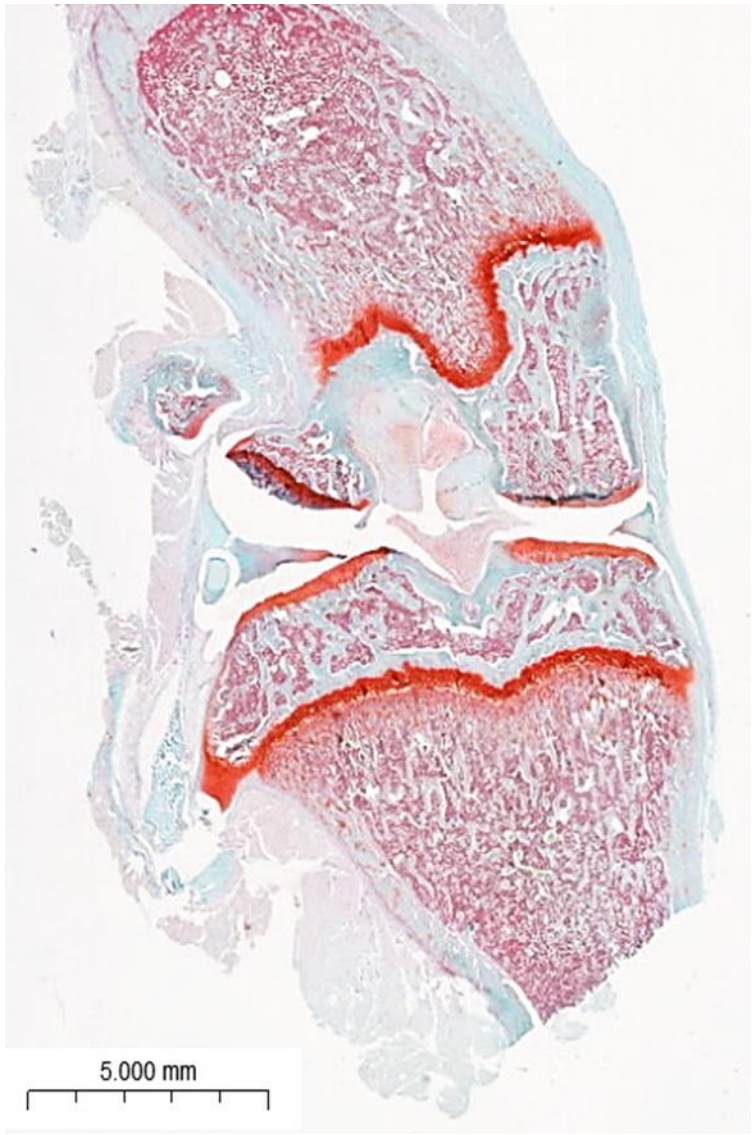
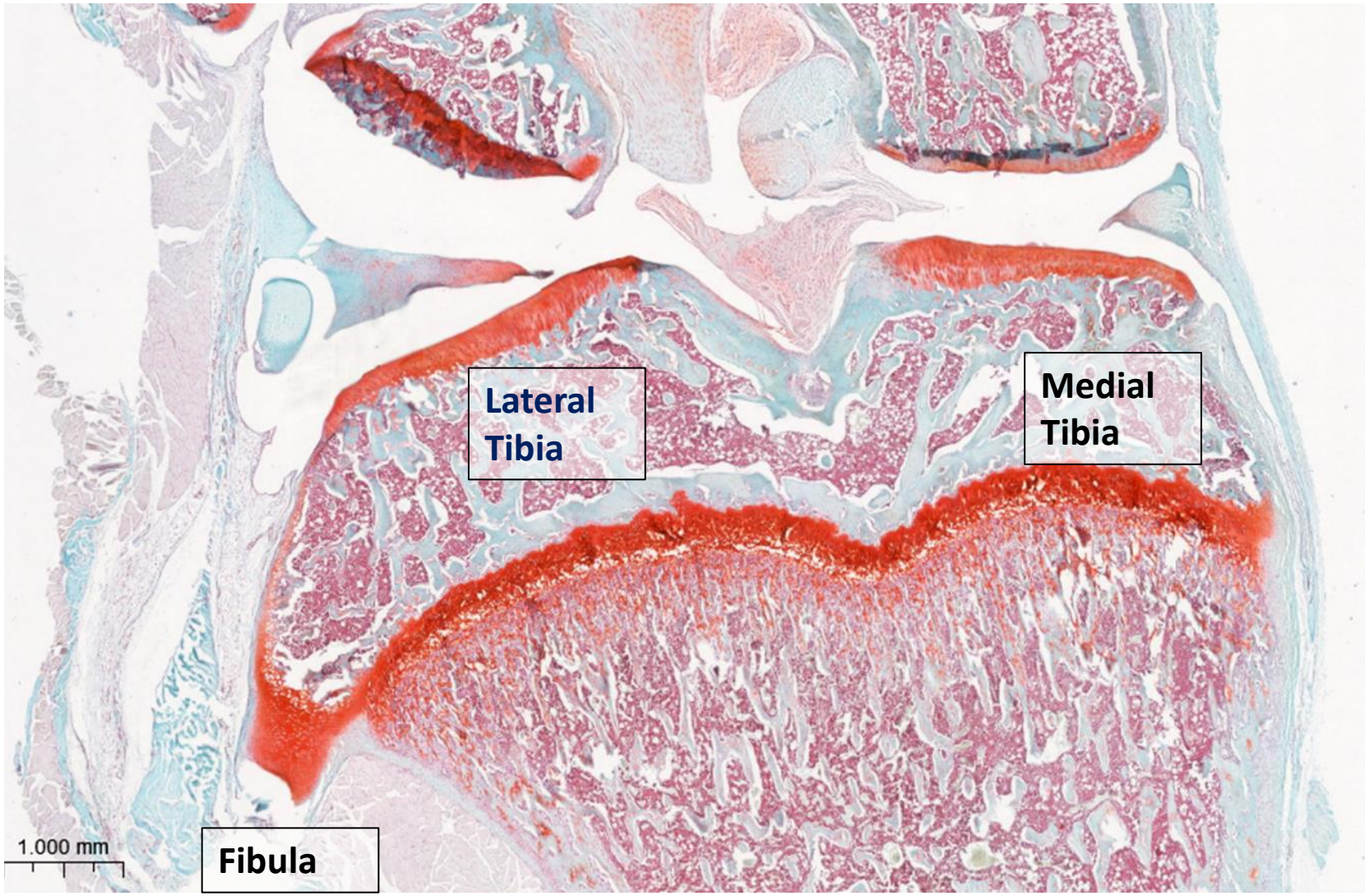
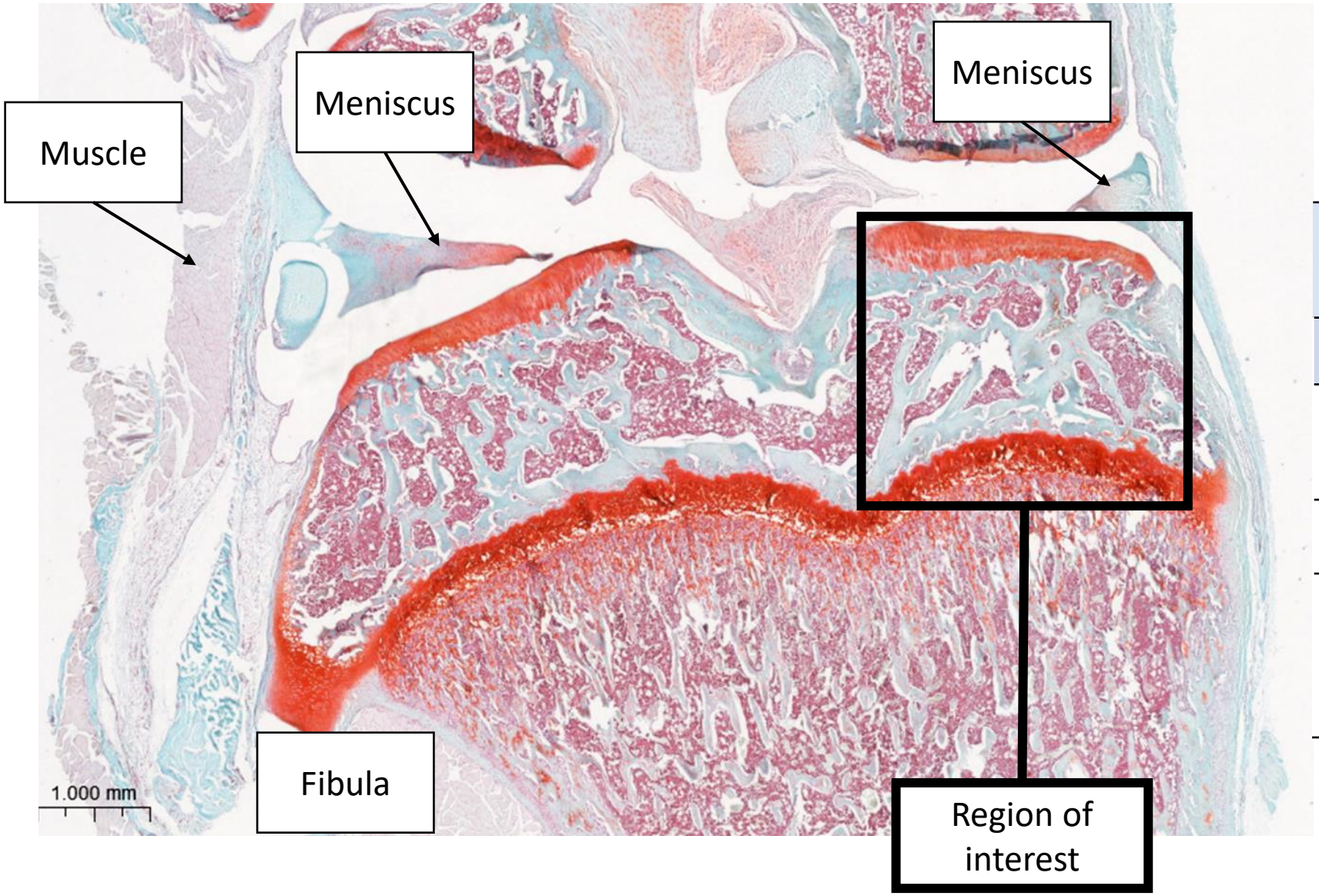
# OSTEOARTHRITIS BONE SCORE (OABS) FOR RAT KNEE OA MODELS (medial tibial plateau)

# The rat knee joint, stained with Safranin-O, Fast Green and Haemotoxylin



# Identifying the region of interest, the subchondral region of the medial tibia




| Identification of medial and lateral compartments | |
|---|---|
| **Lateral** | **Medial** |
| Fibula | Contralateral to fibula |
| More muscle | Less muscle |
| Meniscus has a pointed or angular end | Meniscus might have a pointed or rounded end |

| Osteoarthritis Bone Score (OABS) in rat knee:- underlying processes |
| --- |
| 1. Cysts present |
| 2. Fibrosis present |
| 3. Increased blood vessels |
| 4. Cartilage islands present |
| 5. Trabeculae thickened |
| 6. Blood vessels entering non-calcified cartilage |
| 7. Inflammation |

# Osteoarthritis Bone Score (OABS) in rat knee:- scoring

**1. Cysts**

None = 0

Present =1

**2. Fibrosis**

None = 0

Present =1

**3. Blood vessels**

Normal = 0

Increased numbers =1

**4. Cartilage islands**

Absent = 0

Present =1

**5. Trabeculae thickened**

Normal = 0

Increased thickness =1

**6. Blood vessels entering non-calcified cartilage**

None = 0

At least one blood vessel within articular cartilage =1

**7. Inflammation**

Normal = 0

Cellular infiltrates present =1

# Osteoarthritis Bone Score (OABS) in rat knee subchondral region:- scoring of Present/Absent

**1. Cysts**

Rounded structures with an outer wall displaying eosinophilic parallel fibres consistent with collagen fibres. Ensure that vessels, adipocytes and sinusoids are not classified as cysts. Scored as present if at least 1 cyst within the subchondral region of interest

**2. Fibrosis**

Eosinophilic parallel fibres consistent with collagen, with or without fusiform mononucleated cells consistent with being fibroblasts. Scored as Present if any bone marrow space displays fibrosis within the subchondral region of interest.

