



# **Connective Tissues**

# General Characteristics

- CTs include tissues such as bone, fat, and blood.
- All CTs have 3 basic components:
  1. *Specialized cells*
  2. *Extracellular protein fibers*
  3. A fluid called *ground substance*; with fibers added it is called the *matrix*.

# General Characteristics

- They occur in all parts of the body.
- They bind structures together, provide support & protection, fill spaces, store fat, produce blood vessels.
- The most common cell in cts are called *fibroblasts*.

# 3 Main Categories

1. Connective tissue proper: tissue w/ many kinds of cells & fibers suspended in sticky ground substance. There are 2 types:
  - (a) loose connective tissue
  - (b) dense connective tissue

# 3 Main Categories

2. Fluid connective tissue: Contains cells suspended in a watery matrix. 2 types:
  - (a) Blood
  - (b) Lymph

# 3 Main Categories

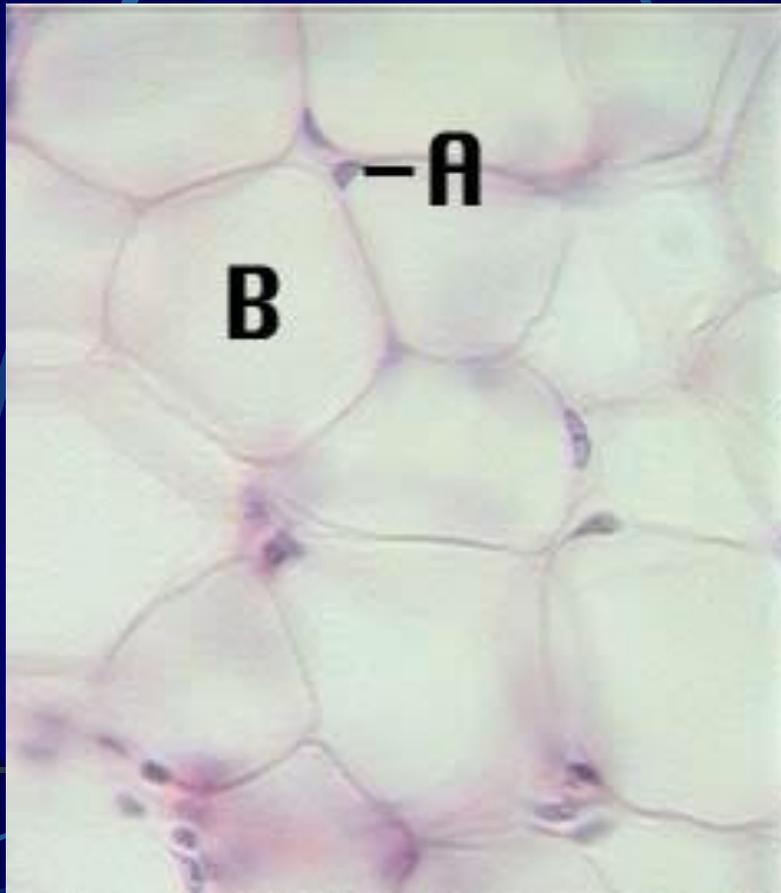
3. Supporting cts: The matrix is jelly like and can be calcified (impregnated with calcium salts). Two types:
  - (a) cartilage
  - (b) bone

# The Cells of CT Proper

- Fibroblasts: The most abundant and the only cell that's found in all proper cts.
- Macrophages: large amoeboid cells scattered through the matrix. Used in body defense

