

# Musculoskeletal Block

## Pathology of Musculoskeletal System

***Practical***

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# ***Muscular Dystrophies***

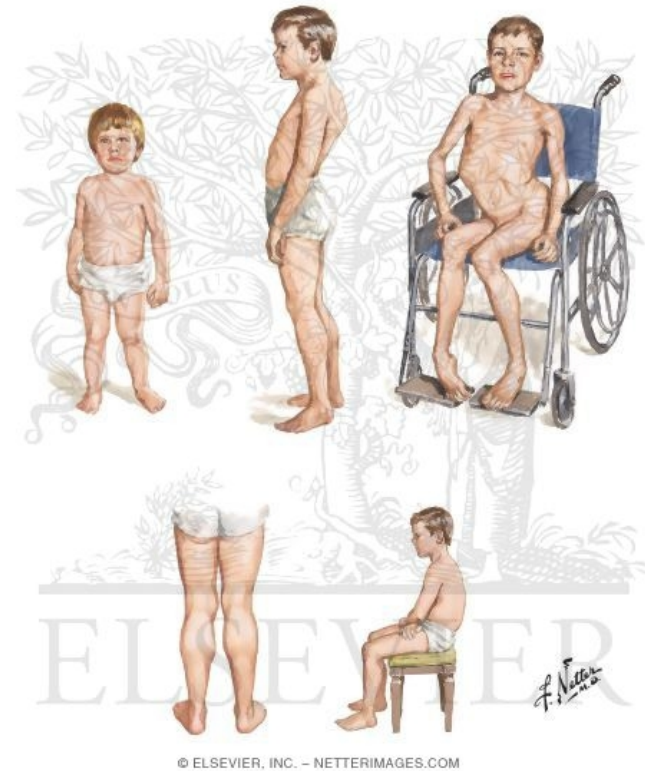


# *Duchenne Muscular Dystrophy (DMD)*



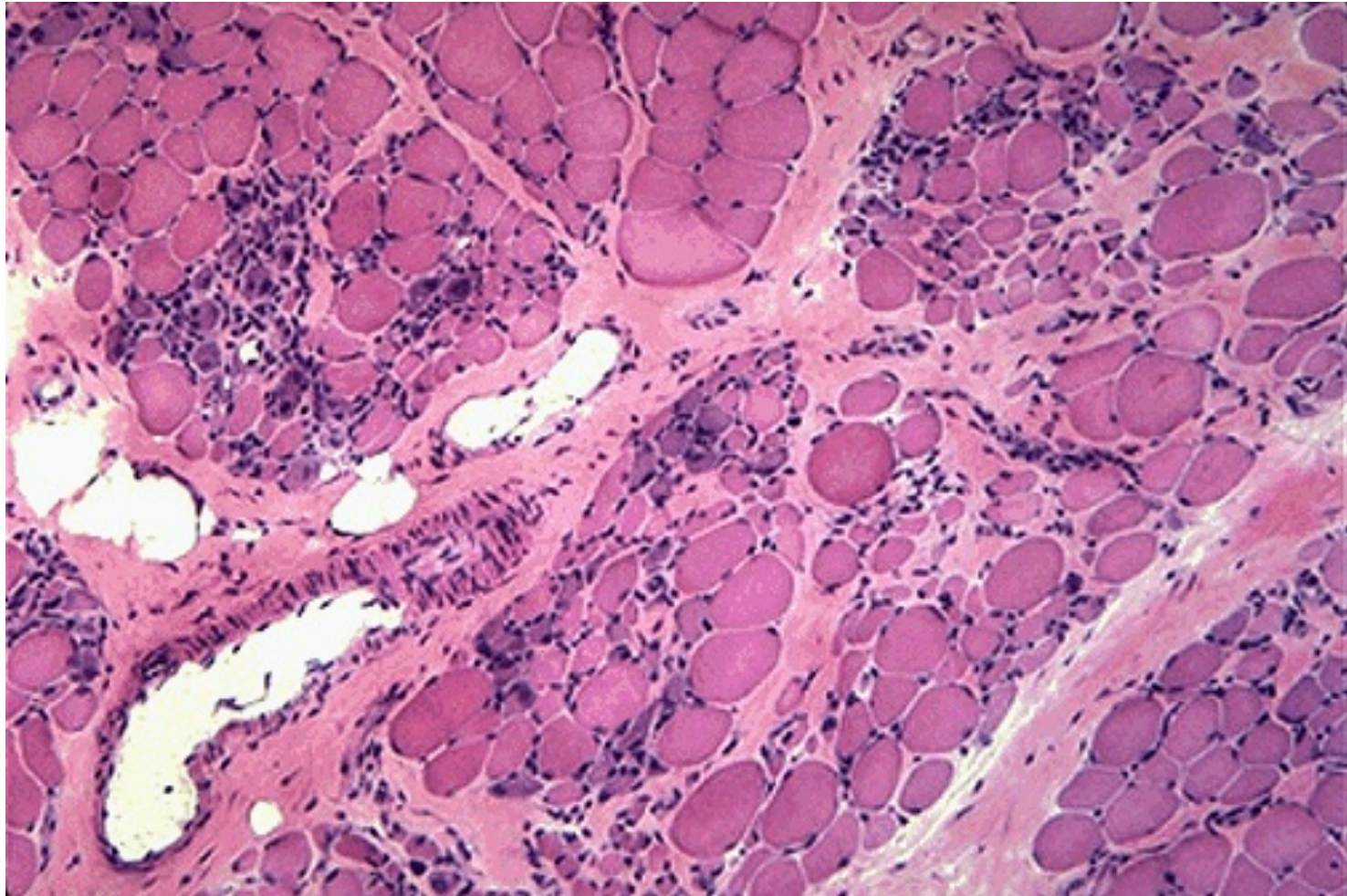
# Case # 1

- A 3 - year- old boy presented to his pediatrician with complaint of his parents from difficulty in walking , poor balance , and frequent falls .
- Laboratory investigation shows elevated creatine kinase .
- Muscle biopsy show absence of dystrophin by western blot analysis



**What is your provisional diagnosis?**

# Duchenne Muscular Dystrophy - LPF

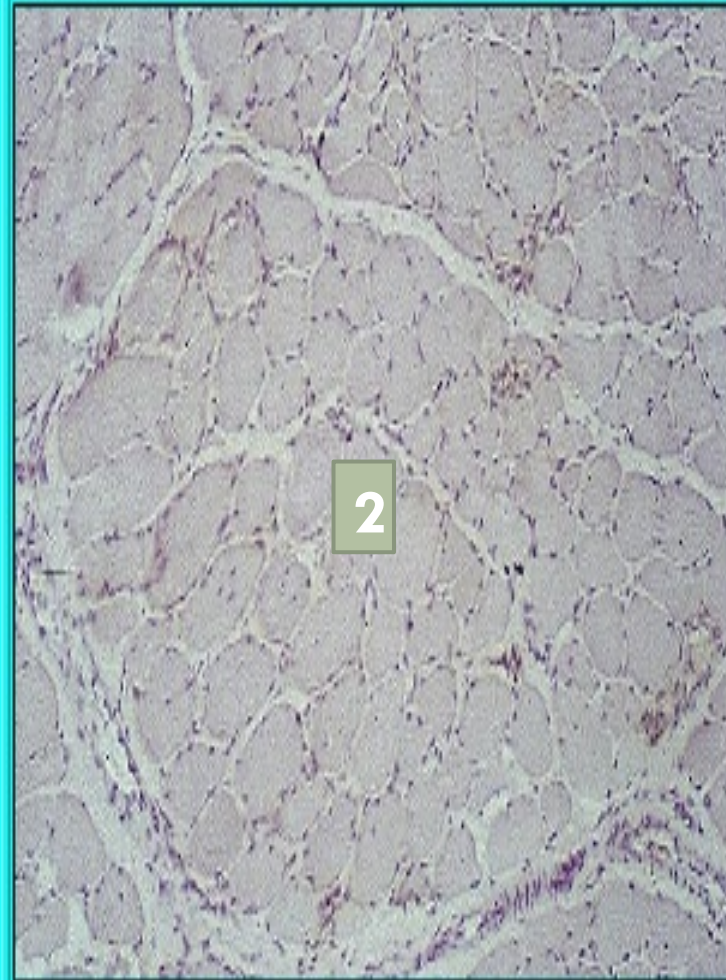
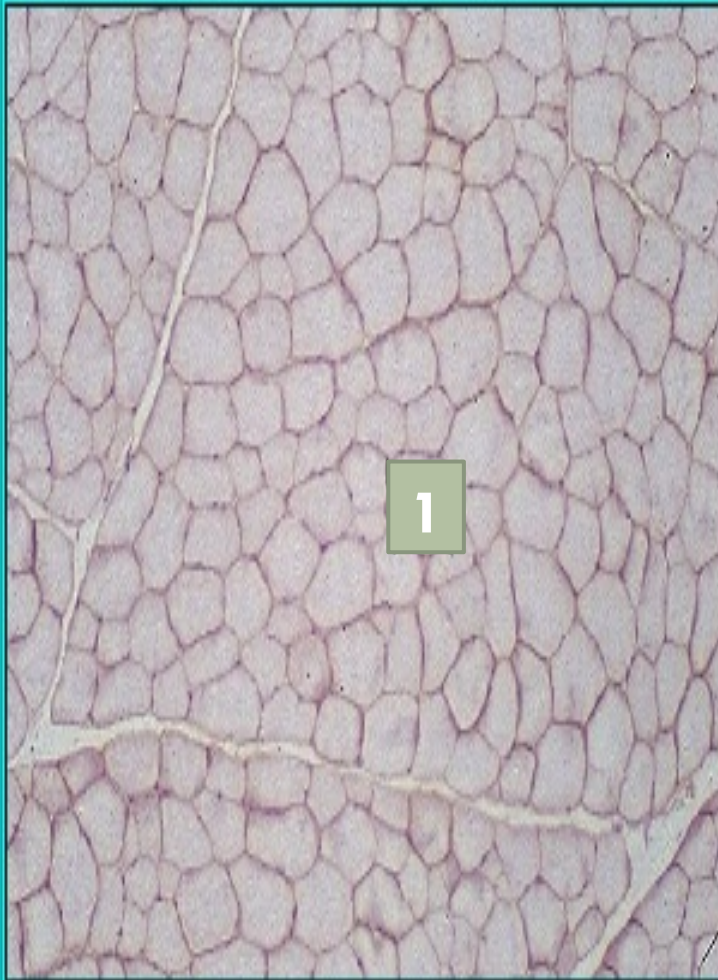


**Duchenne muscular dystrophy** showing **variations in muscle fiber size** , **increased endomysial connective tissue** , and **regenerating fibers (blue tint)**



## NORMAL Ms

## DMD



**In DMD** : Dystrophin, an intracellular protein, forms an interface between the cytoskeletal proteins and a group of transmembrane proteins

# ***Dermatomyositis***

## **Case # 2**

**A 52-year-old woman presents with 6-month history of progressive muscle weakness and a skin rash.**

**Physical examination is remarkable for a diffuse purple/red discoloration of the skin over her cheeks, nose, and eyelids. Examination confirms proximal muscle weakness.**

**Laboratory findings show an increase in creatine kinase (10 times the normal).**

# Dermatomyositis

- is an **autoimmune disorder**.