**3. Blood vessels**

Annular or tubular structures with cellular (endothelial cell) walls, often have erythrocytes within the lumen and often have smooth muscle around them. Sinusoids are not counted as vessels. Scored as Present if >15 blood vessels within the subchondral region of interest.

**4. Cartilage islands.**

New cartilage (eosinophilic or safranin-O stained matrix containing chondrocytes) that is discontinuous with articular cartilage. Acellular regions of proteoglycan within bone are not counted as cartilage islands. Scored as Present if at least 1 cartilage island with chondrocytes is within the subchondral region of interest. Do not assess the osteophyte or chondrophyte.

**5. Trabeculae thickened.**

Scored as present if at least 3 trabeculae show increased thickness (>50 µm at the widest point between junctions with other trabeculae) between the subchondral bone plate and growth plate. Disregard other trabecular abnormalities (e.g. disorganisation).

**6. Vessels entering the cartilage**

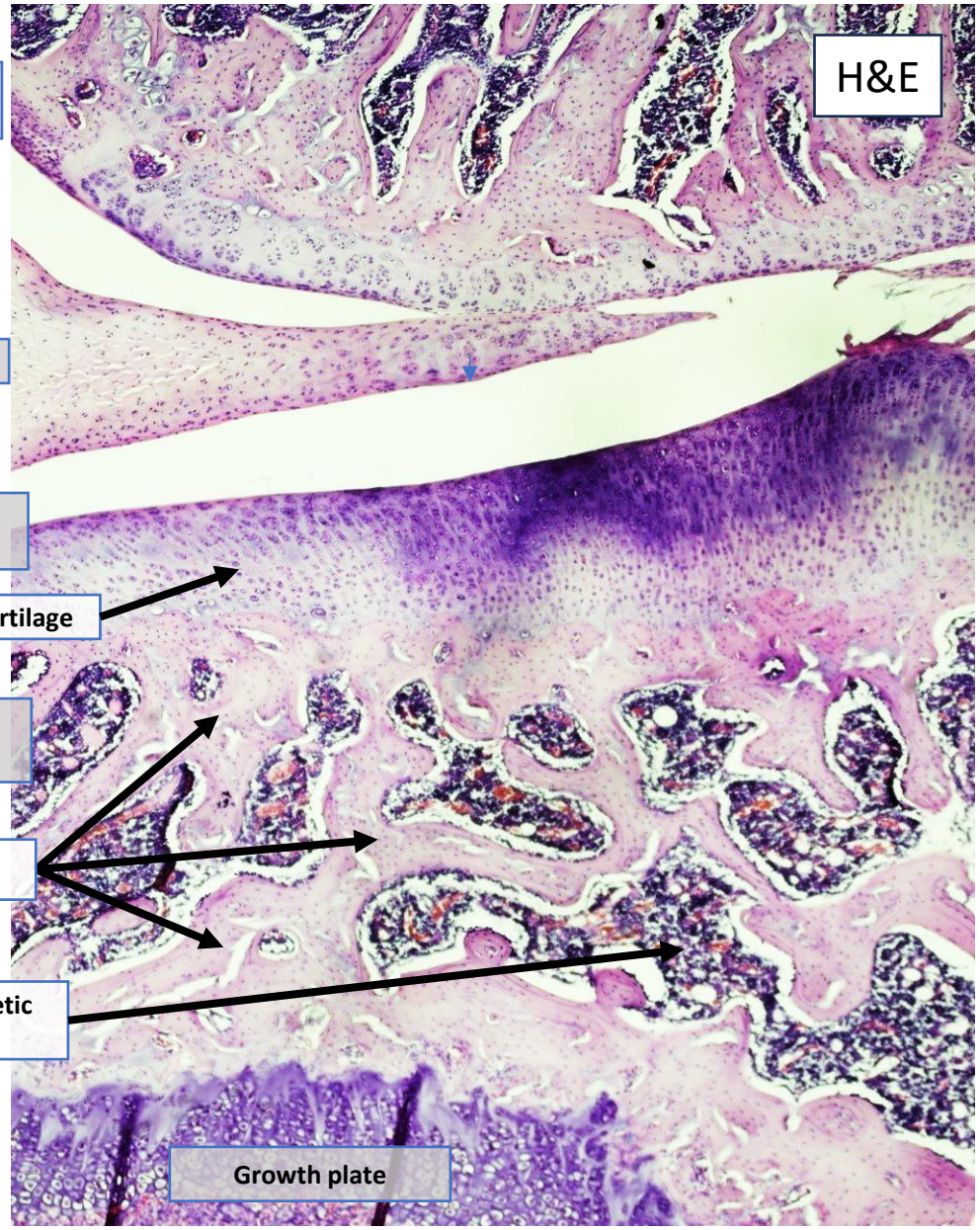
Scored as Present if at least 1 channel (cellular tissue forming a tubular structure that may contain a blood vessel) enters the articular cartilage. Score as 0 if there is no articular cartilage.

**7. Inflammation**

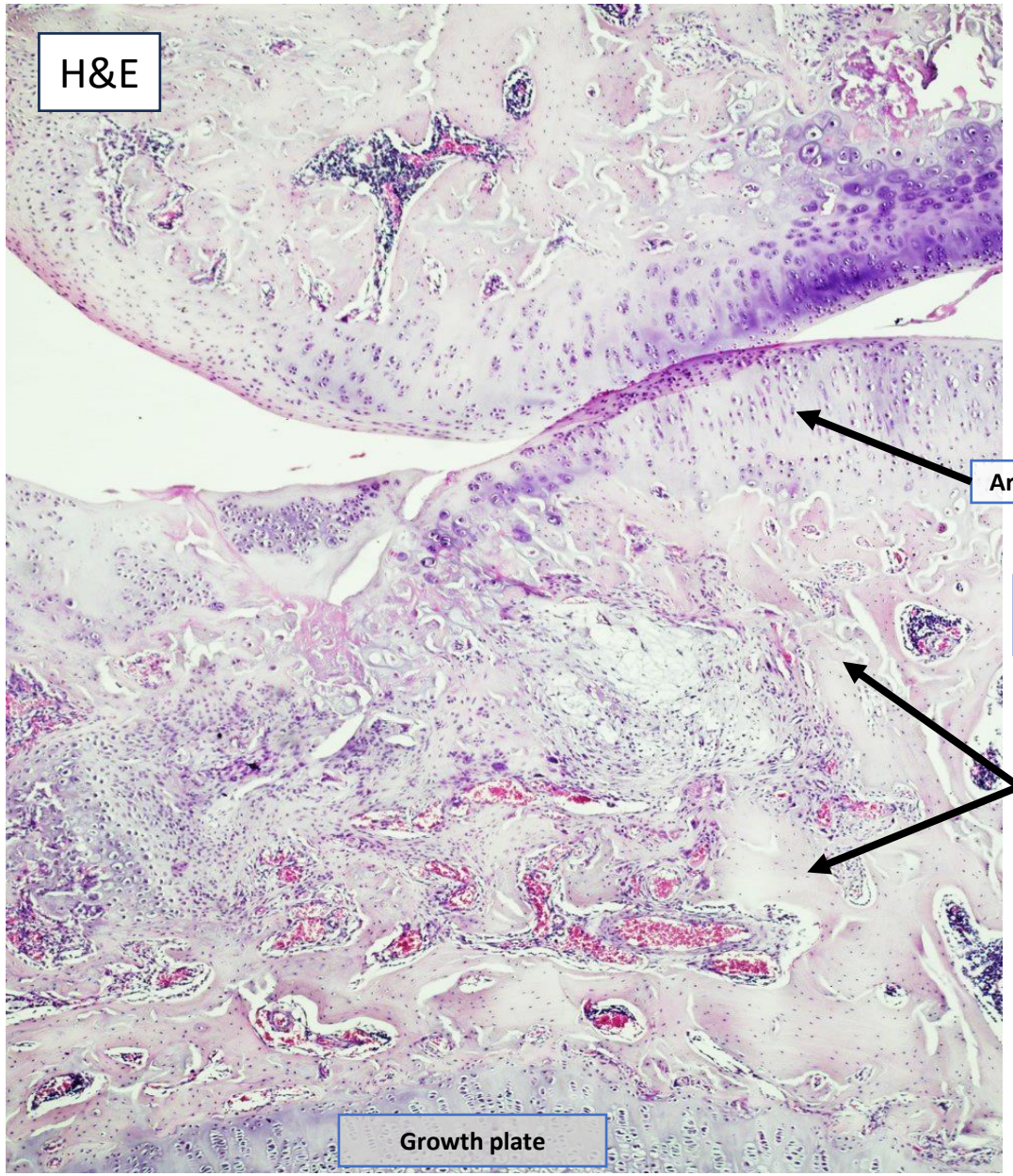
Non-fusiform mononuclear cells embeded within eosinophilic tissue. Multinucleated cells, consistent with being osteoclasts, and fibroblast-like cells may be present, but should not be the only cell type. Scored as Present if at least 1 area of inflammation within the subchondral region of interest.