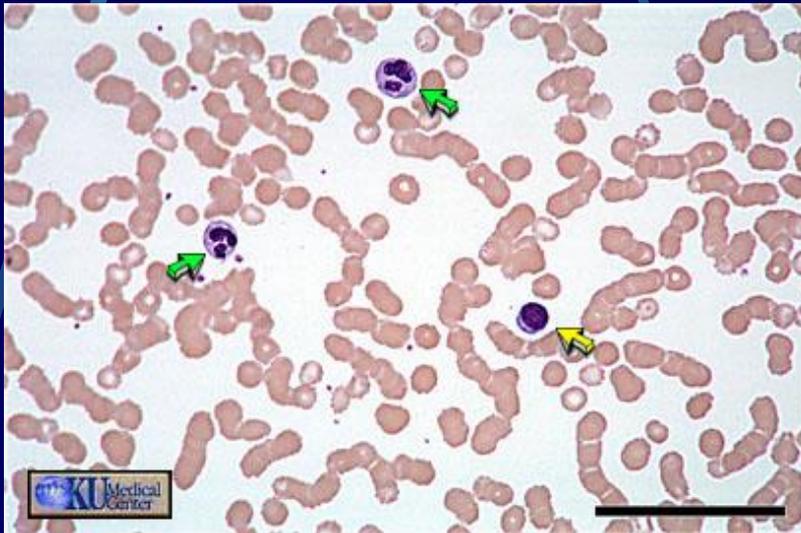
# The Cells of CT Proper

- Adipose Cells: contains a drop of fat.



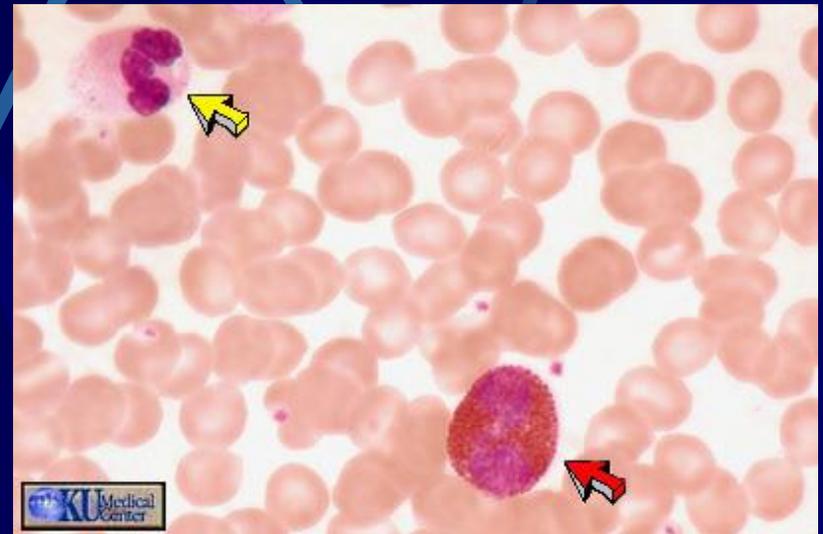
# Fluid CT

- Lymphocytes: Can move through the body, especially when damage or infection occurs. They can make *plasma cells* that produce *antibodies*.



# Fluid CT

- Microphages: amoeboid blood cells that move through cts during infection or injury. They are called *neutrophils* & *eosinophils*.