-Serological test that is usually abnormal are high CK and increased anti nuclear antibodies (ANA)

-Clinically: **Purple/red colored discoloration mainly around eyelids**

-Dermatomyositis can be associated with internal malignancies including a primary in lung, ovary and stomach

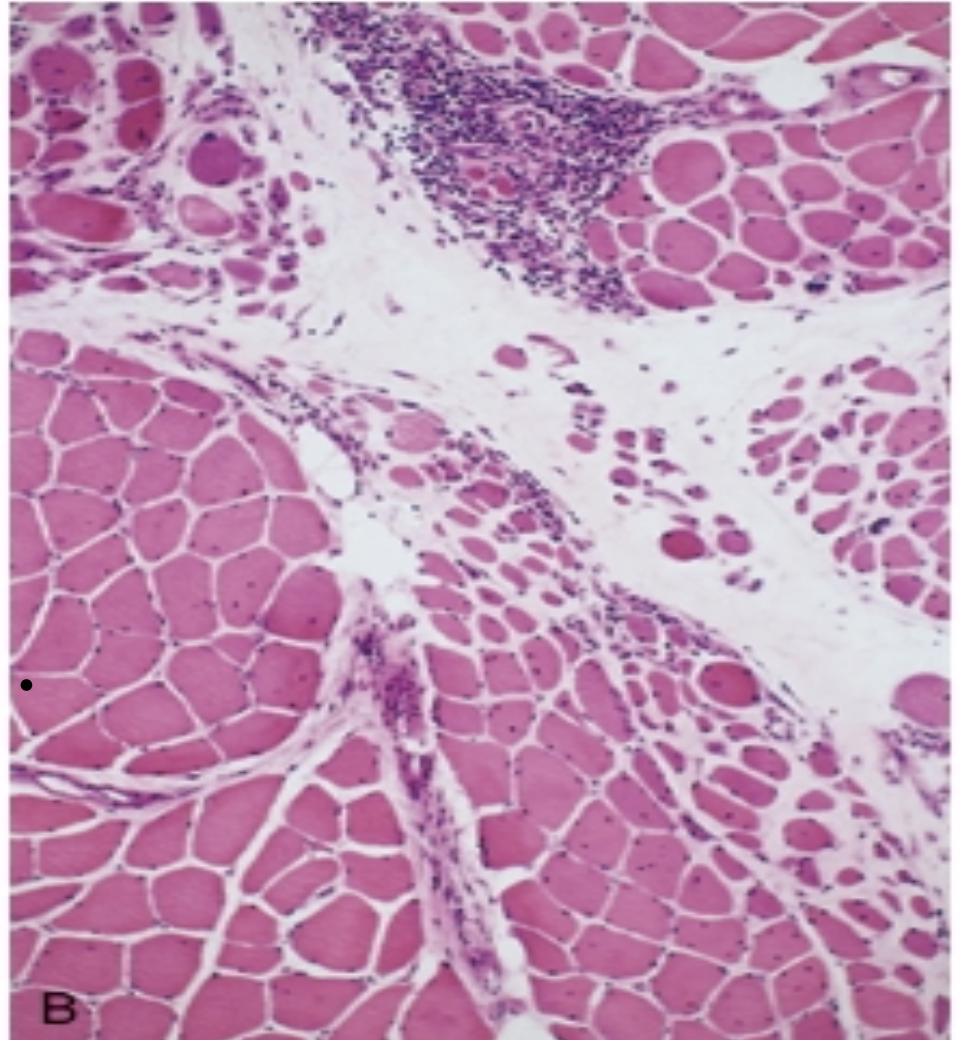




# Dermatomyositis

Microscopically:

- **Perifascicular atrophy of muscle fibers**
- **Chronic inflammation .**

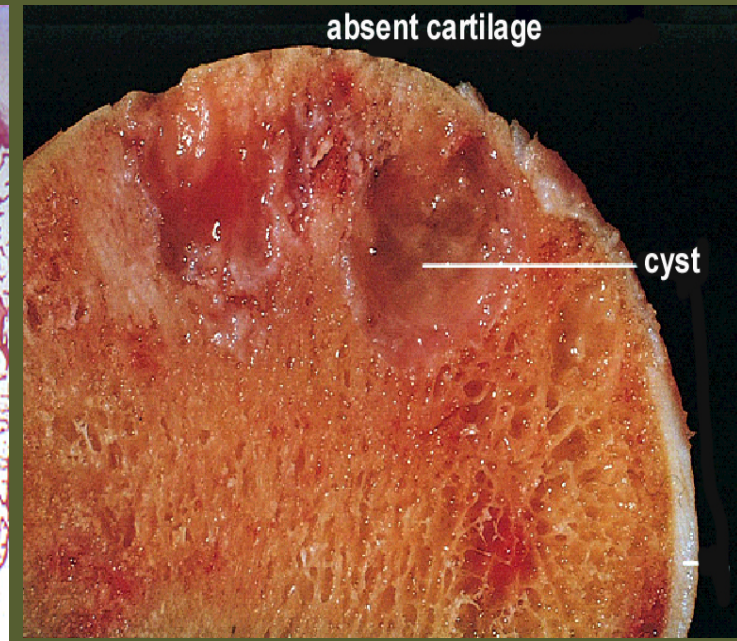
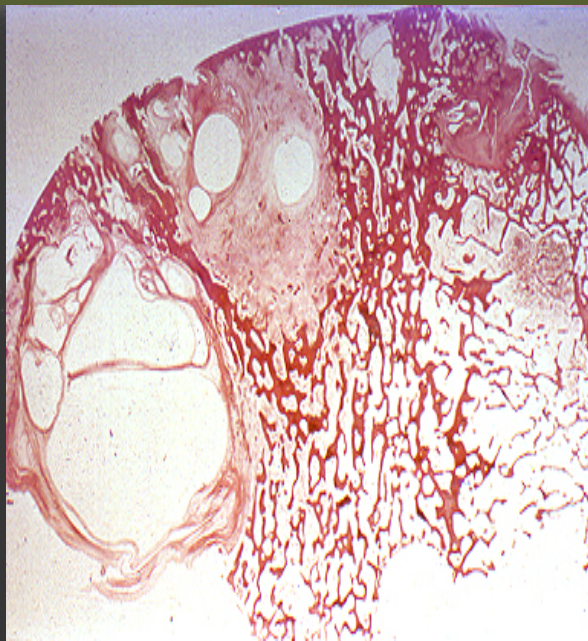






# **NON INFECTIOUS ARTHRITIS**

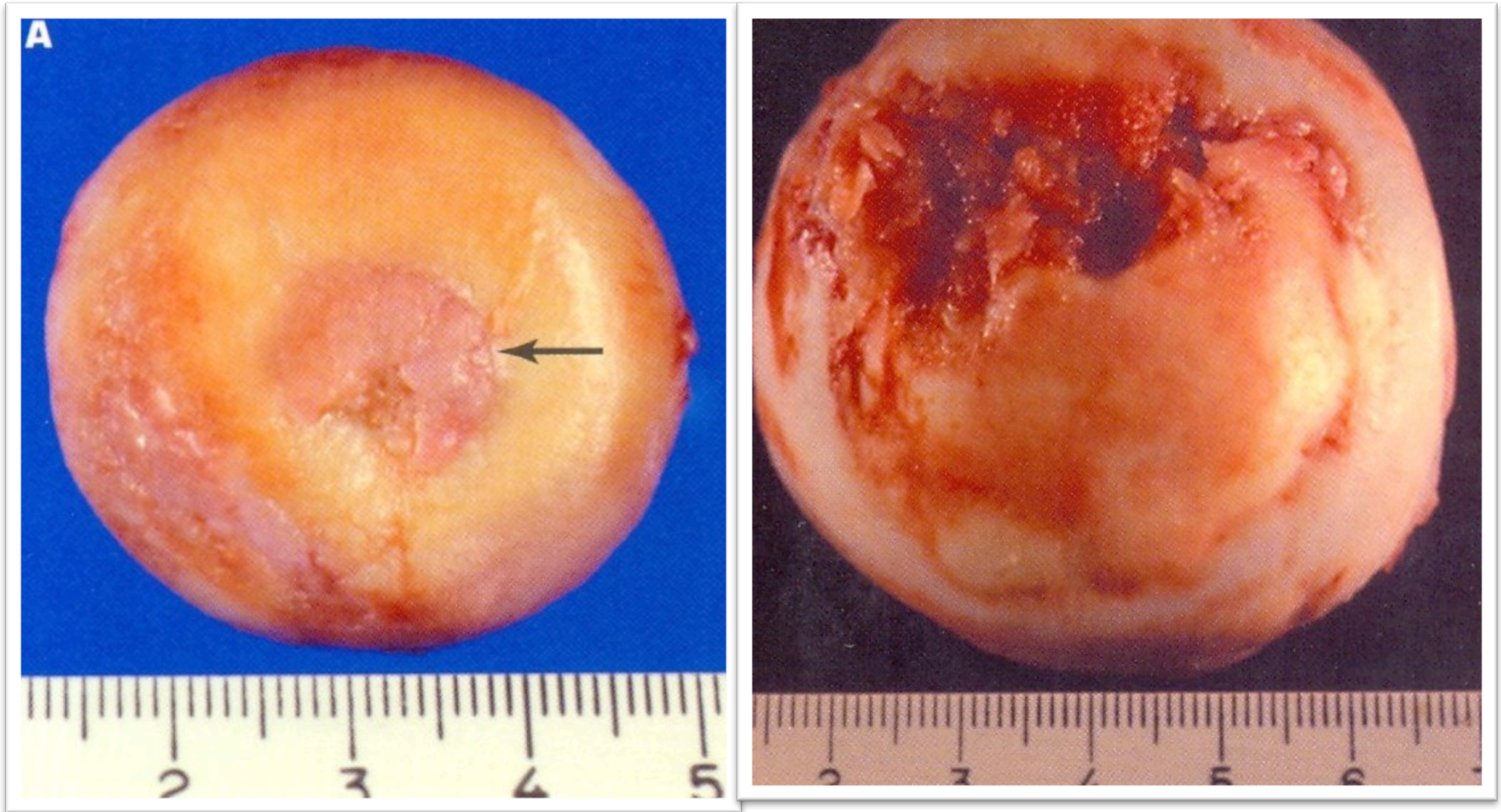
# Osteoarthritis



## Case # 3

- **An obese 56-year-old woman presented with bilateral localized pain to her knees, hands and difficulty in walking .**

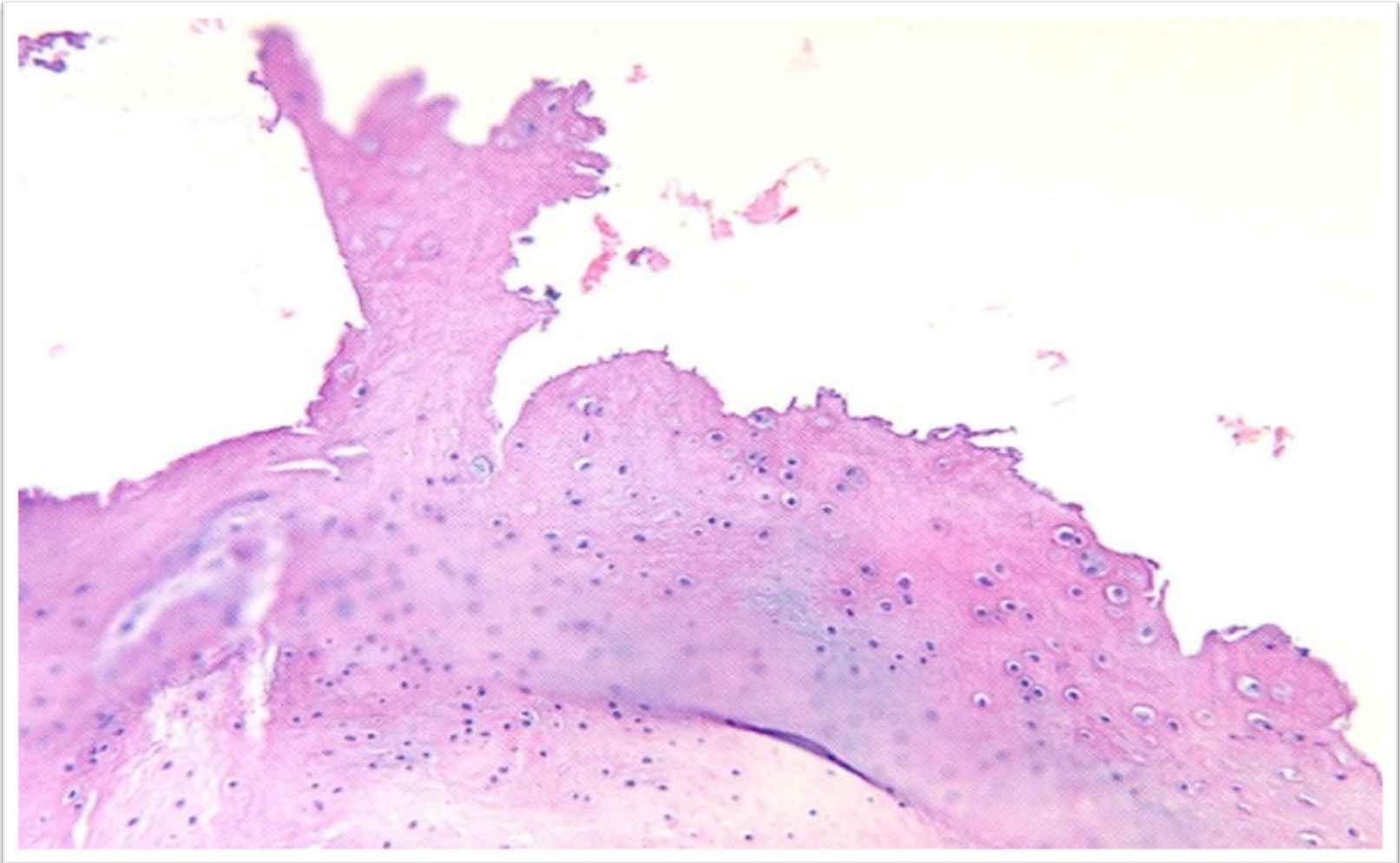
# Osteoarthritis - Gross



***Progressive erosion of articular cartilage, eburnated articular surface , subchondral cyst and residual articular cartilage (Osteoarthritis)***