# Examples of normal rat knees and OA models

# Normal appearance (sham-operated)



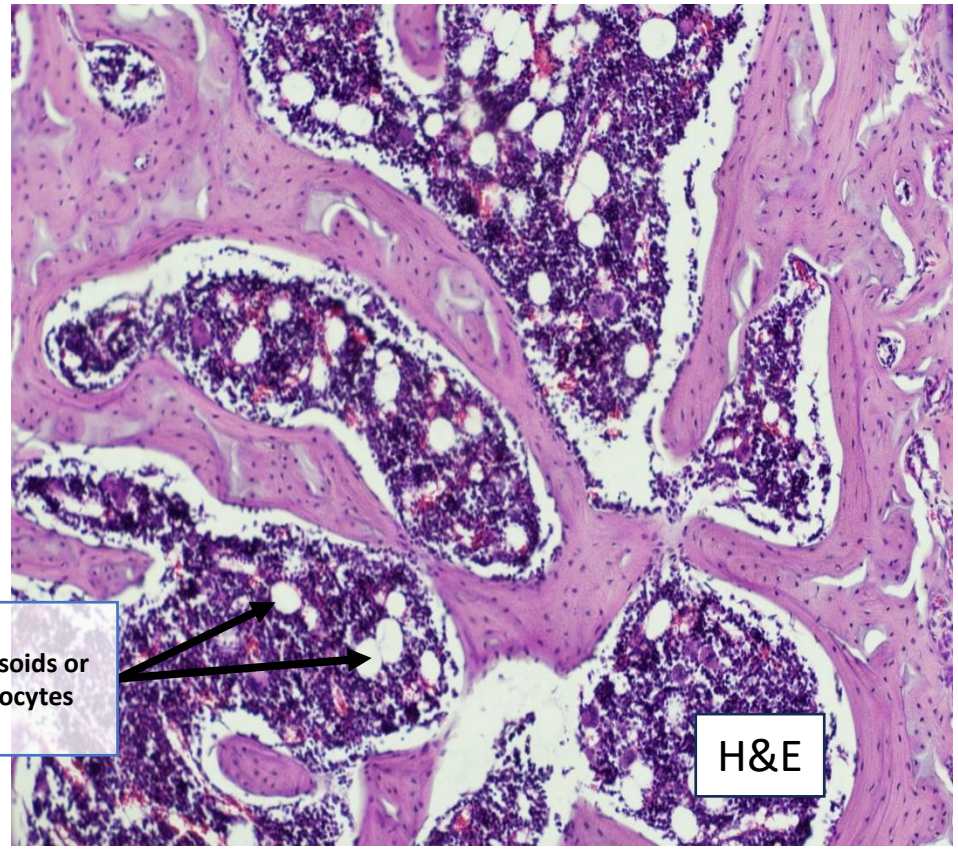

# OA model (meniscal transection (MNX))



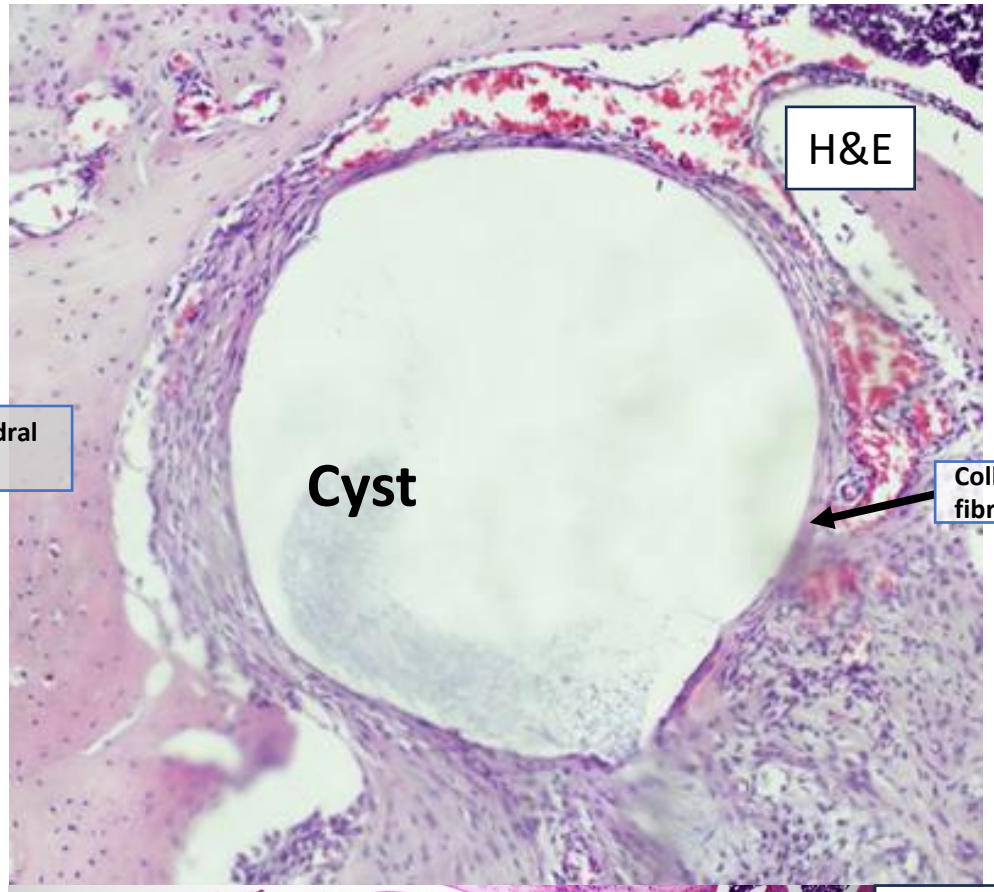
# Visual guide for scoring each of the criteria

