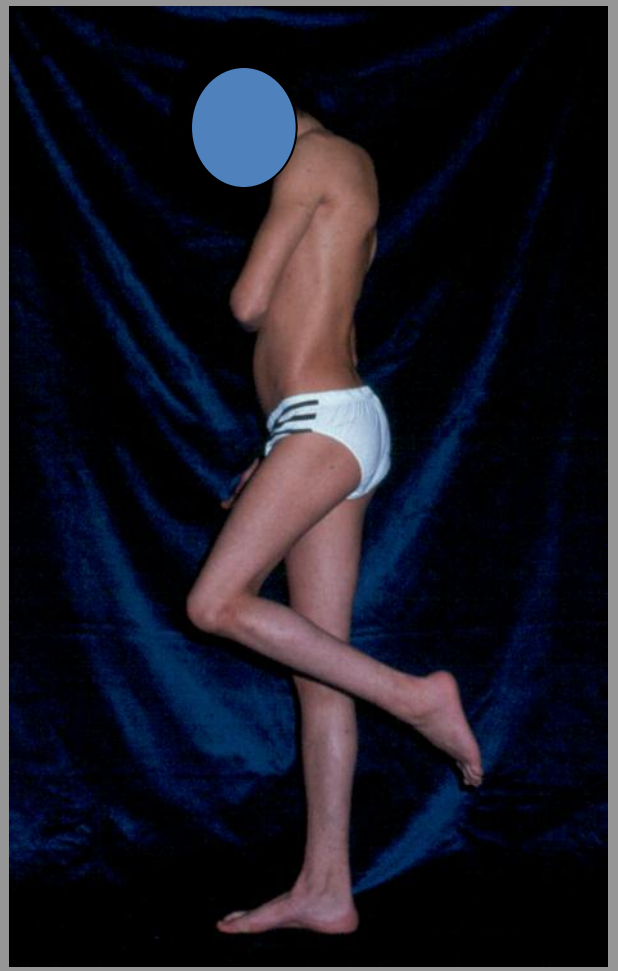


Osteosarcoma (radiological signs)