# Osteoarthritis - LPF



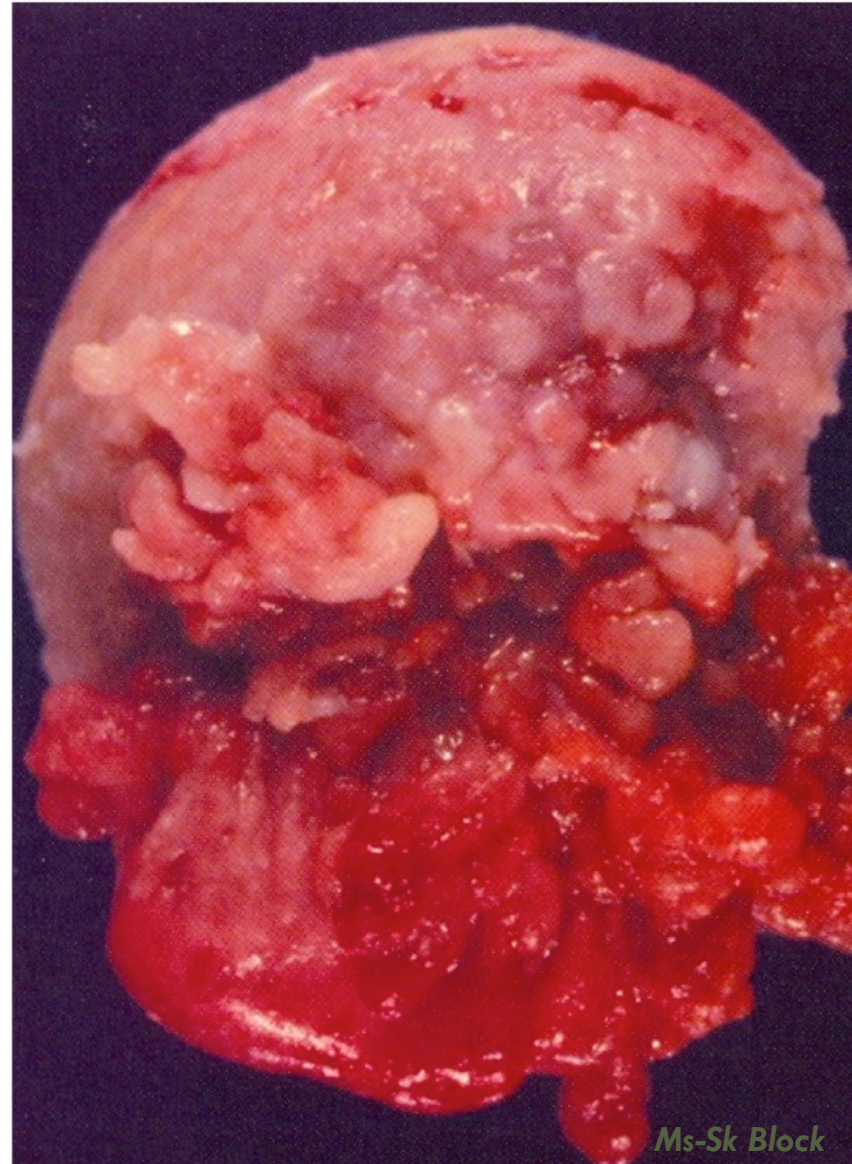
***Mushroom-shaped osteophytes (bony outgrowths ) develop at the margins of the articular surface and are capped by fibrocartilage and hyaline cartilage that gradually ossify . Note the absence of inflammation . (Osteoarthritis)***

## Case # 4

- **A 45 -year- old woman complains of low grade fever , malaise and stiffness in her joints each morning .**

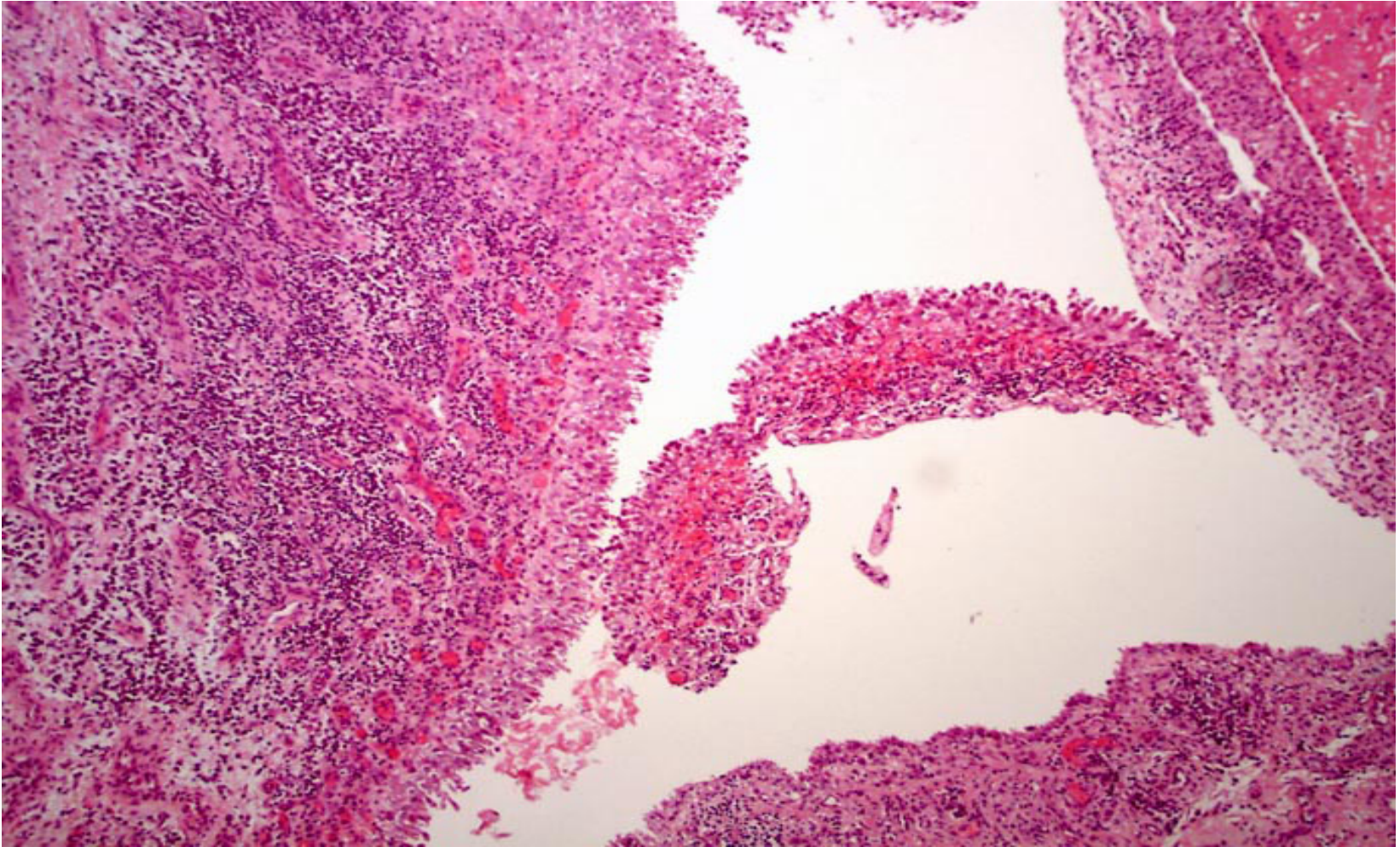
# Rheumatoid Arthritis

- Affecting the head of the femur.
- The synovium becomes edematous, thickened and hyperplastic and transforming its smooth contour to one covered by delicate and bulbous fronds .
- Serological tests which are somewhat specific for this disease:
  - 1- Rheumatoid factor (RF)
  - 2- Antibodies to citrullinated peptides in the serum
  - 3- C-Reactive protein (CRP) and ESR (Non specific)