# Cysts present

## Score=0



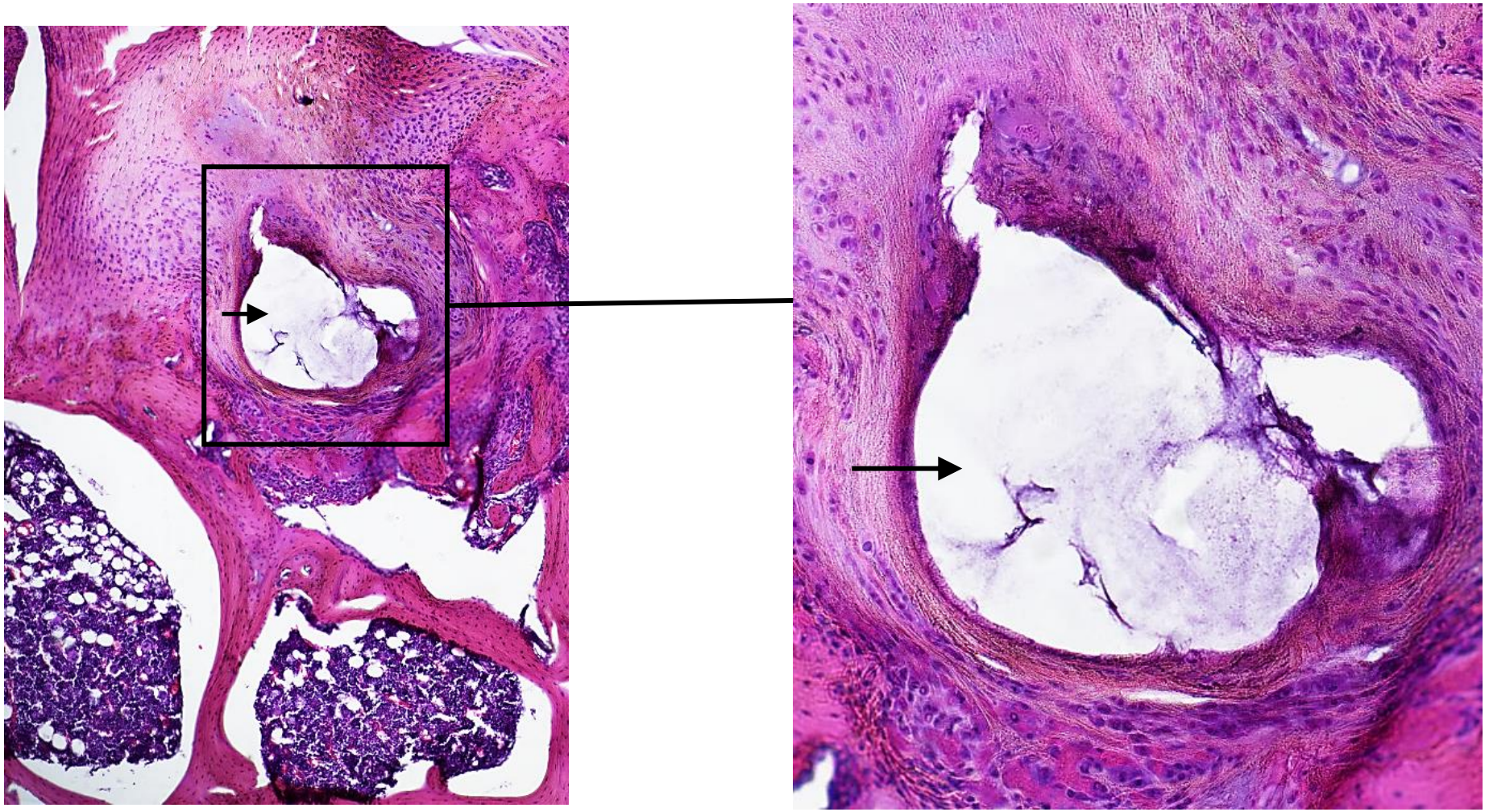

## Score= 1





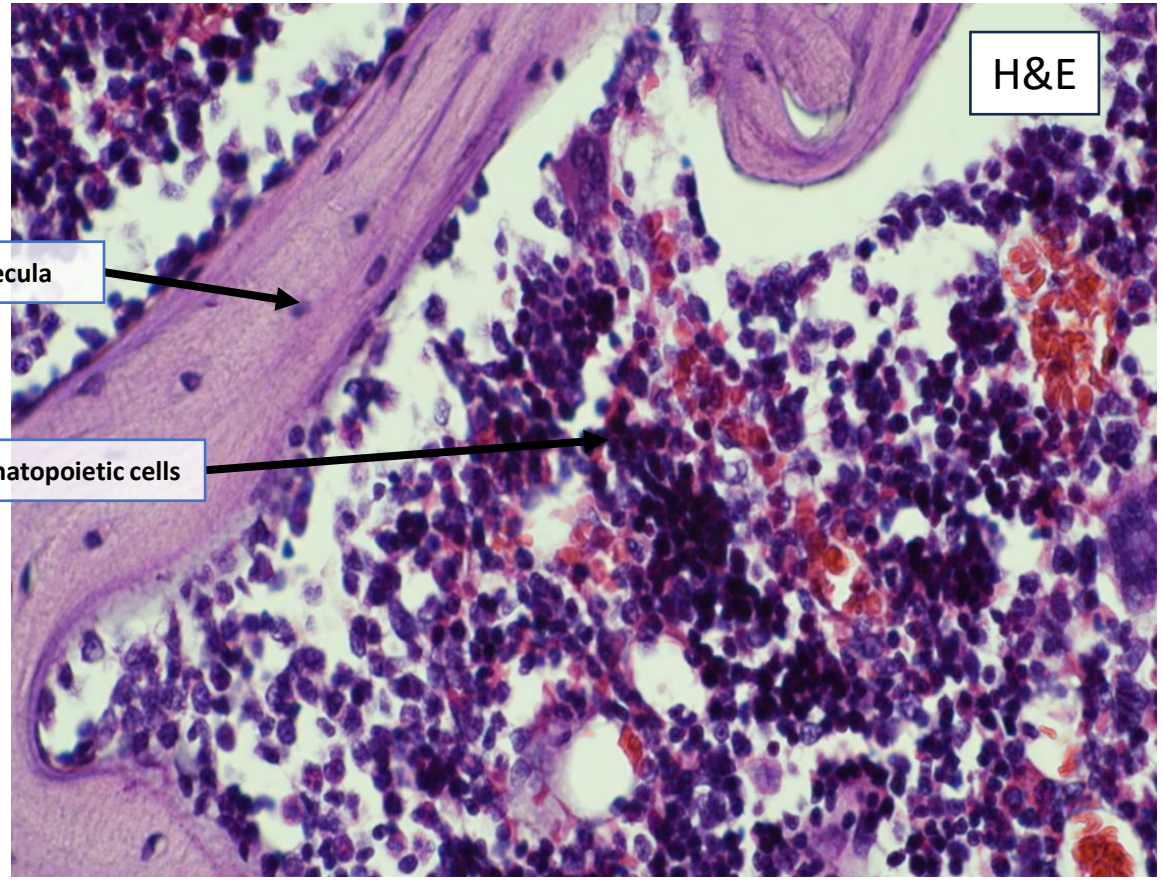
x4 lens objective lens

# Cyst at lower and higher magnification

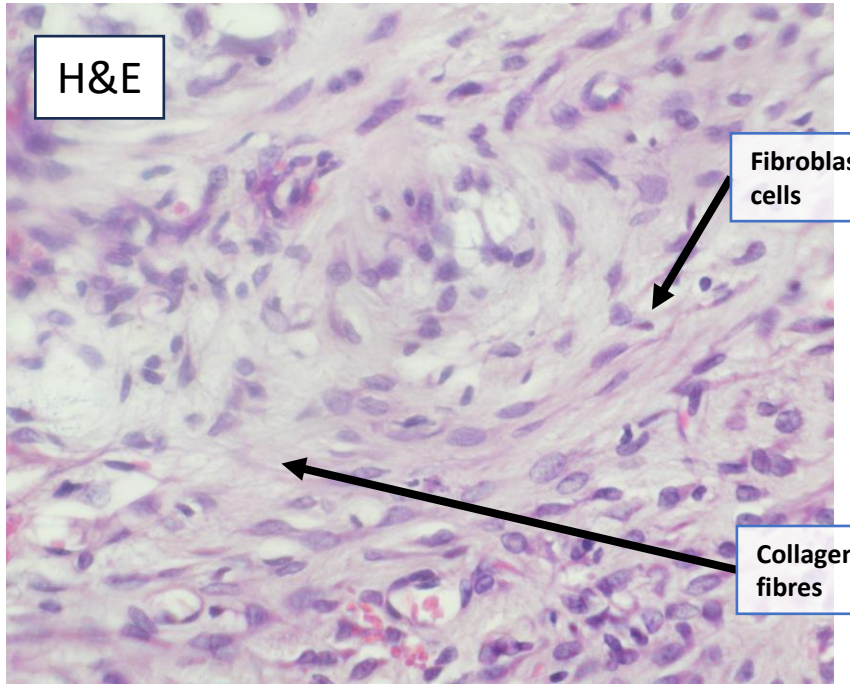


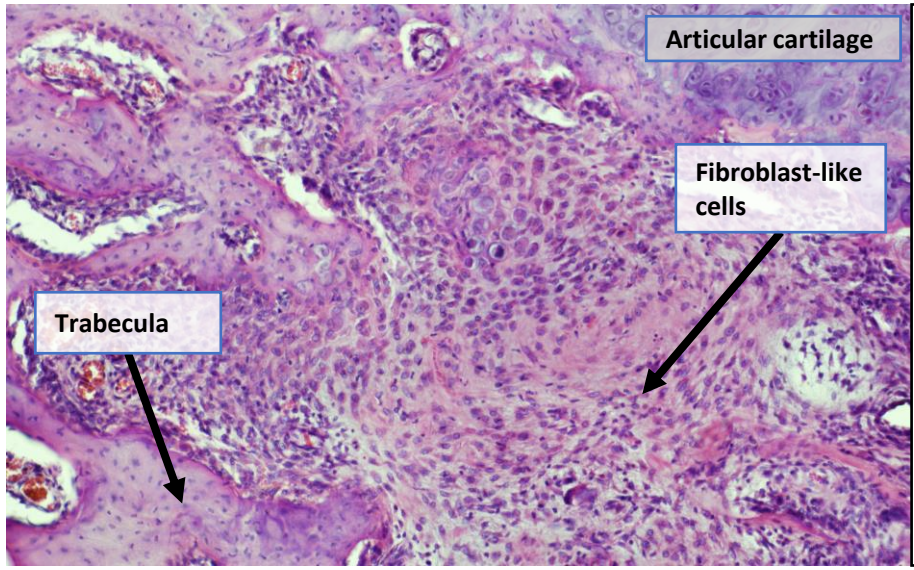
# Fibrosis present

## Score= 0



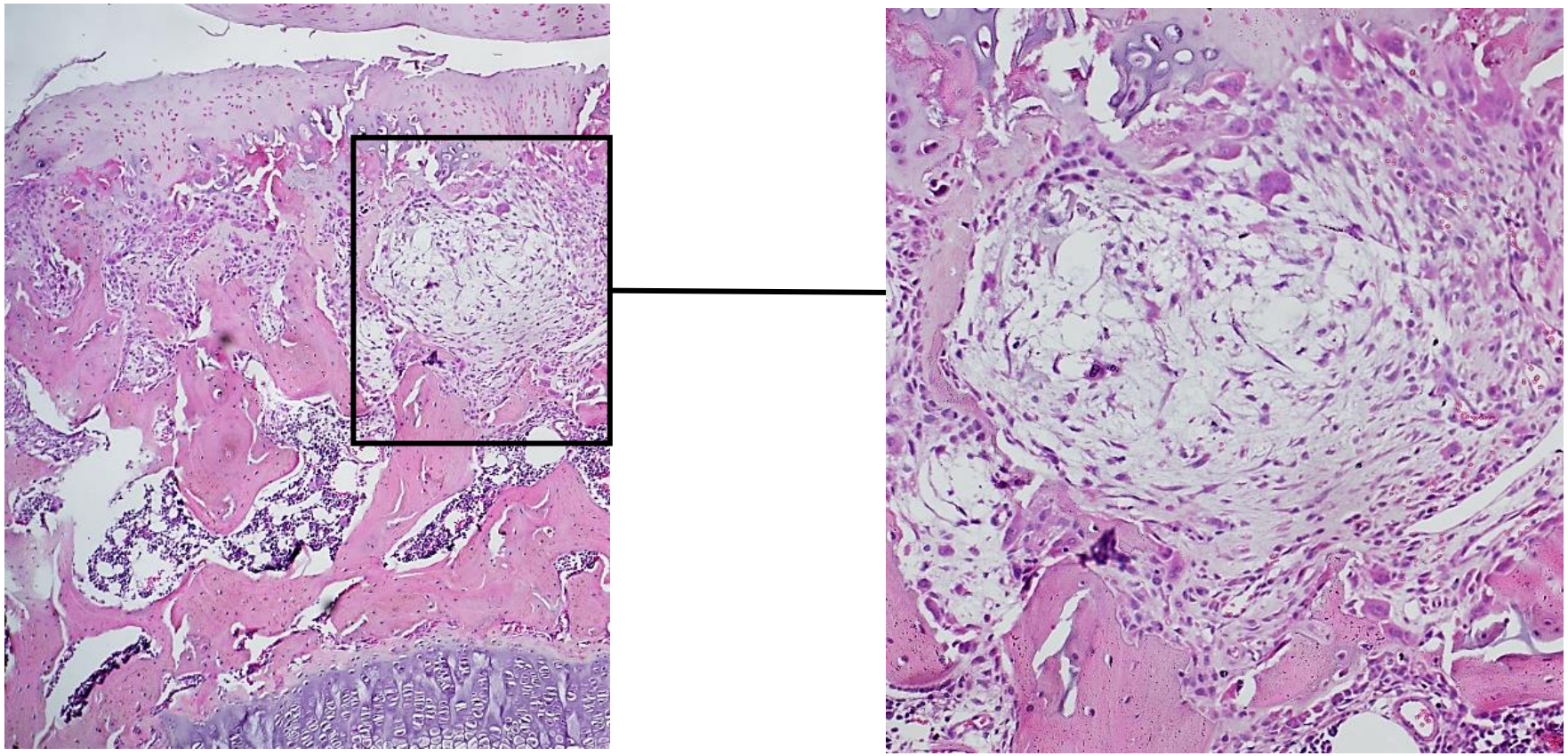

## Score= 1



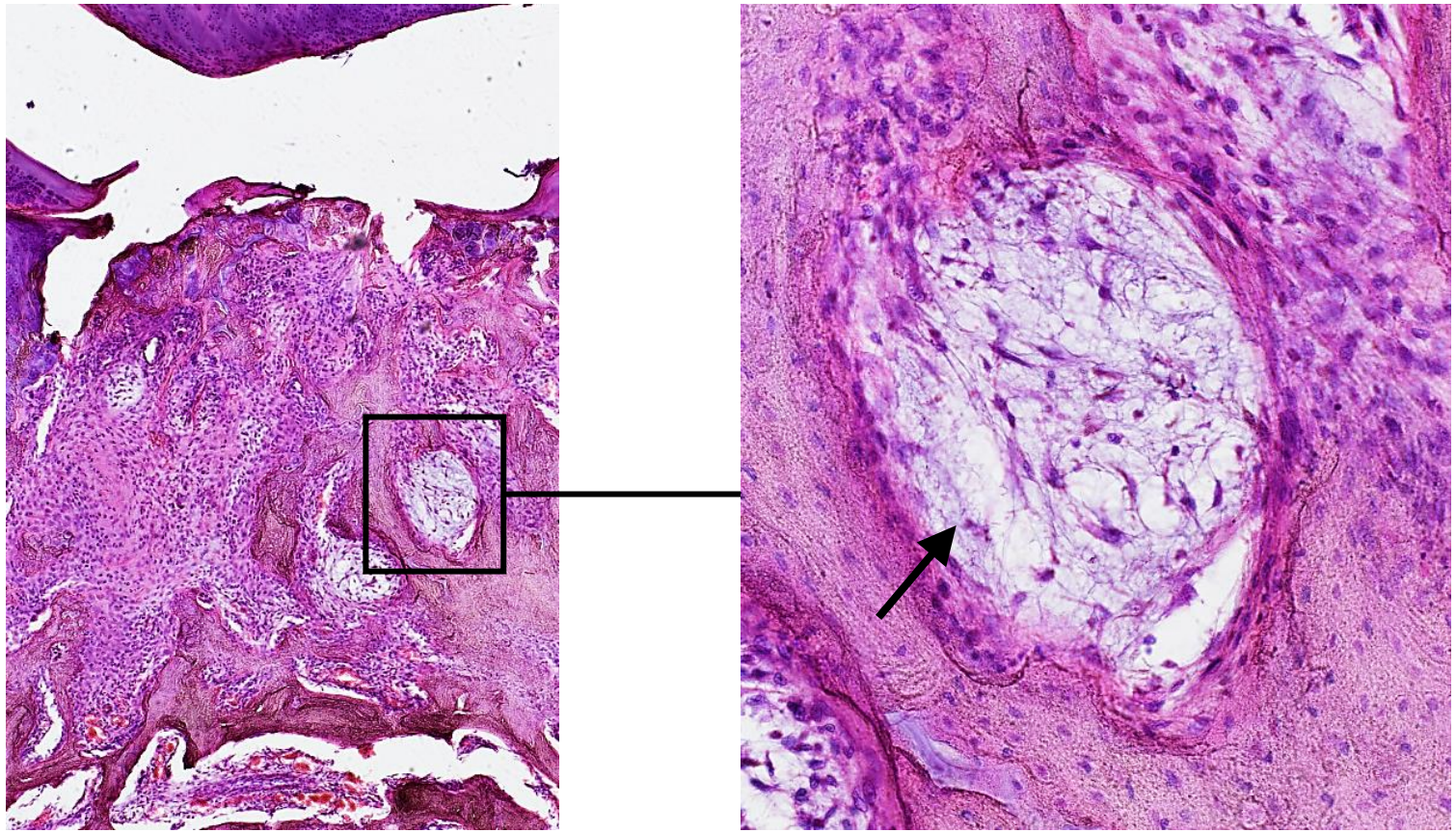




Lower power view of fibrosis