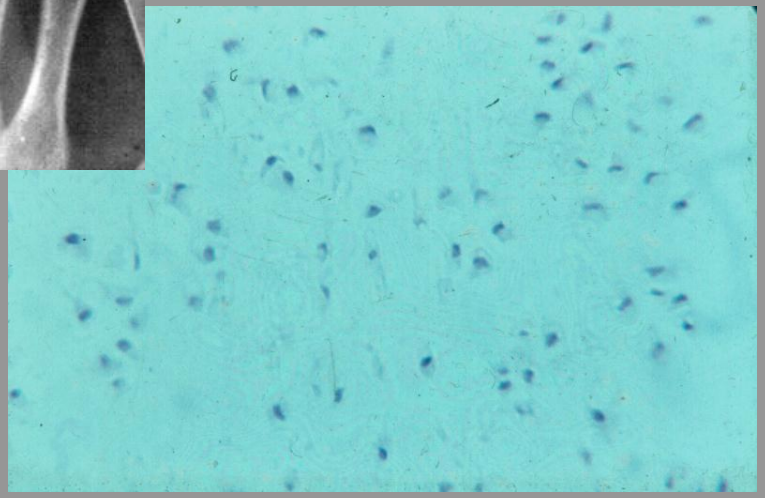


Osteosarcoma

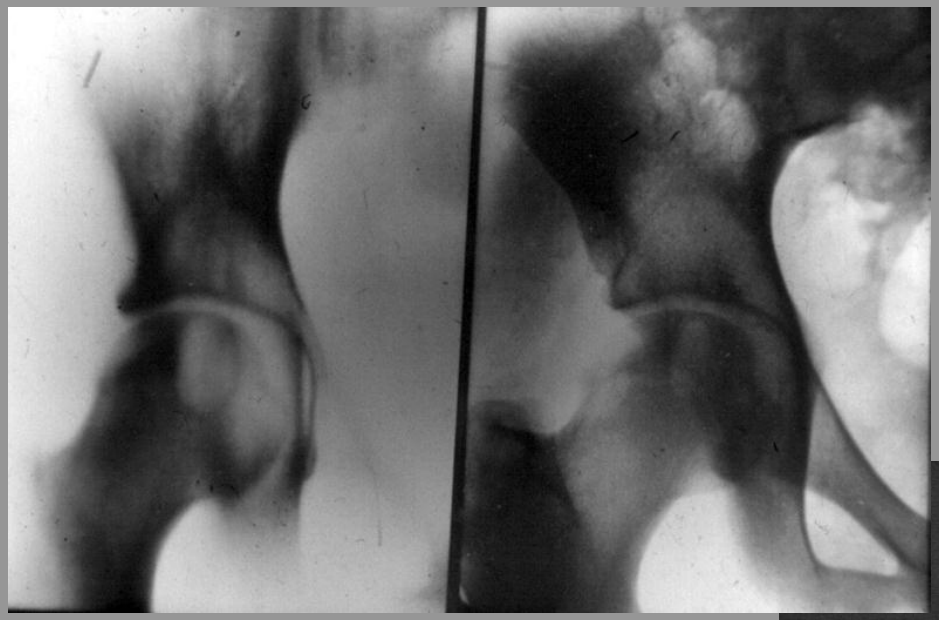
Osteosarcoma

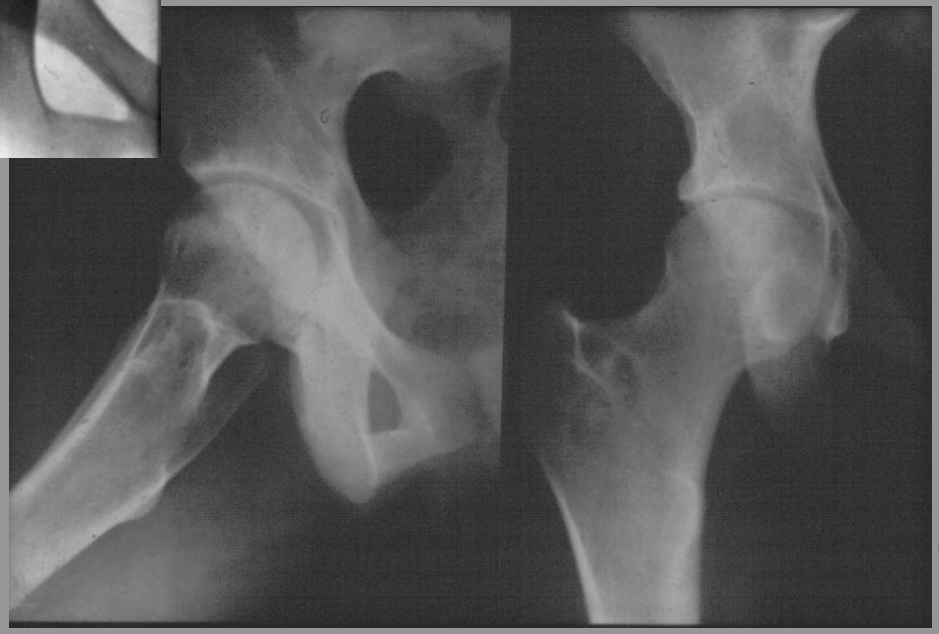


Enchondroma

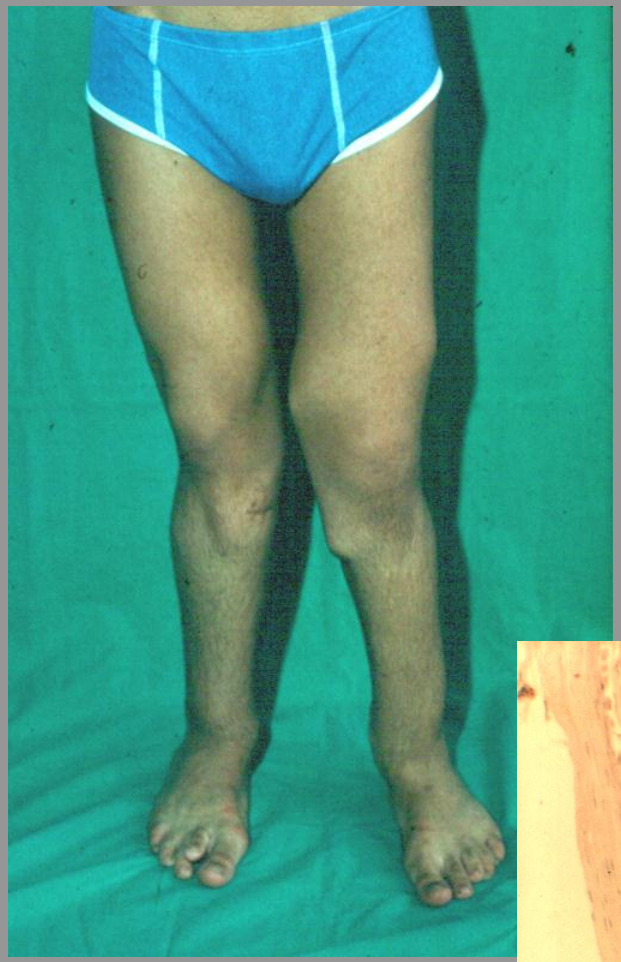