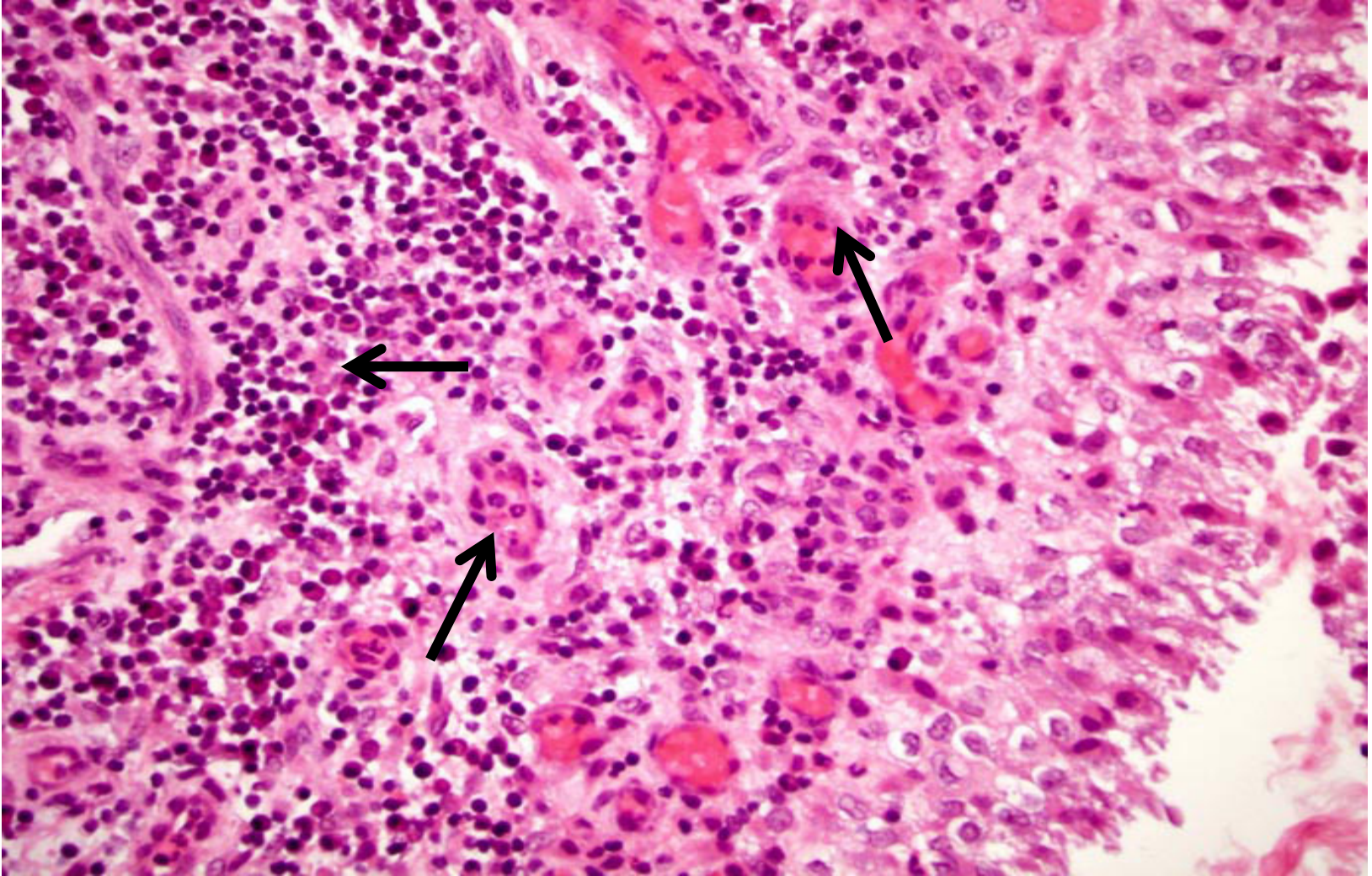
# **Hyperplastic Synovium - LPF**



**Hyperplastic synovial lining with villous like projections**



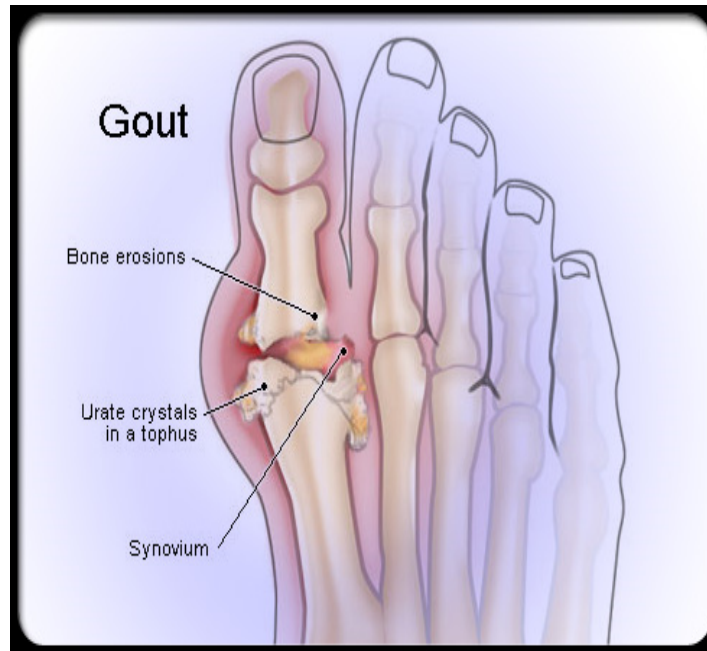
## **Hyperplastic Synovium - HPF**



**Hyperplastic synovium** with underlying plasma cells and lymphocytes including many congested blood vessels in **Rheumatoid arthritis**

# GOUT

**Gout is a syndrome caused by the inflammatory response to tissue deposition of monosodium urate crystals (MSU).**





**Severe gout in the fingers resulting in large, hard deposits of crystals of uric acid. These deposits are called Tophi**



The main cause of this condition is accumulation of uric acid tophi with secondary inflammation.

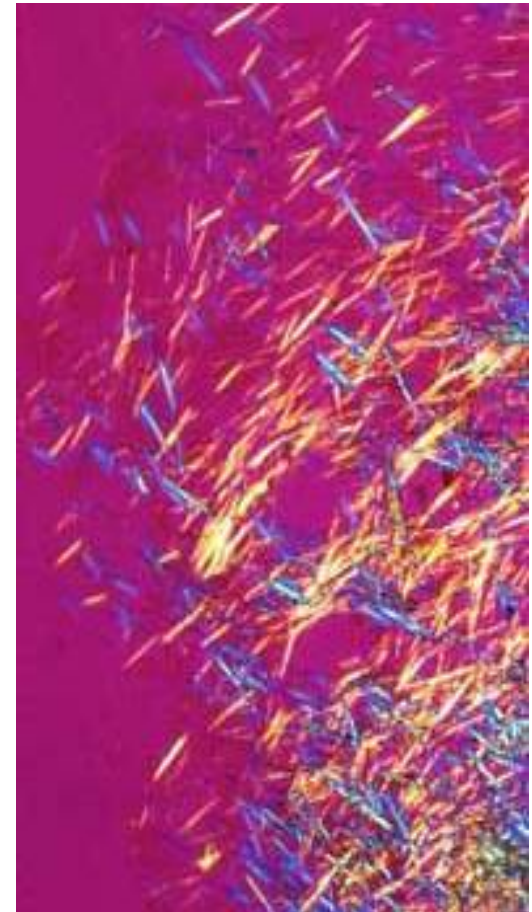
**Acute gouty arthritis** on the big toe of an elderly man.



Swelling, Redness and oedema



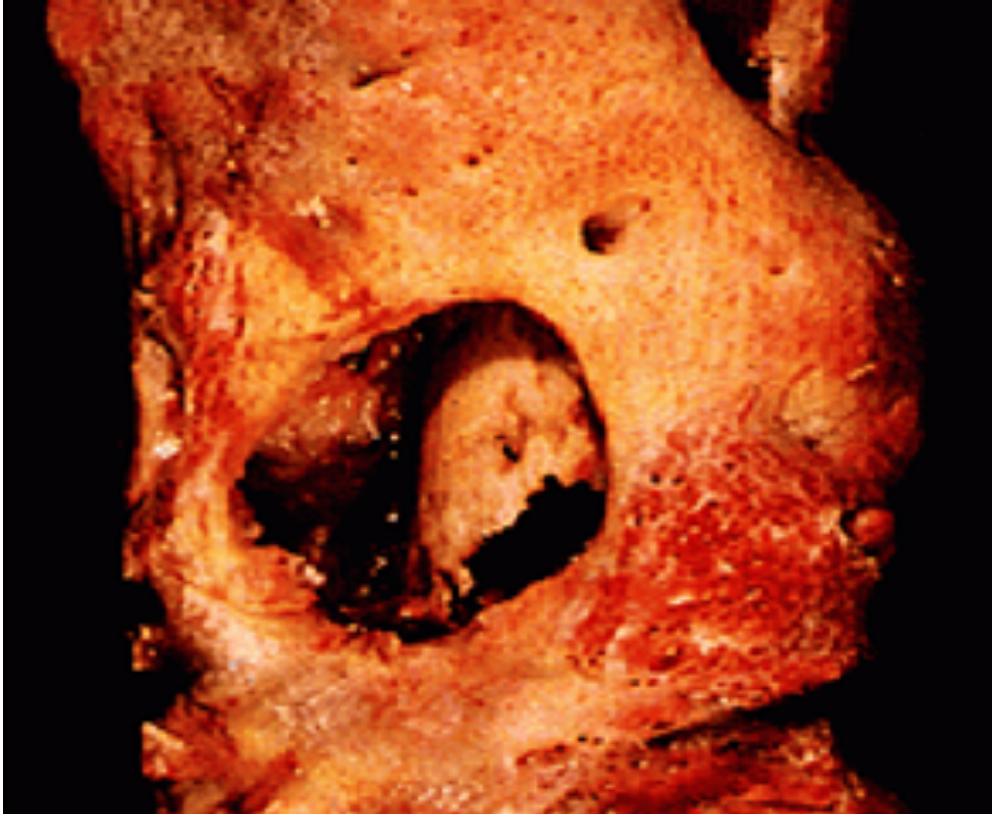
**Needle-shaped monosodium uric acid crystals diagnostic of gout from an acutely inflamed joint as seen under polarized microscopy**



- Gouty Arthritis can be secondary to
- Leukemia, Chronic renal diseases, post chemotherapy and drugs like thiazide diuretics.
- **Syndrome which is responsible for the inherited form of gouty arthritis is:**  
*Lesh-Nyhan syndrome due to lack of HGPRT enzyme.*

# *Osteomyelitis*

# Osteomyelitis



***Resected femur in a patient with draining osteomyelitis. The drainage tract in the subosteal shell of viable new bone (involucrum) reveals the inner native necrotic cortex (sequestrum)***

- Direct infection of bone.
- Bacterial most often
  - Staphylococcus
  - Salmonella
    - Sickle Cell Disease
  - Tuberculosis
    - Spine first

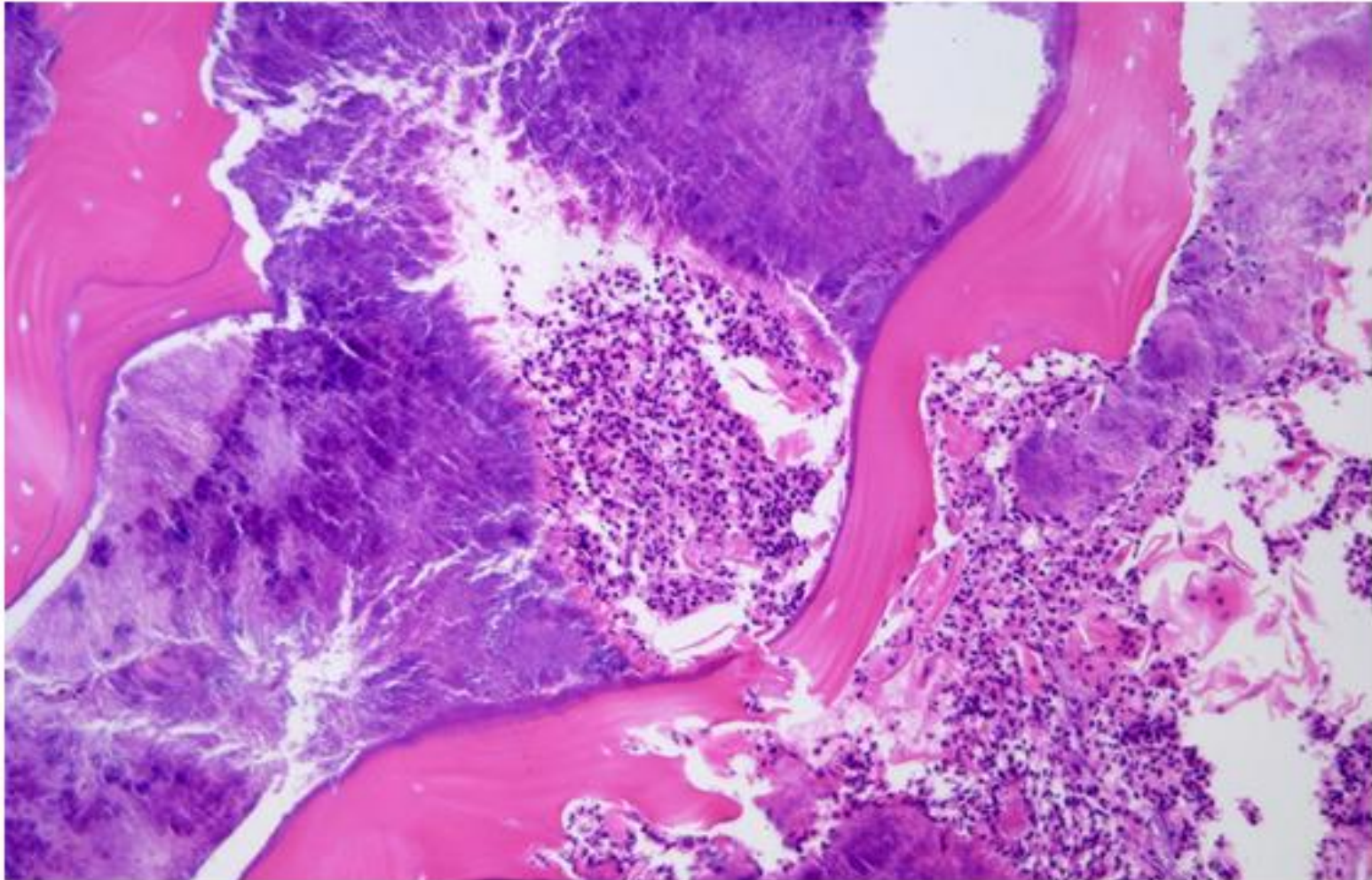


## Case # 5

- **A 22- year- old male presented with localized pain above his right knee joint with recurrent fever. Later, he had a discharging sinuses from the skin overlying the right knee.**