# Region of fibrosis at lower and higher magnification

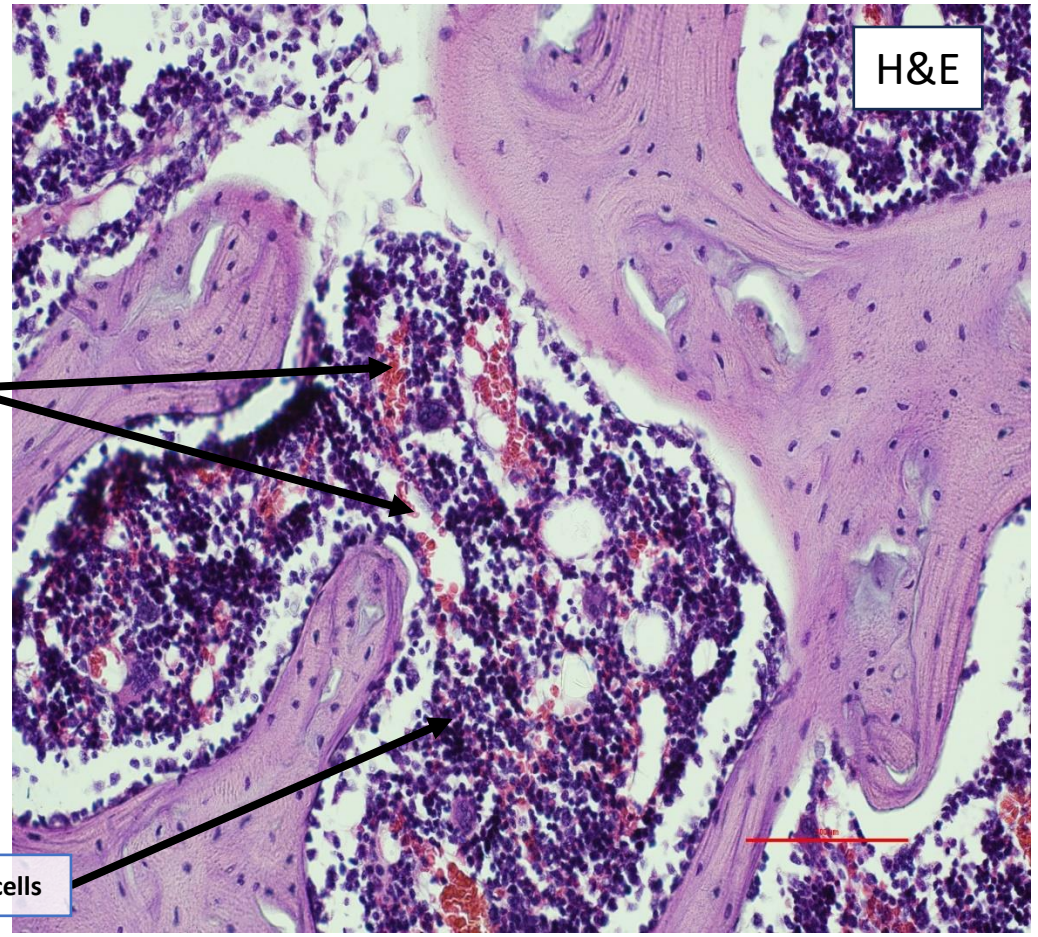


# Region of fibrosis and lower and higher magnification

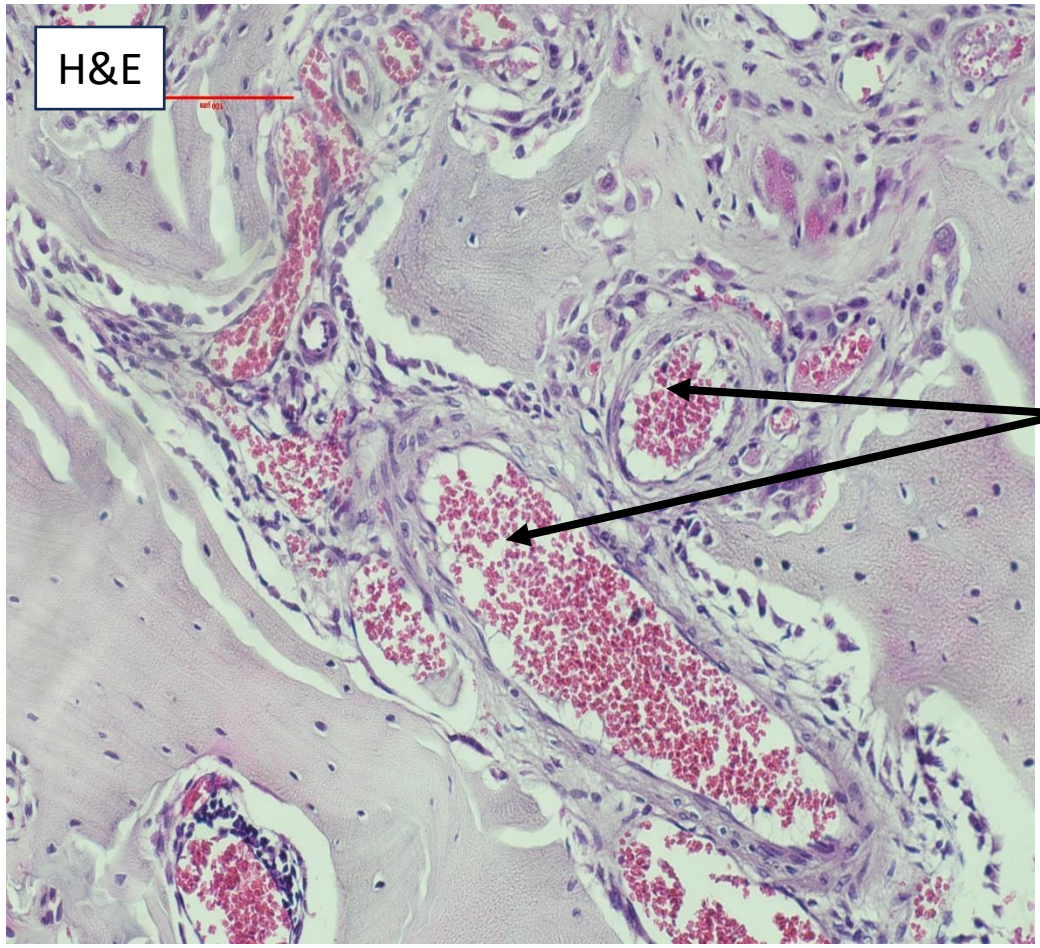


# Increased blood vessels

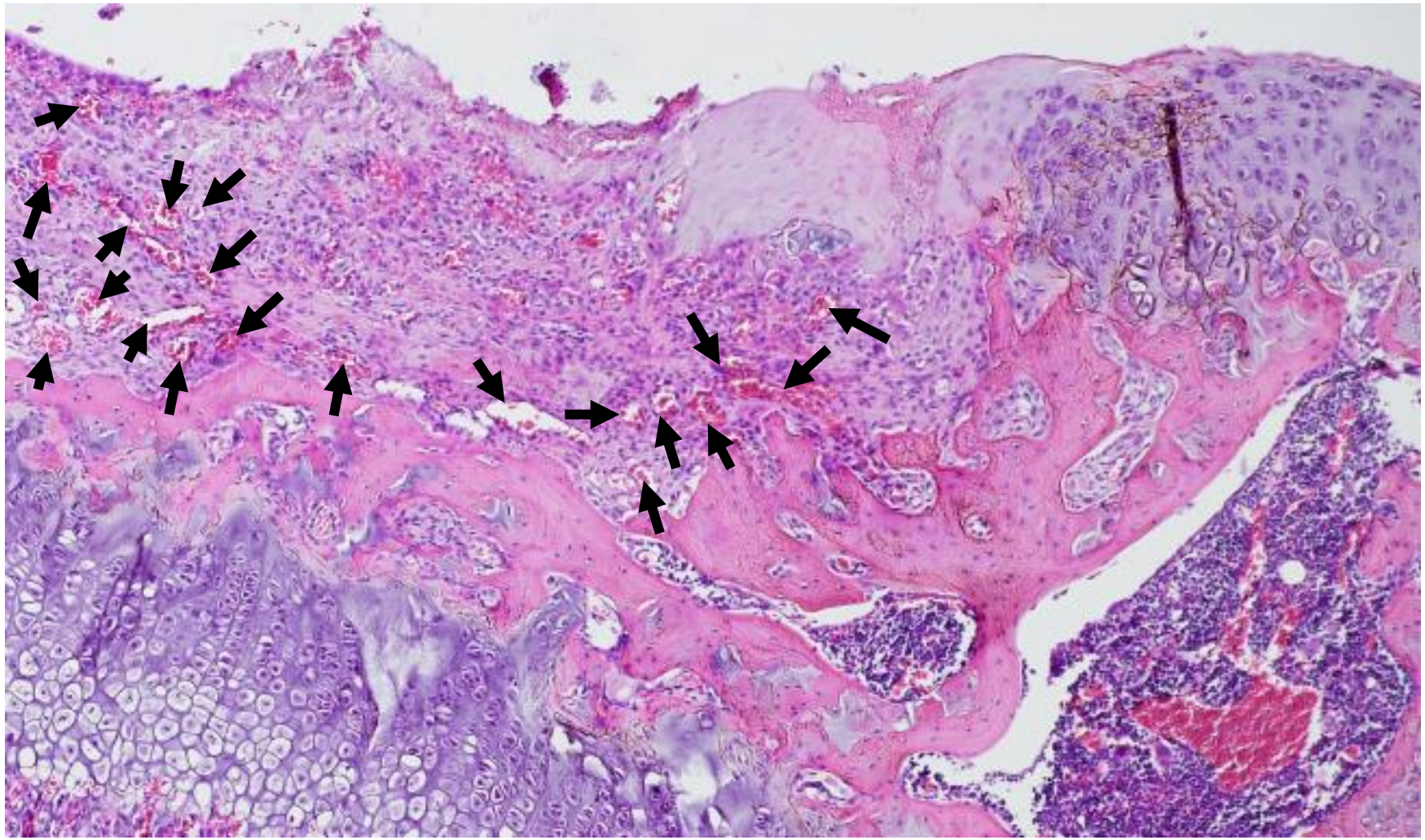
## Score= 0




## Score= 1

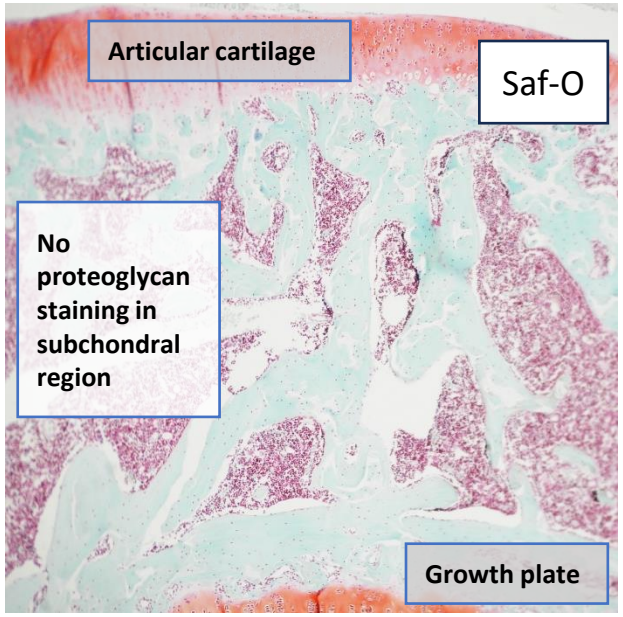


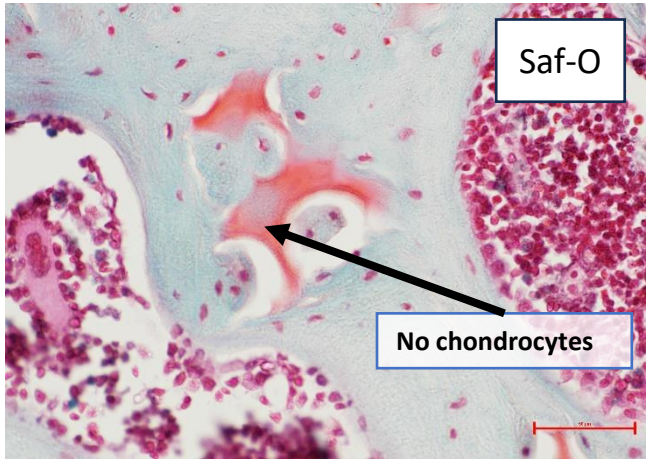
# Increased blood vessels viewed at lower magnification