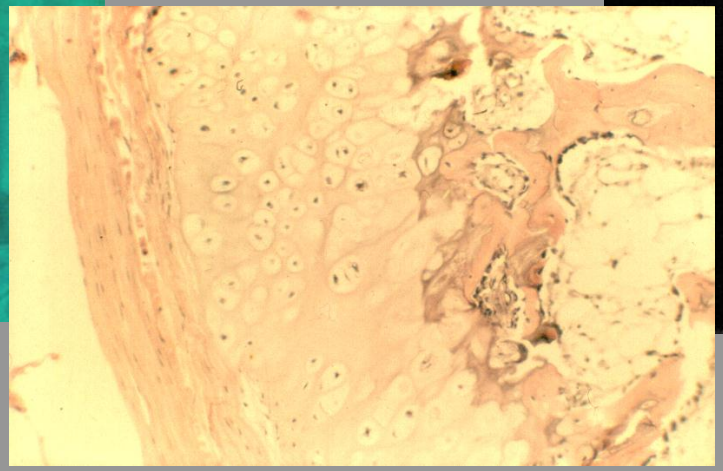
Chondroblastoma



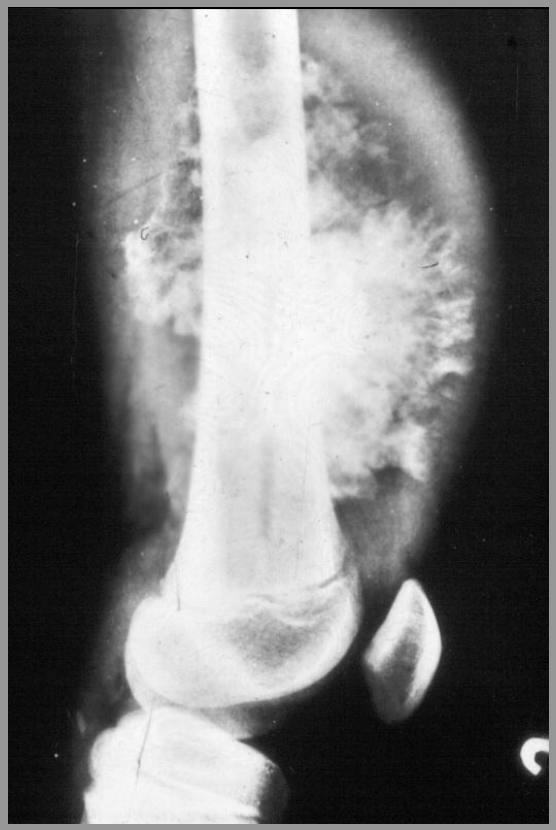


Multiple osteochondroma



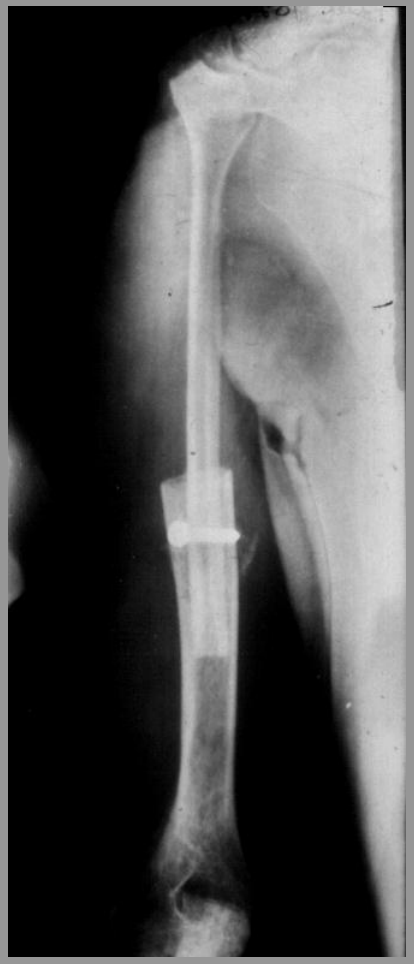


Malignant transformation of osteochondroma



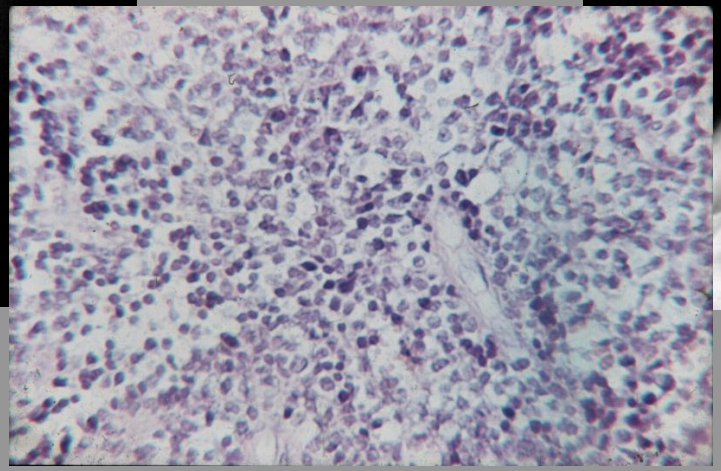