**What is the most likely diagnosis ?**

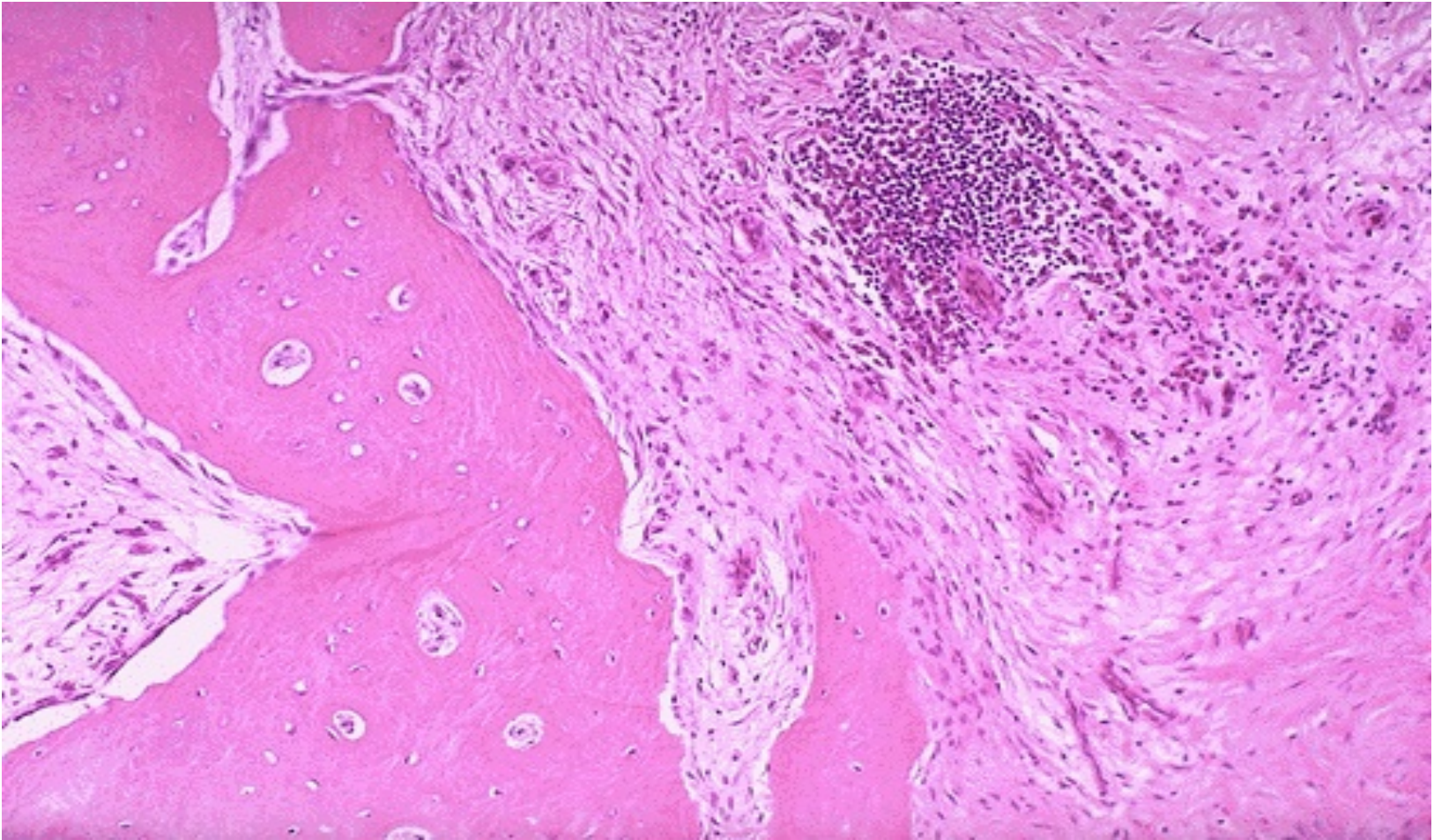
# **Acute Osteomyelitis - LPF**



***Acute Osteomyelitis.*** Bony sequestrae are surrounded by colonies of bacteria as well as purulent infiltrate.



# Chronic Osteomyelitis - LPF



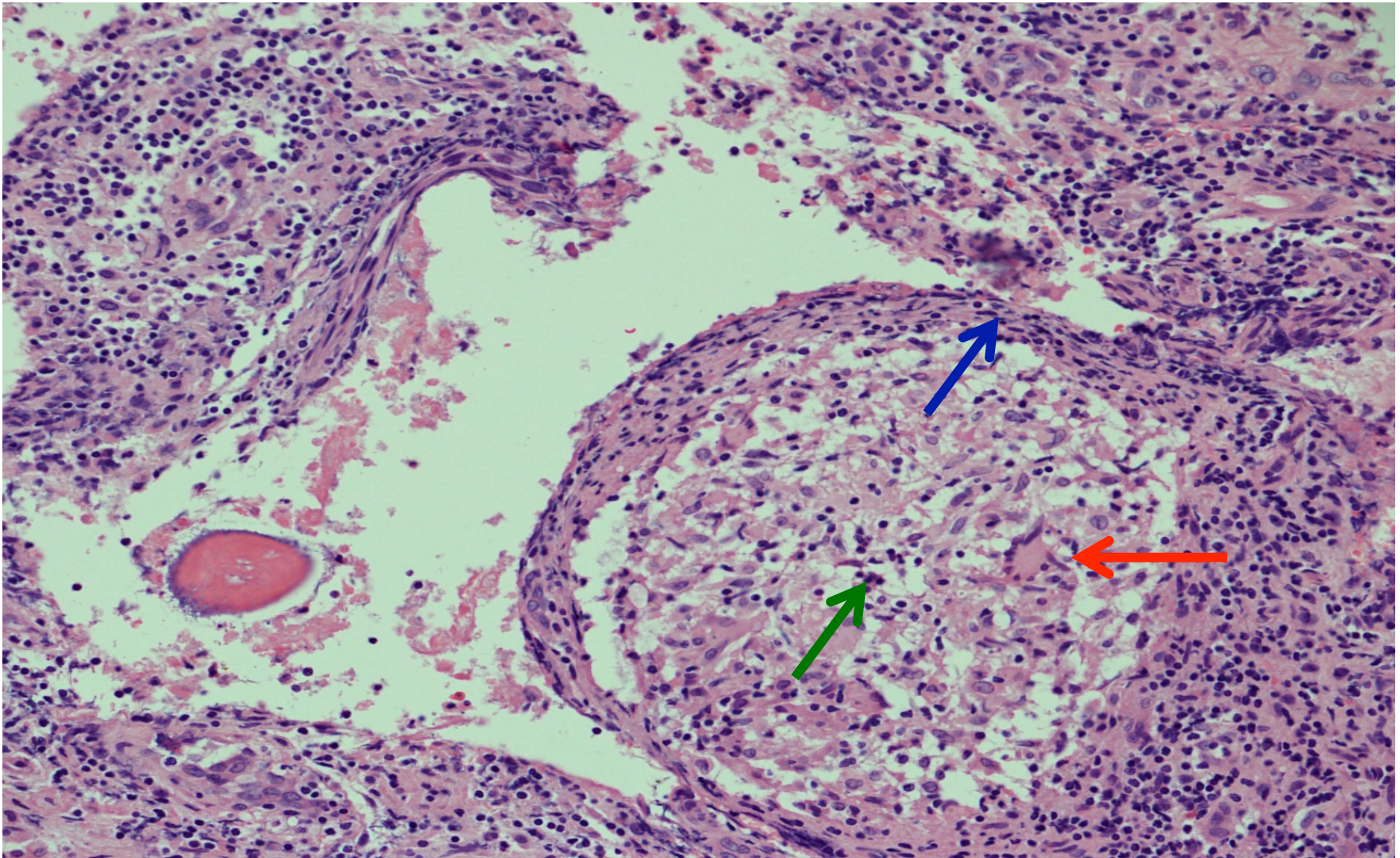
***Chronic Osteomyelitis.*** Note the fibrosis of the marrow space accompanied by chronic inflammatory cells. There can be bone destruction with remodeling.

# Tuberculous arthritis

## Case # 6

- **A 30 -year-old debilitated man presented to the orthopedic clinic with increasing swelling and pain in right knee joint, low grade fever, marked elevation of sedimentation rate.**
- **The patient has a history of coughing up blood, fever, chills, night sweats, weight loss, pallor, and often a tendency to fatigue very easily.**
- **The biopsy was taken from the synovium.**





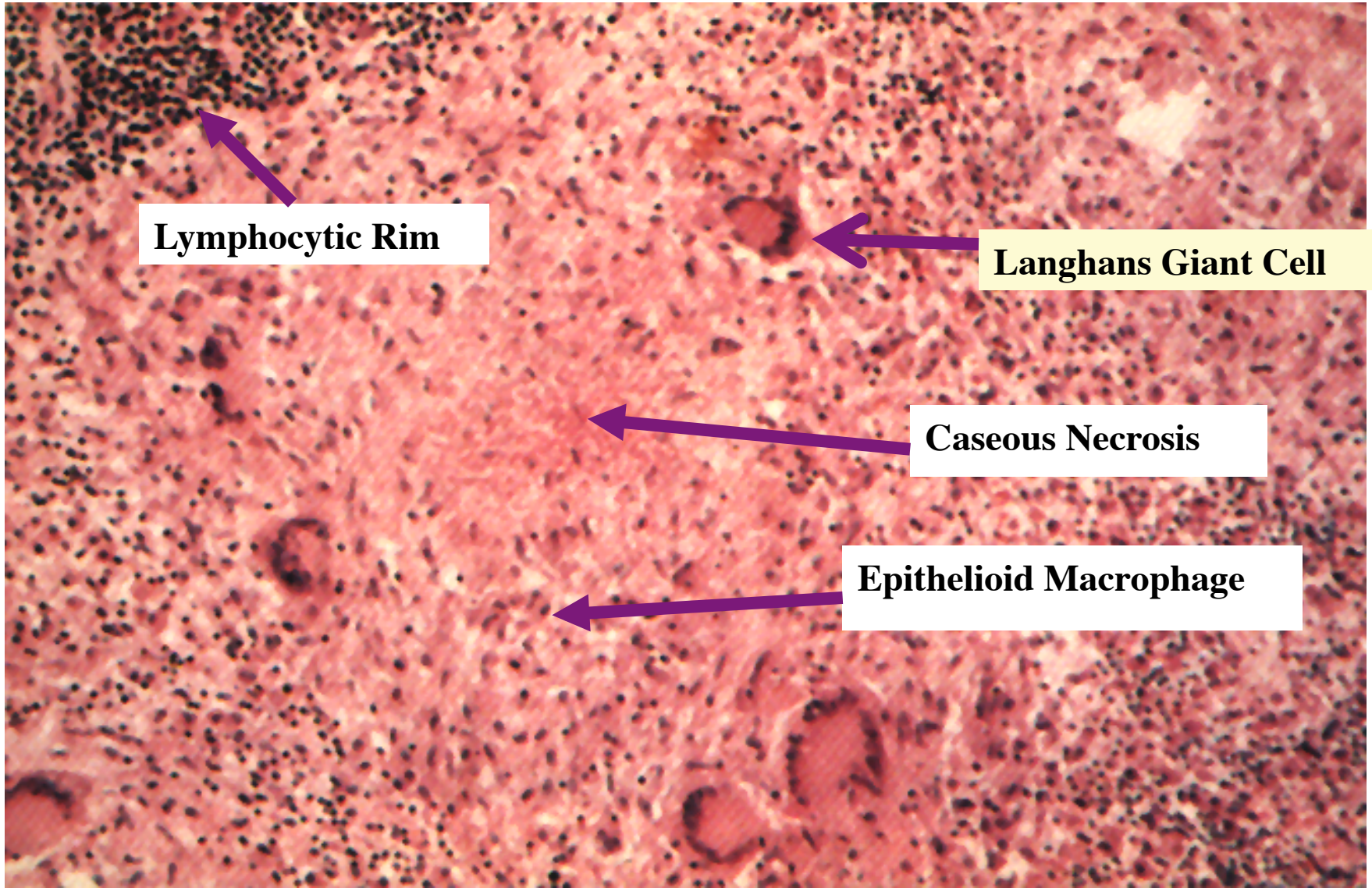
Section of synovial biopsy shows granuloma formation with **epithelioid like cells** , **Langhans-type giant cells** and rim of **lymphocytes**





- Bone section shows **Epithelioid cells fuse to form giant cells** containing 20 or more nuclei. The nuclei arranged either peripherally (**Langhans-type giant cell**) or haphazardly (**foreign body-type giant cell**). These giant cells can be found either at the periphery or the center of the granuloma.