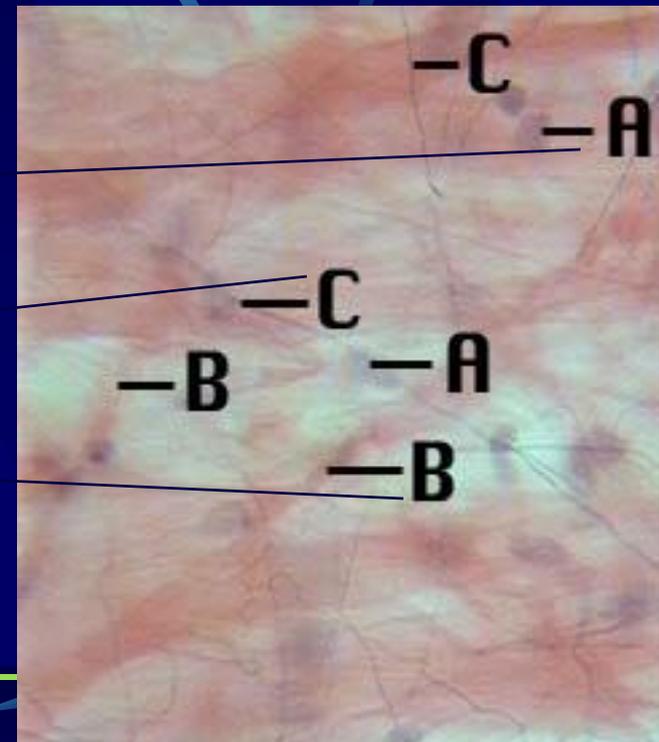
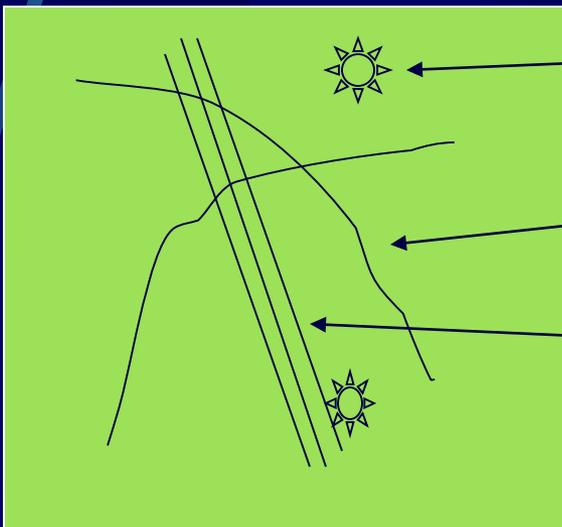


# The Fibers of CTs

- Collagen fibers: long & straight and stronger than steel. Is flexible but not very elastic. **Tendons** are almost all collagen fibers. Tendons connect muscle to bone.
- Elastic fibers: Contain the protein **elastin**. Will stretch, found in **ligaments** (connect bone to bone.)

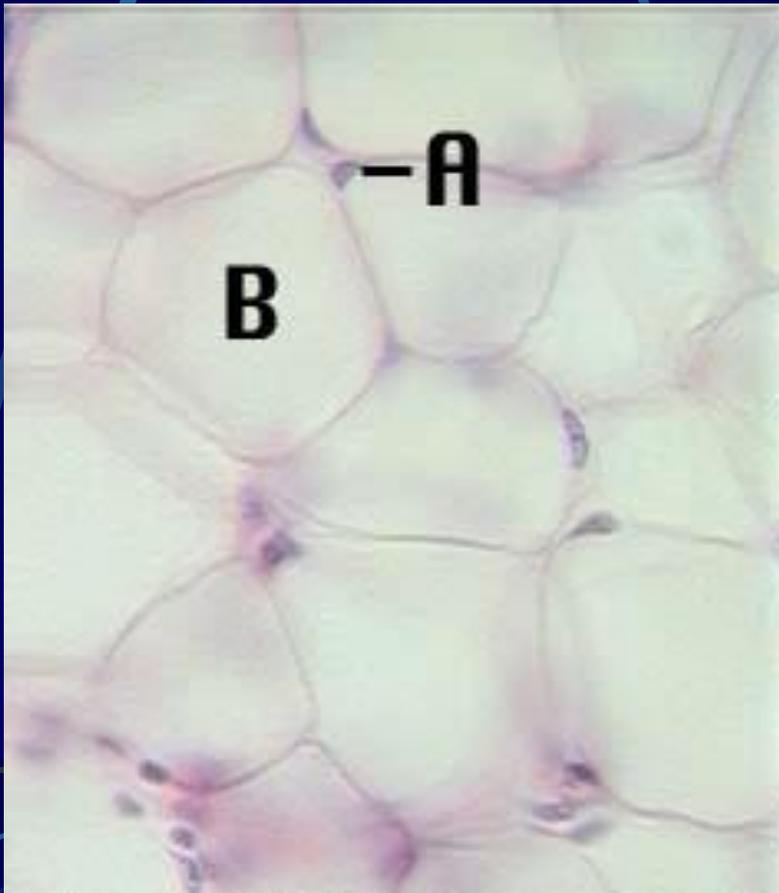
# Loose CT

- Areolar tissue: The “packing material” of the body. Contains all the cells and fibers of the CTs.