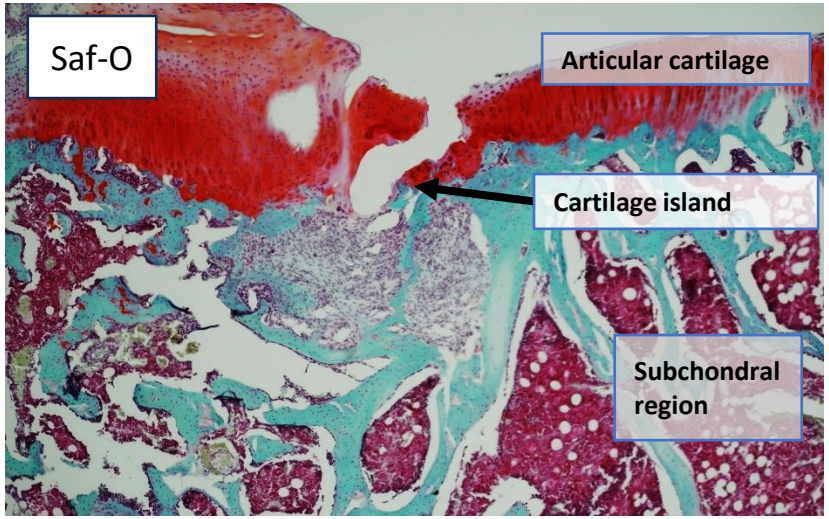
# Cartilage Islands present

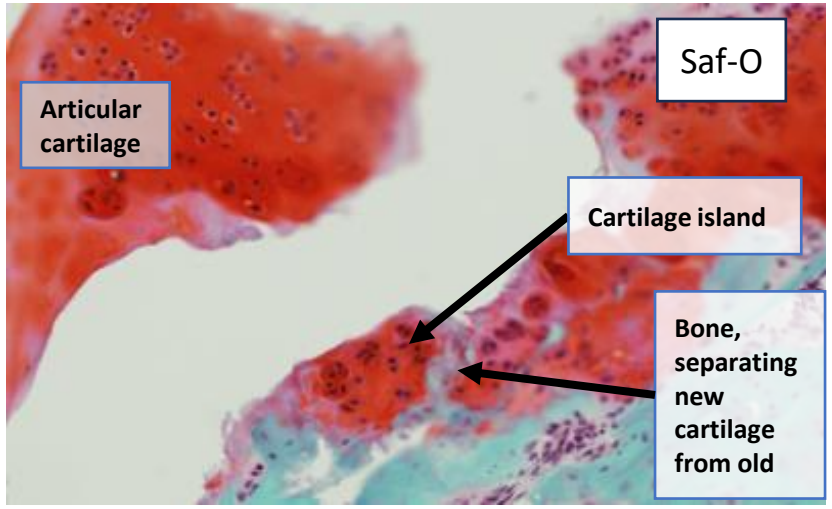
## Score= 0



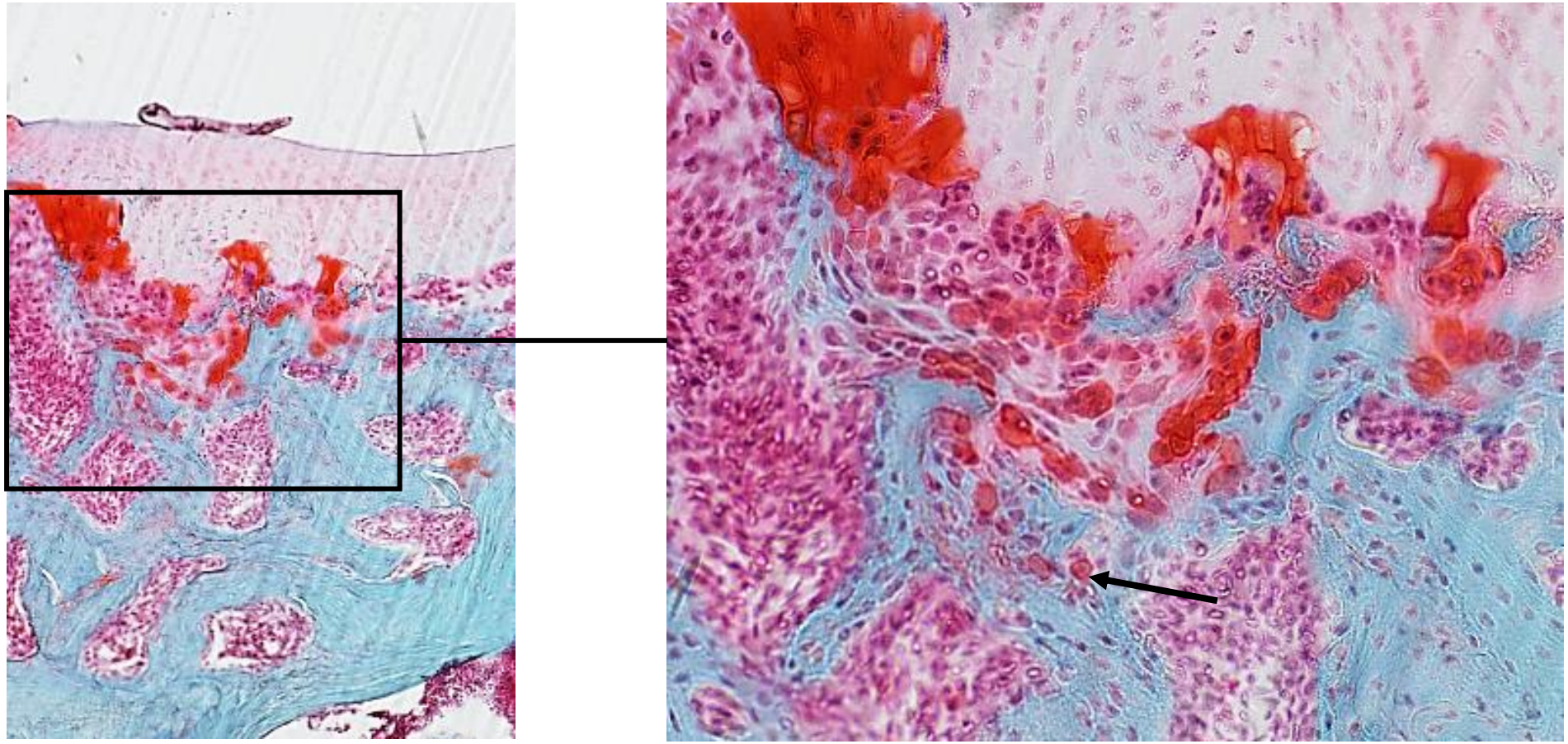




## Score= 1



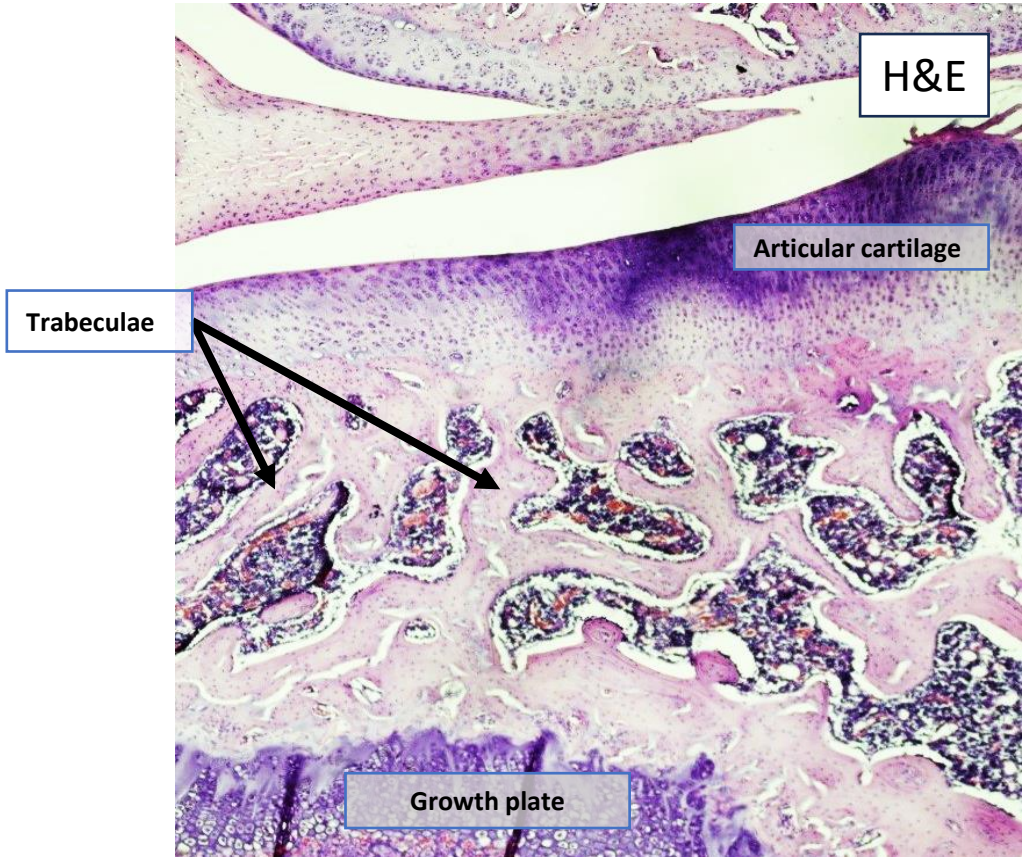



# Cartilage islands at lower and high magnification

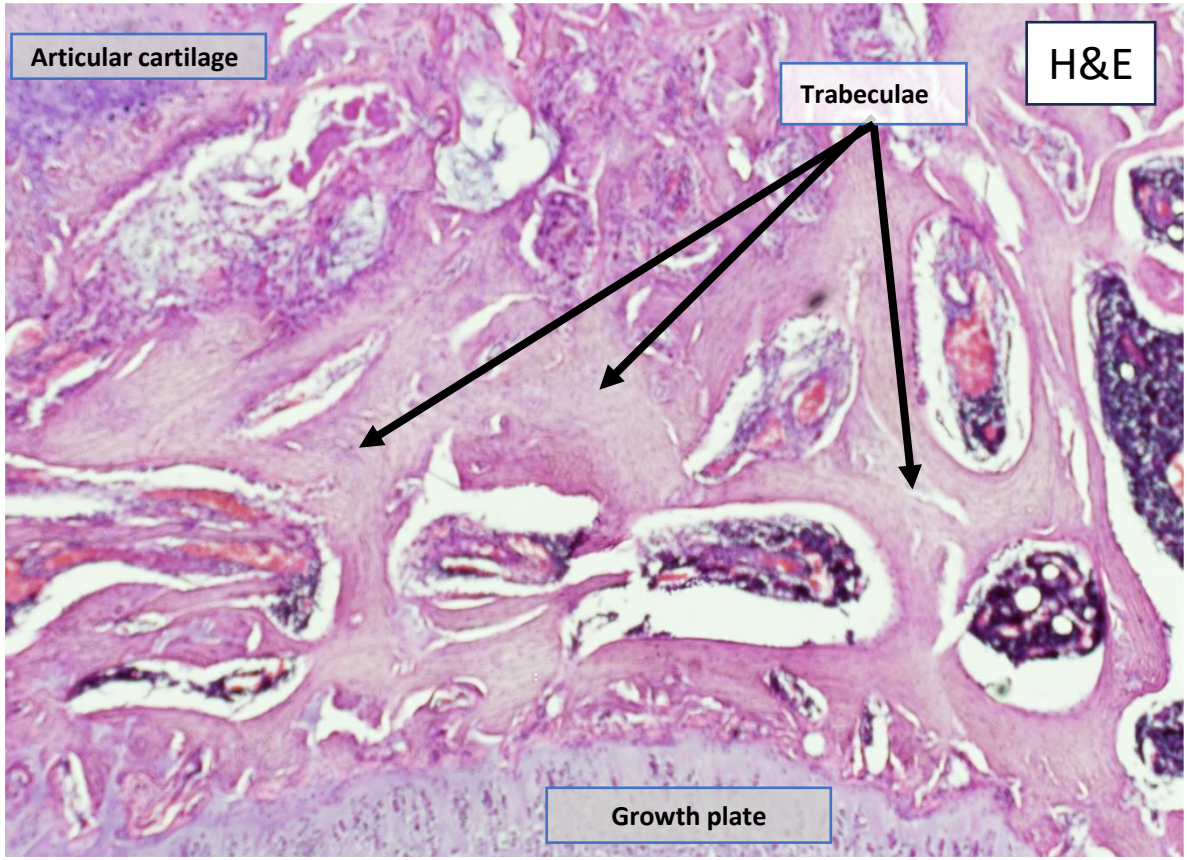