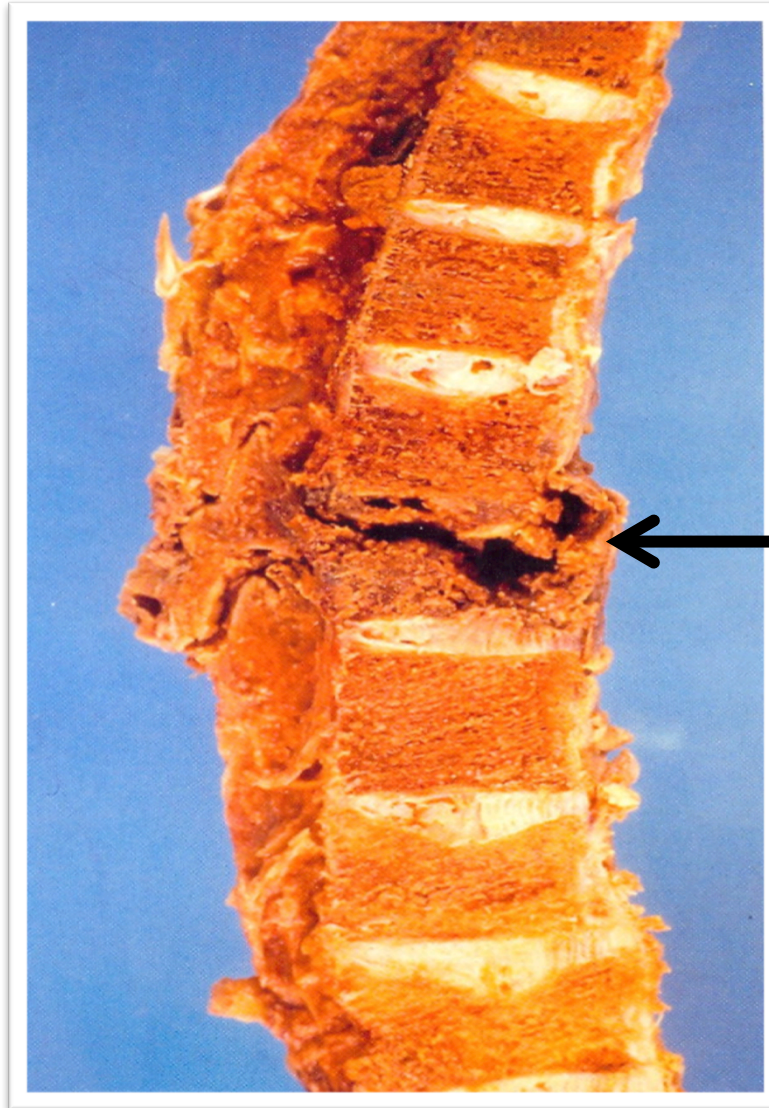




***Section of bone shows granuloma formation with epithelioid like cells ,  
langhans-type giant cells and rim of lymphocytes***

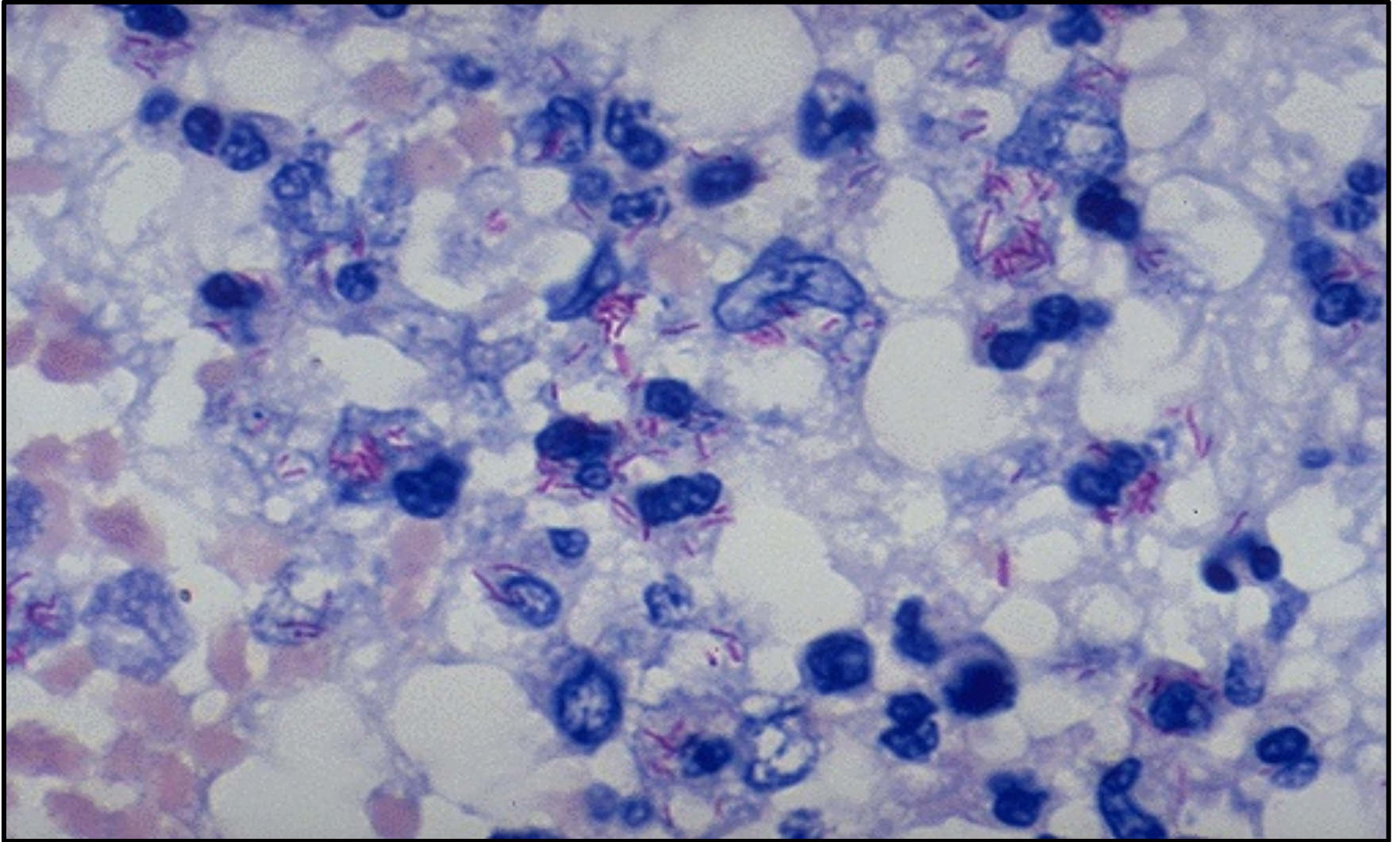


# **Gross pathology of T.B Osteomyelitis of the vertebral Column (Pott's Disease)**



**Granulomatous  
necrosis of  
vertebral column**

## *Acid Fast bacilli of Mycobacterium TB in the Lung*



*A stain for **Acid Fast Bacilli (AFB stain)** also called Zeil Nelson stain is done to find the mycobacteria . The mycobacteria stain as red rods, as seen here at high magnification. Molecular test → PCR (Polymerase chain reaction) is also done for acid fast bacilli*

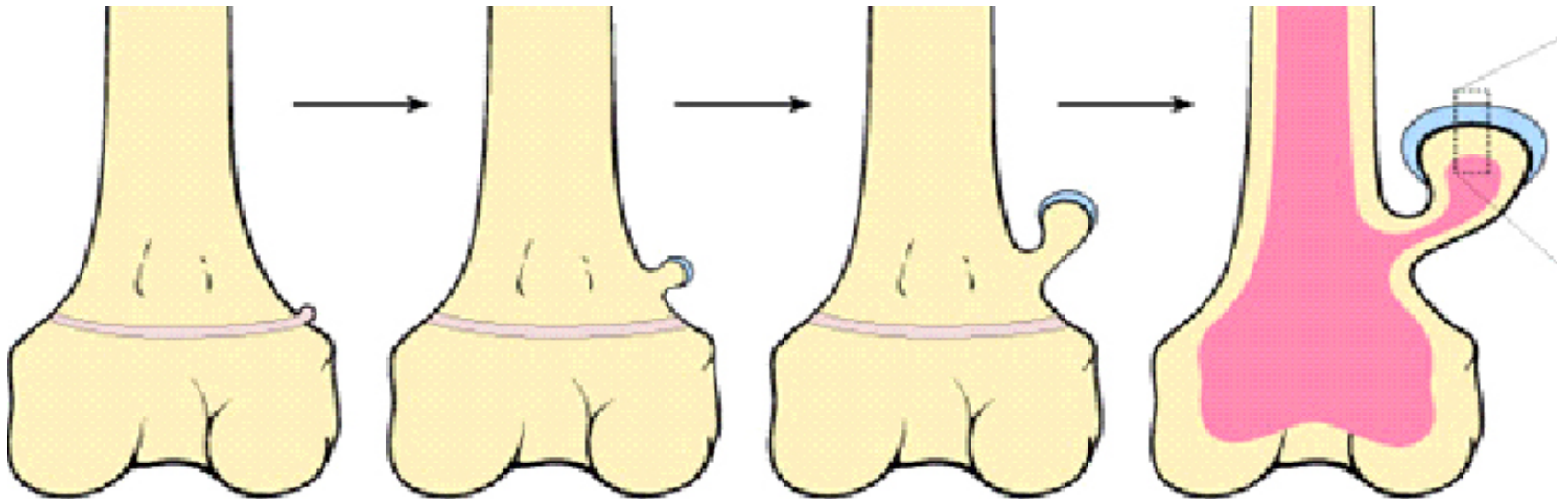
# ***BONE TUMORS***



# ***Osteochondroma*** **(osteochondroma exostosis)**

# Osteochondroma

(osteochondroma exostosis)