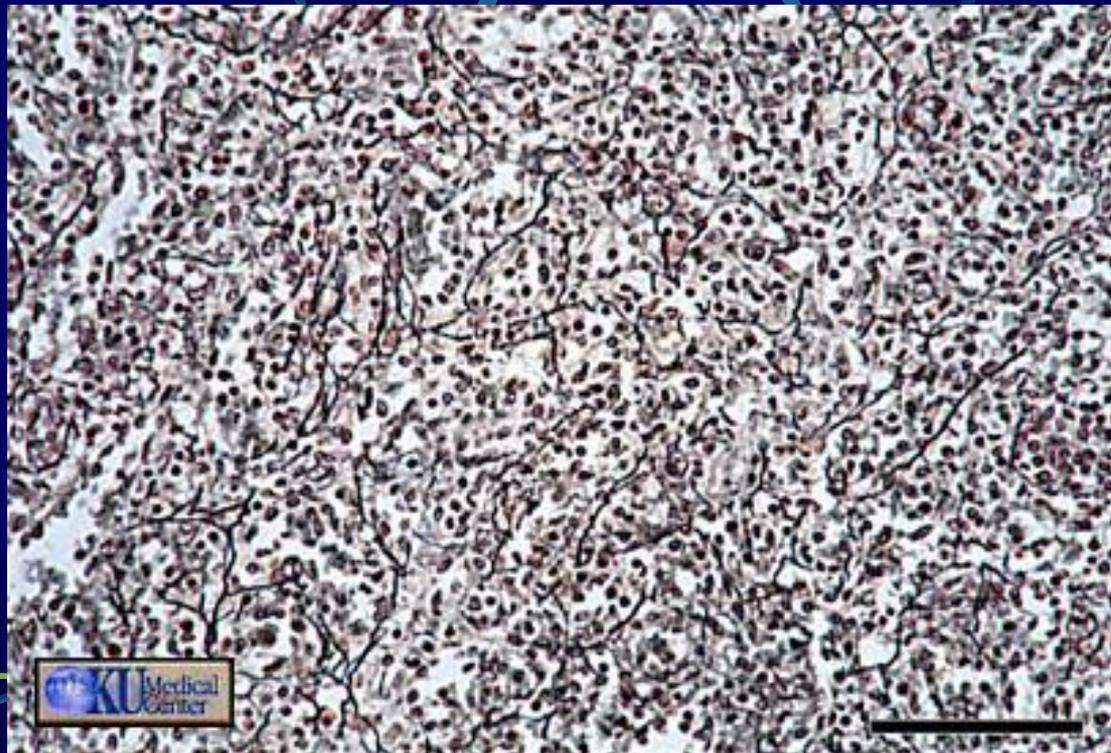
# Loose CT

- Adipose tissue: Fat!