# Trabeculae Thickened

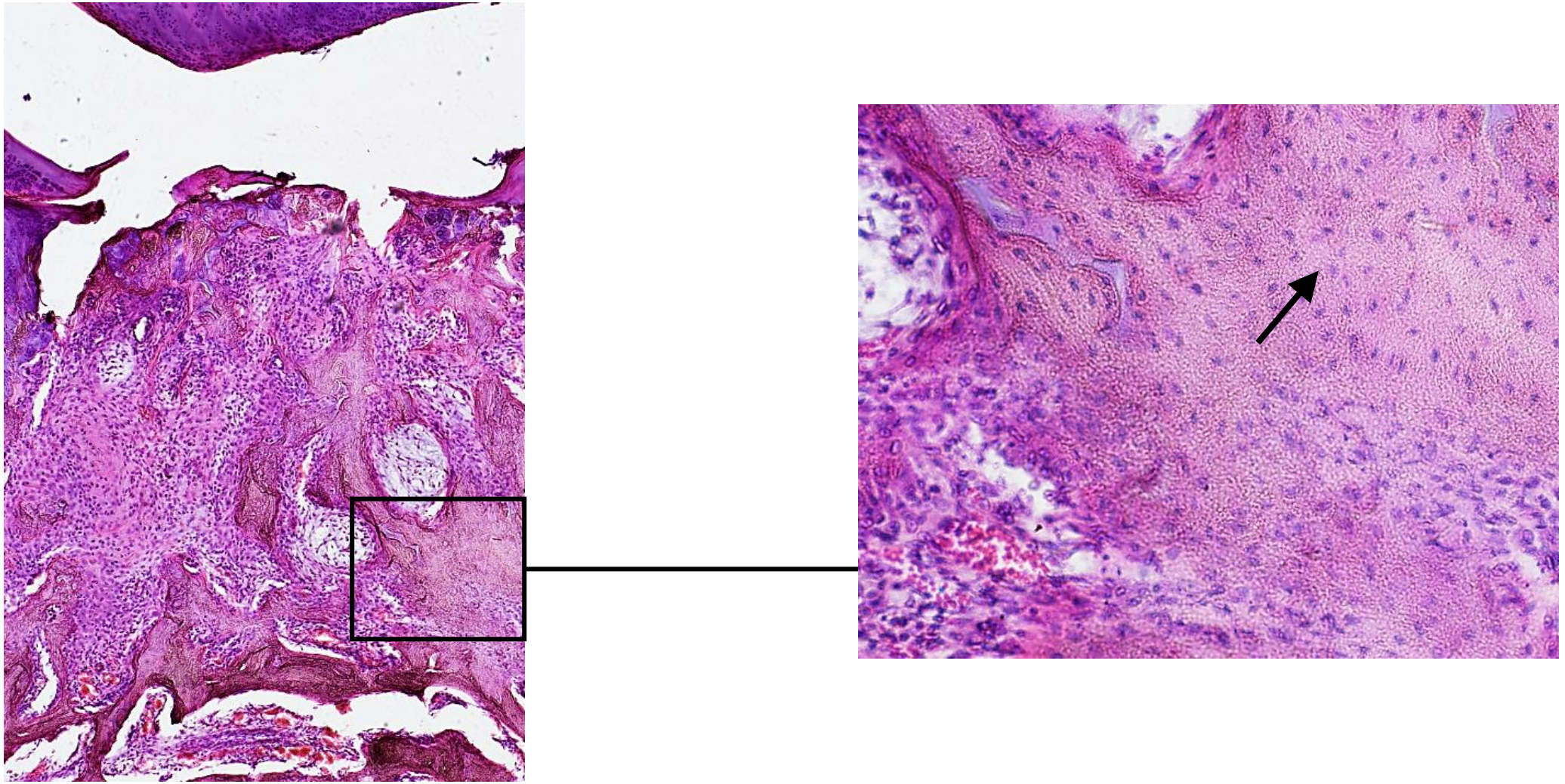
## Score= 0




## Score= 1

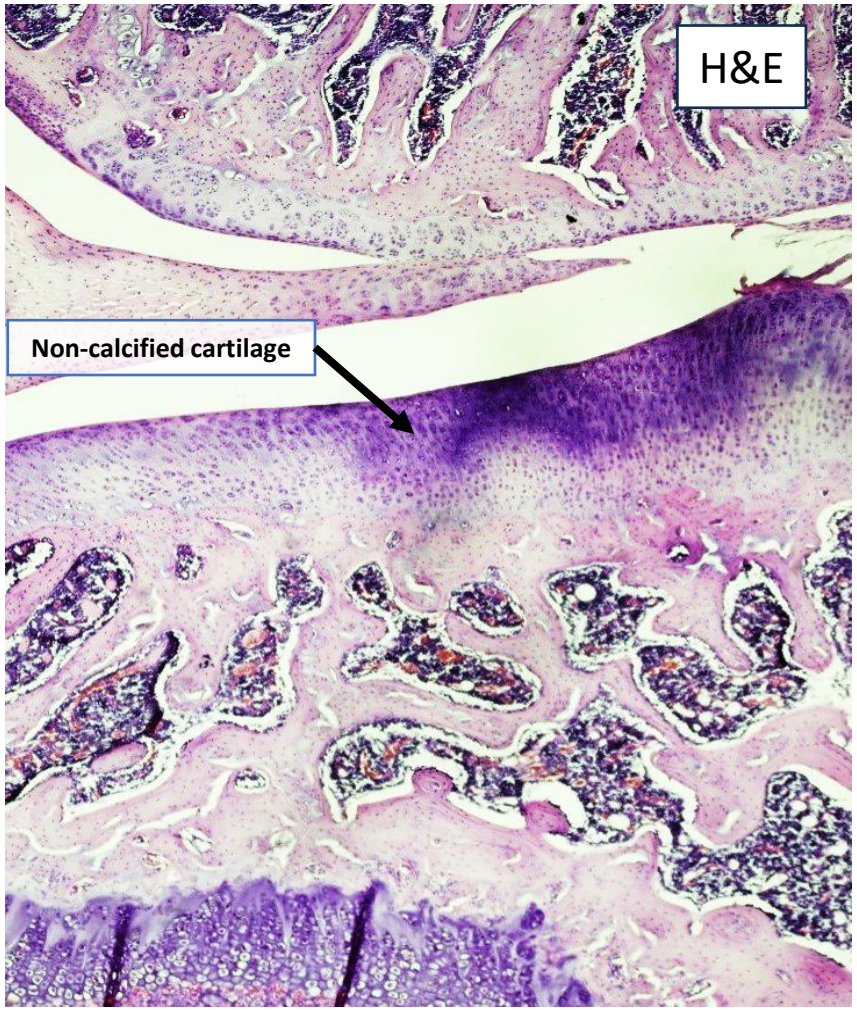


# Thickened trabeculae at lower and higher magnification

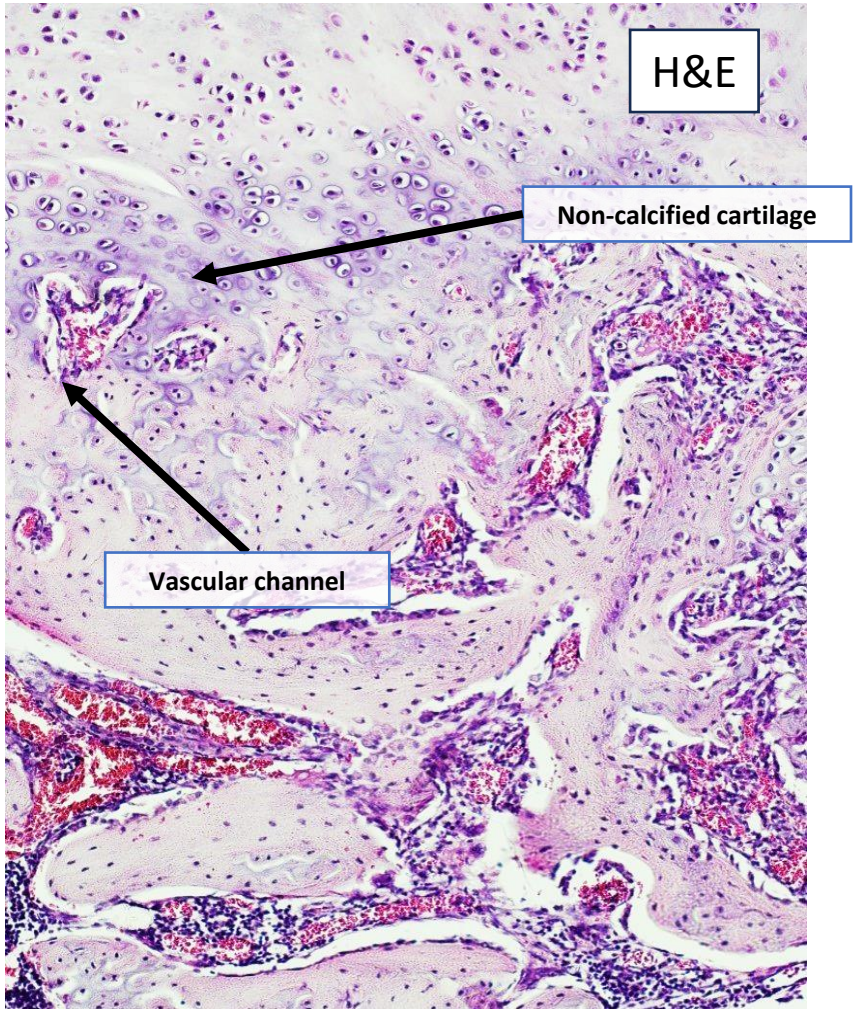


# Blood vessels entering non-calcified cartilage

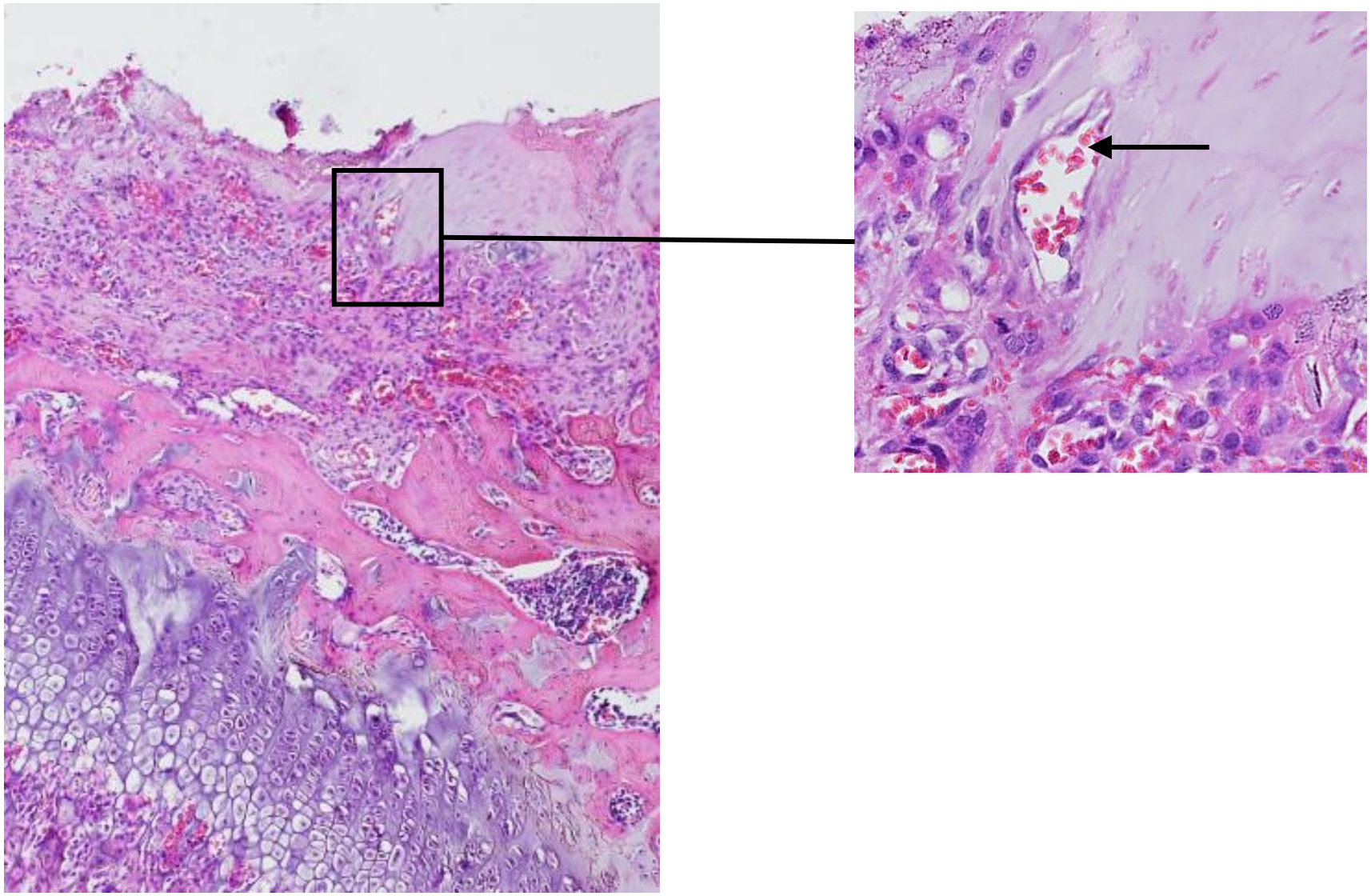