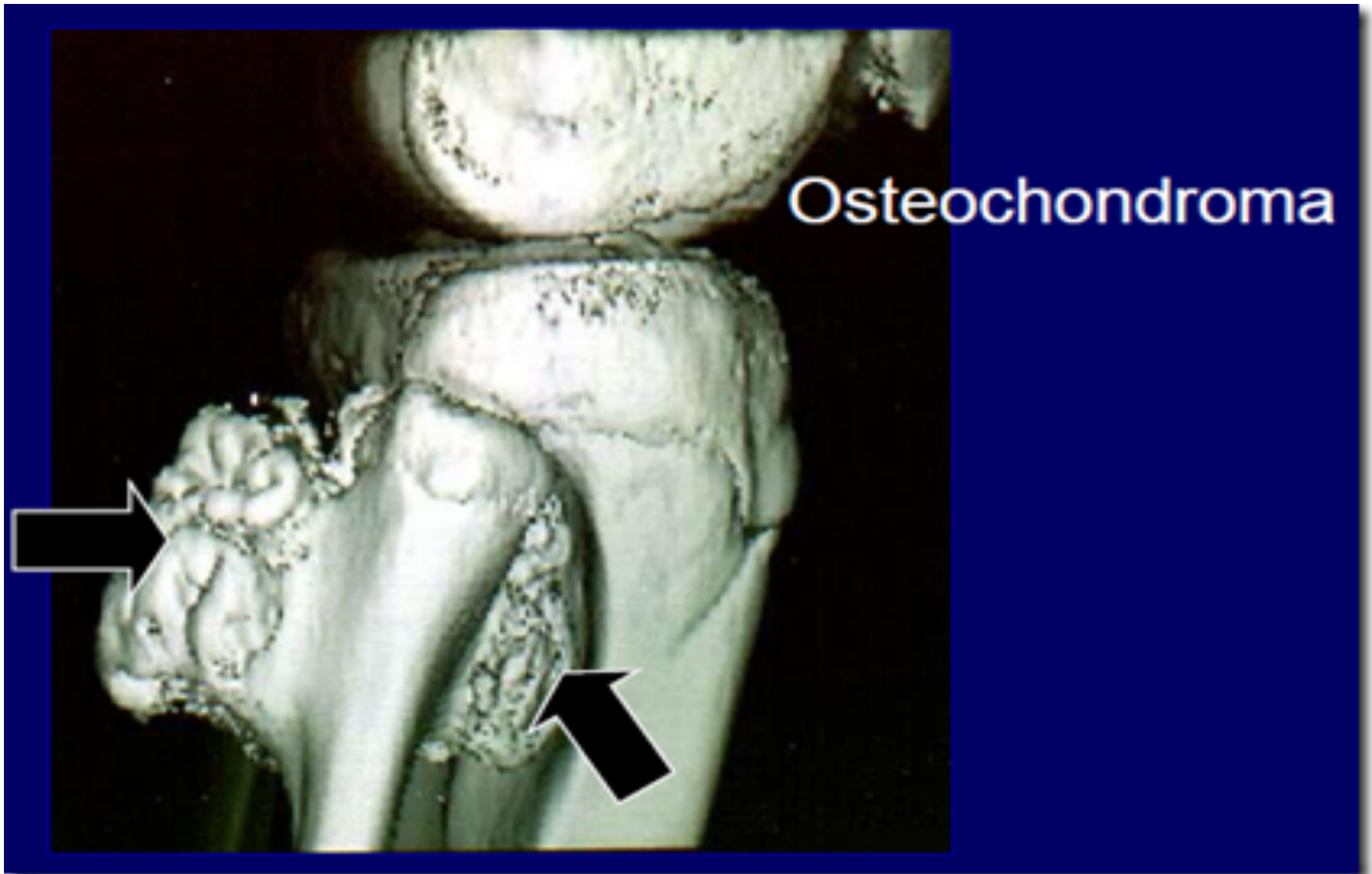


- **The solitary osteochondroma is the most common benign bone tumors**
- **Seen in patients aged from 10-30 years**
- **Arise during skeletal growth**
- **Equally in males and females**
- **Etiology is unknown**

## Case # 7

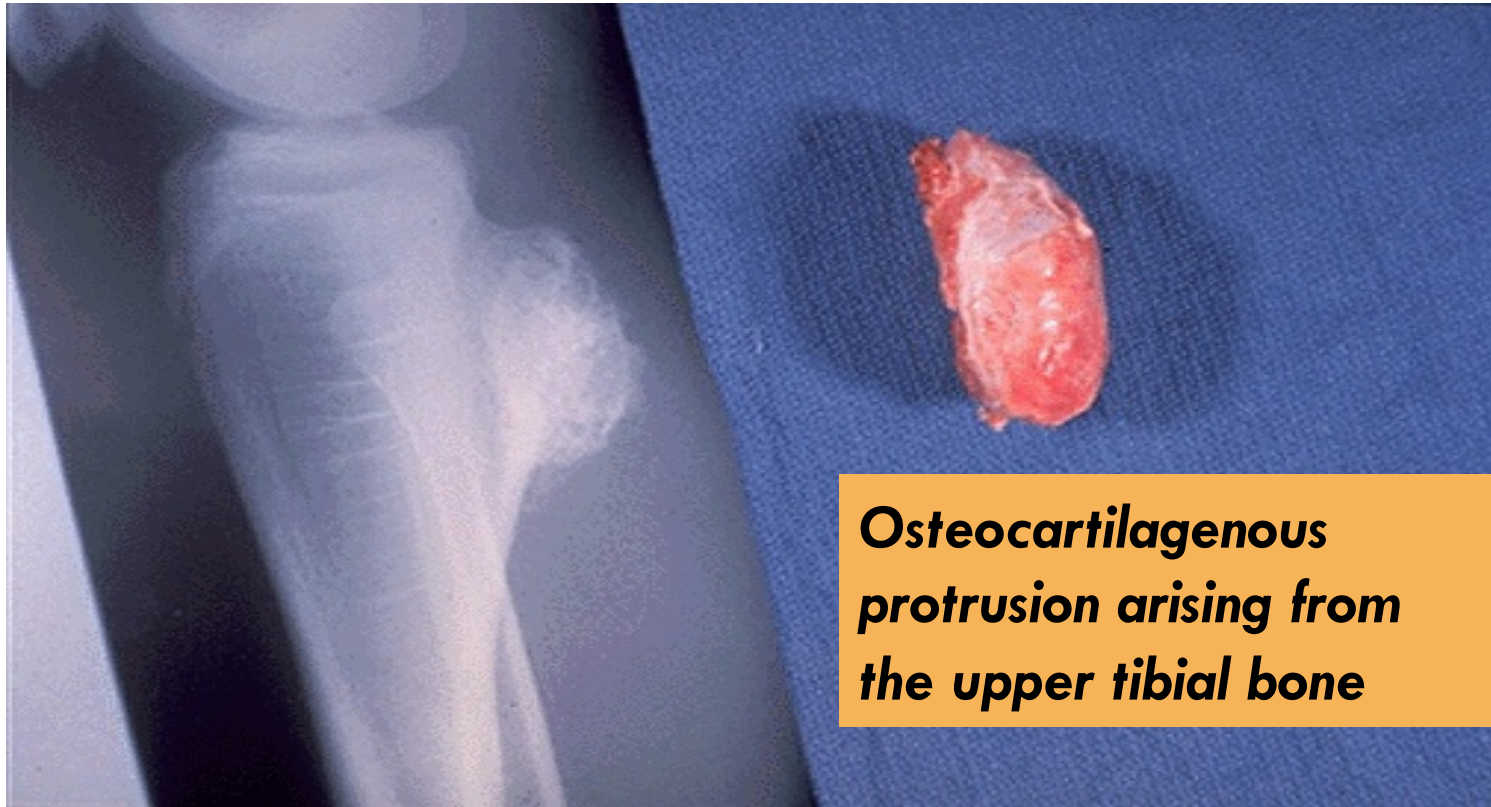
- **A 16 -year-old male was found to have a small swelling protruding from upper part of his leg with local pain .**





***MRI picture showing two osteochondromatous exostosis which are arising from the upper third of fibula .***

# Osteochondroma: Gross & X-ray



**Osteocartilagenous protrusion arising from the upper tibial bone**

*Most are solitary, incidental lesions that may be excised if they cause local pain. There is a rare condition of multiple osteochondromatosis marked by bone deformity and by a **greater propensity for development of chondrosarcoma.***

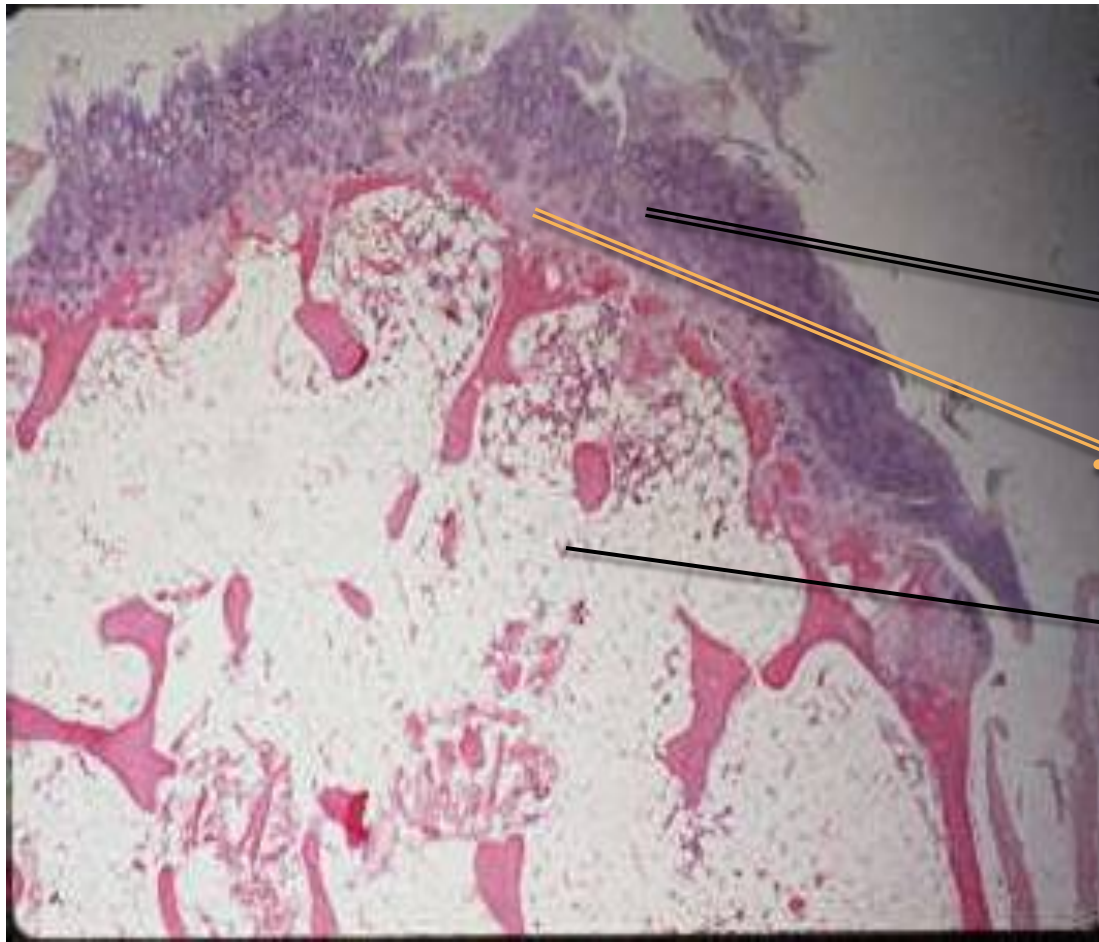
# Osteochondroma - Gross



***Solitary osteochondroma. Gross osteochondroma specimen at the time of resection. Bone stalk and overlying membrane on cartilage cap.***



# Osteochondroma - LPF



-Fibrous cap

-Cartilagenous layer

- Bone

*The microscopic appearance of an osteochondroma displays the benign cartilagenous cap at the upper and the bony cortex at the left lower.*

**Prognosis is Excellent**

**Possible complication :** - *Chondrosarcoma may occur if these lesions are multiple*

# Osteosarcoma

## Case # 8

- **An 18-year-old female presented to the rheumatology clinic with 2 months history of pain and swelling in her upper thigh with weight loss .**