Chondrosarcoma

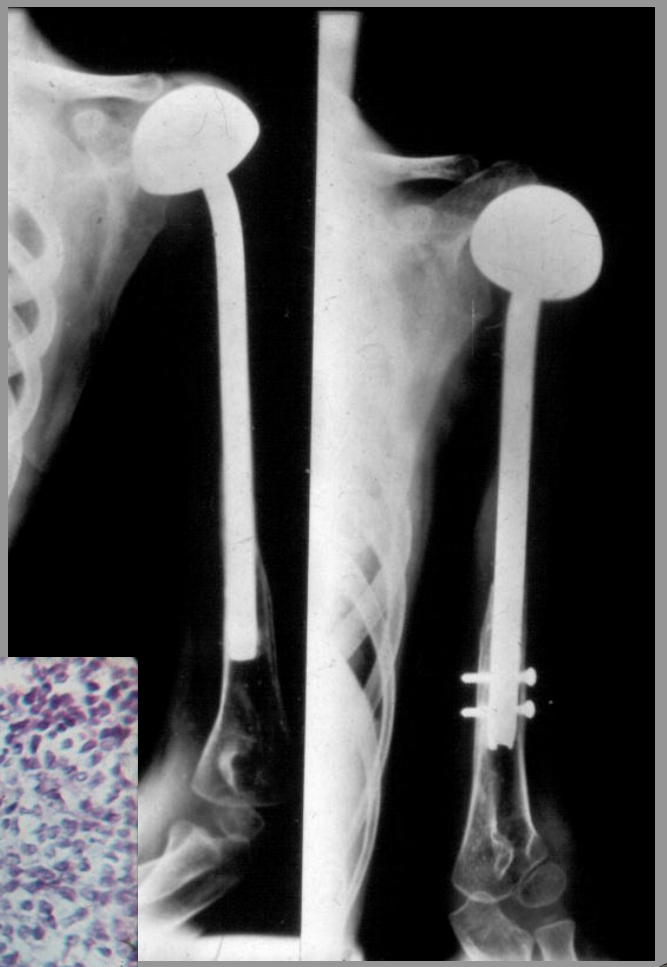
Chondrosarcoma



Giant cell tumor **(osteoclastoma)**

Ewing's sarcoma





Ewing's sarcoma (radiological signs)

Metastasis

Thank you for your attention !