## Score= 0




## Score= 1

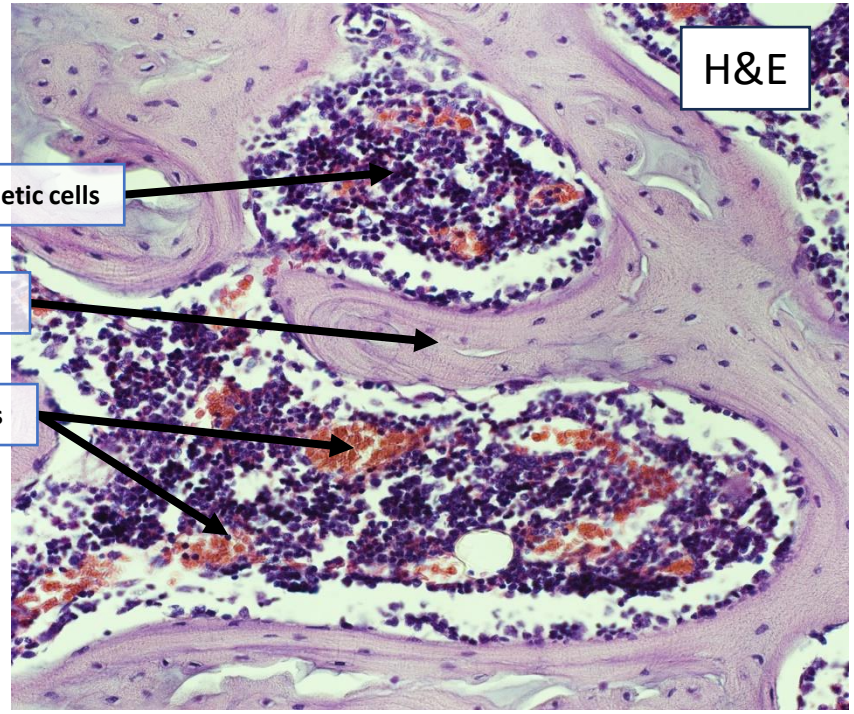


# Blood vessel entering non-calcified cartilage at lower and higher magnification

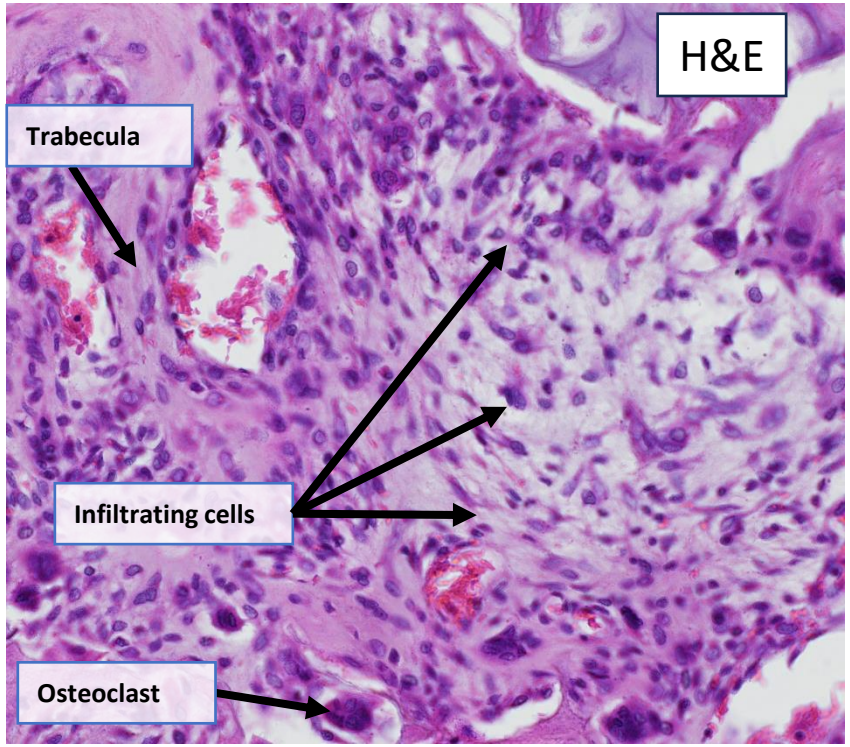


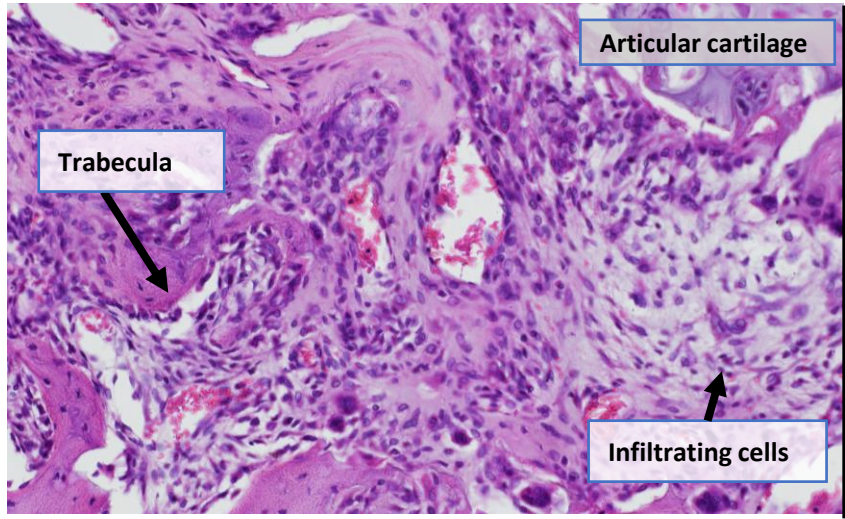
# Inflammation

## Score= 0




## Score= 1




Lower power view

# Inflammation at lower and higher magnification