# Osteosarcoma of the upper end of the tibia

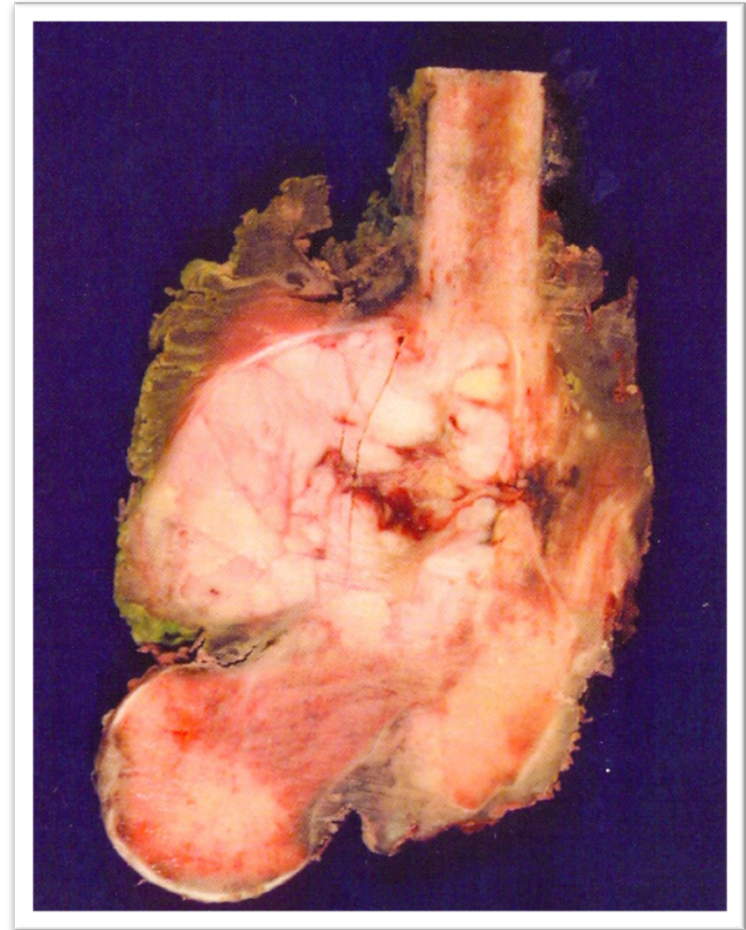
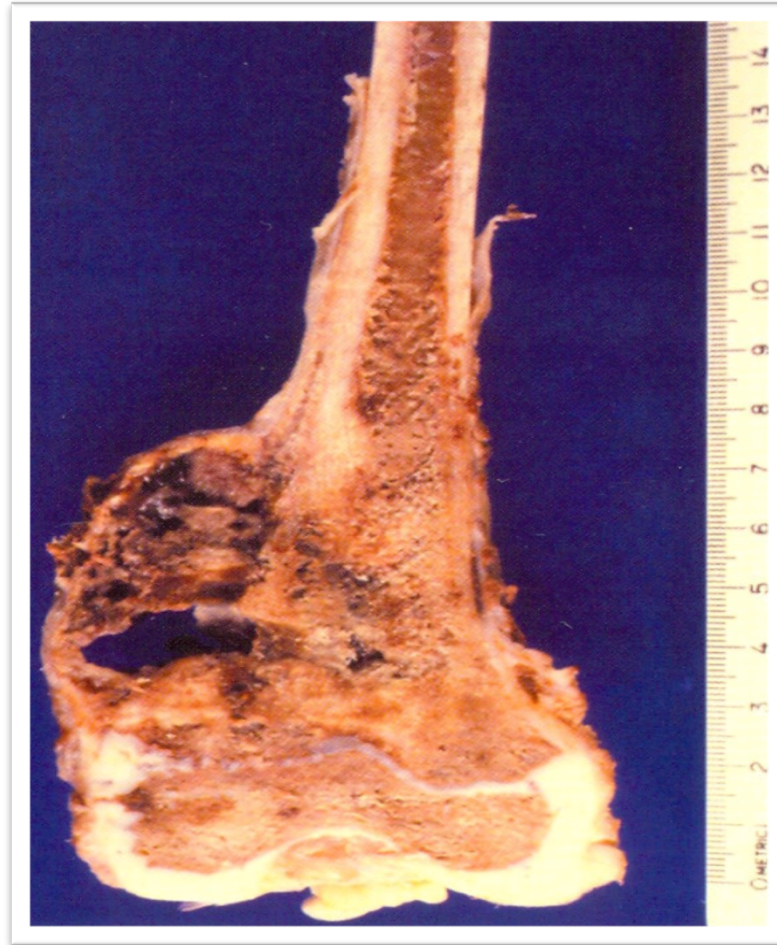
- **Malignant tumor of mesenchymal origin**
- **2<sup>nd</sup> most common primary bone tumor**
- ***RB gene mutation is seen in 60% of these cases.***
- ***In elderly patient, paget's disease and previous radiation exposure are predisposing factors.***
- **Classical radiological feature seen is **CODMAN triangle****



The **tan-white tumor** fills most of the medullary cavity of the metaphysis and proximal diaphysis.

It has infiltrated through the **cortex, lifted the periosteum, and formed soft tissue masses on both sides of the bone.**

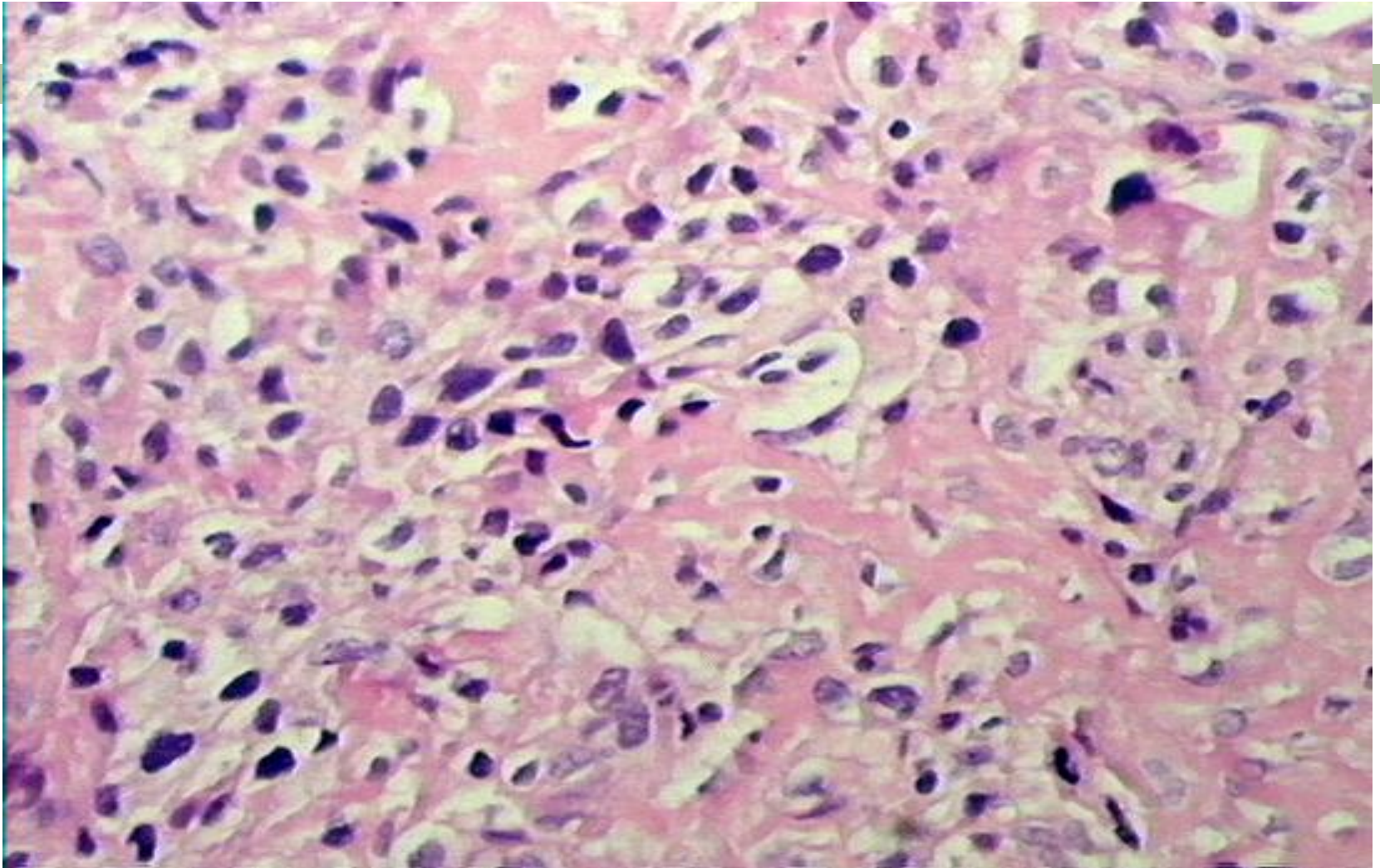
# Conventional Osteosarcoma - Gross



***Mixture of osteoid, fibrous, cartilaginous, necrotic, hemorrhagic, cystic areas***



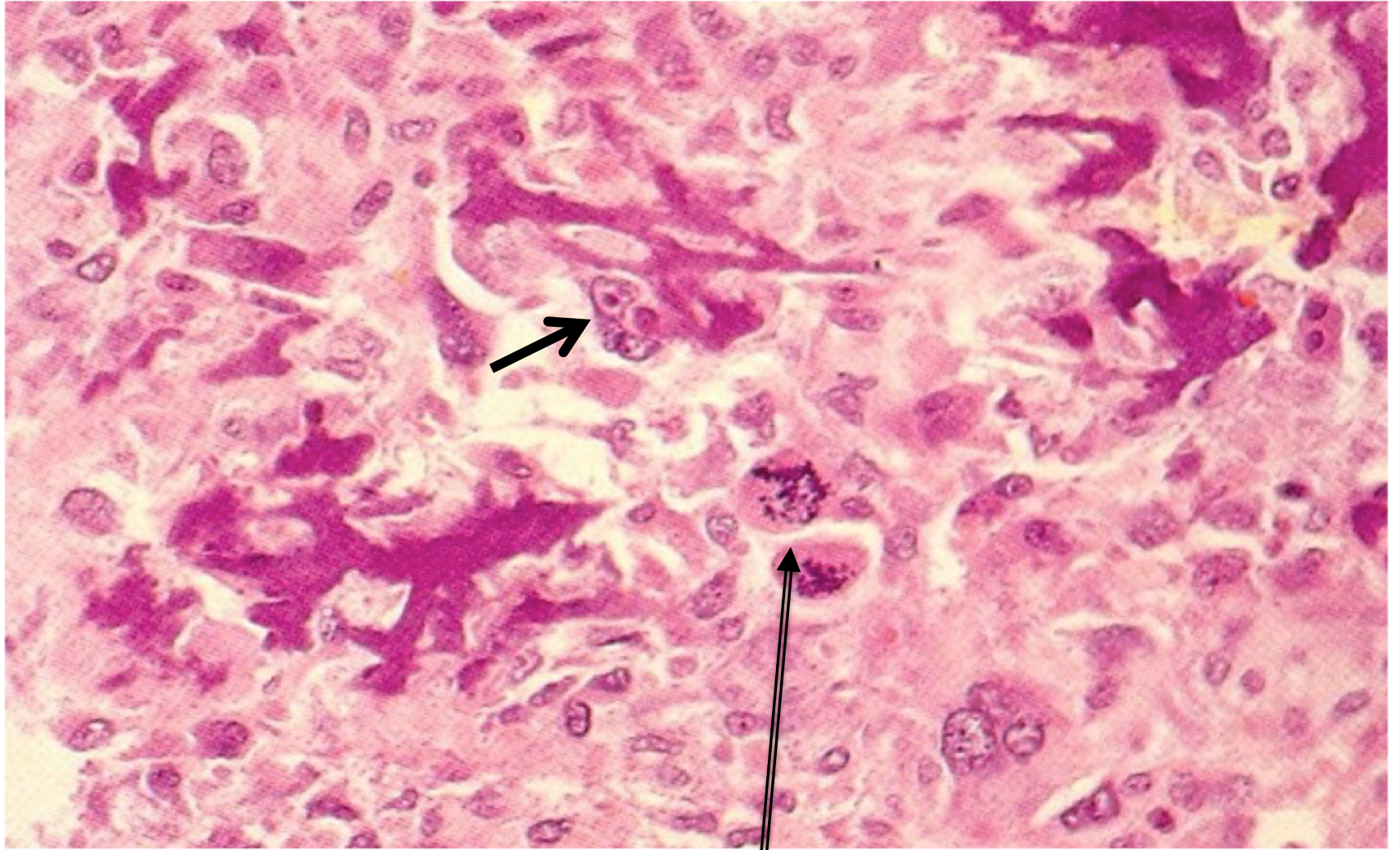
# **Osteosarcoma - LPF**



- ***Pleomorphic and hyperchromatic nuclei of malignant cells.***
- ***Osteoid formation by the tumor cells.***



# **Osteosarcoma - HPF**



***Malignant osteoid producing Spindle cells, giant cells,  
Abnormal Mitosis***

**THE END**