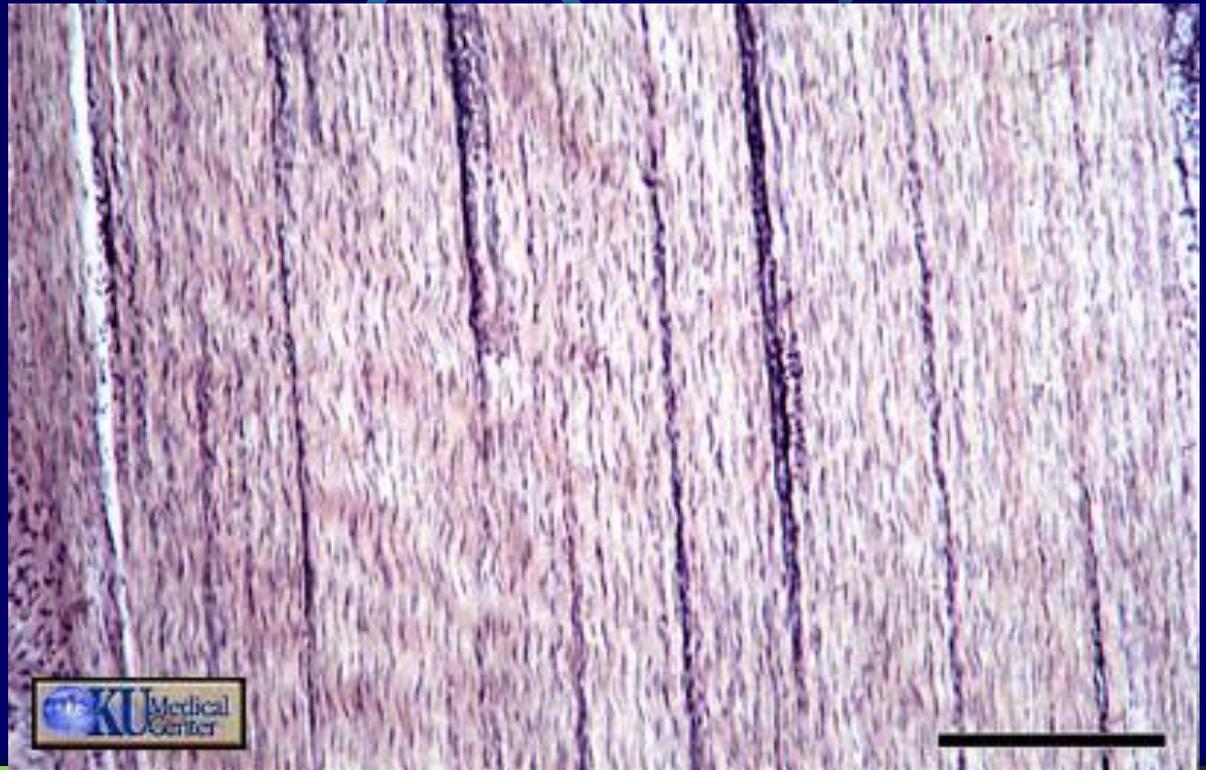
# Loose CT

- Reticular tissue: Organ tissue; fills in spaces.

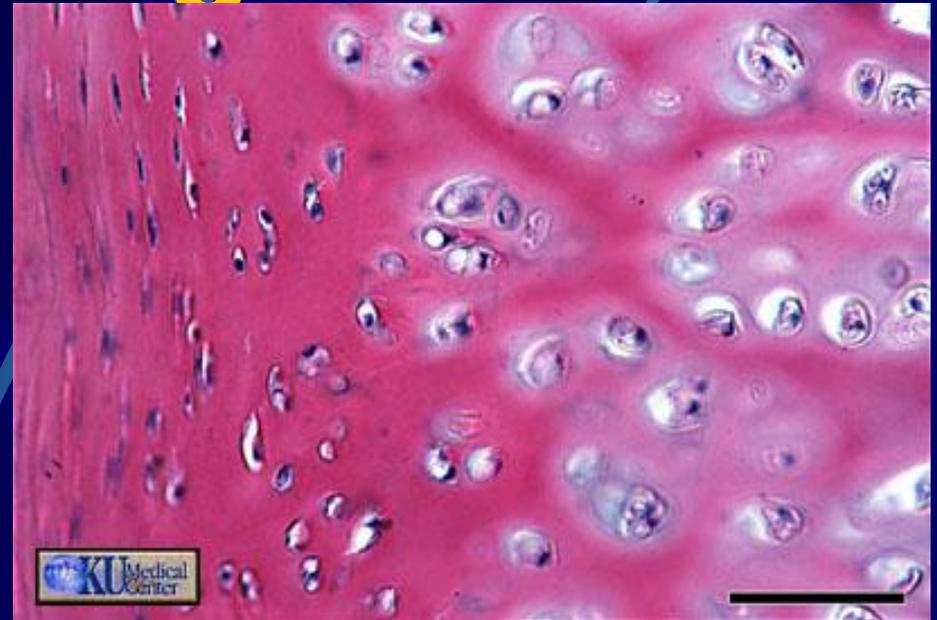
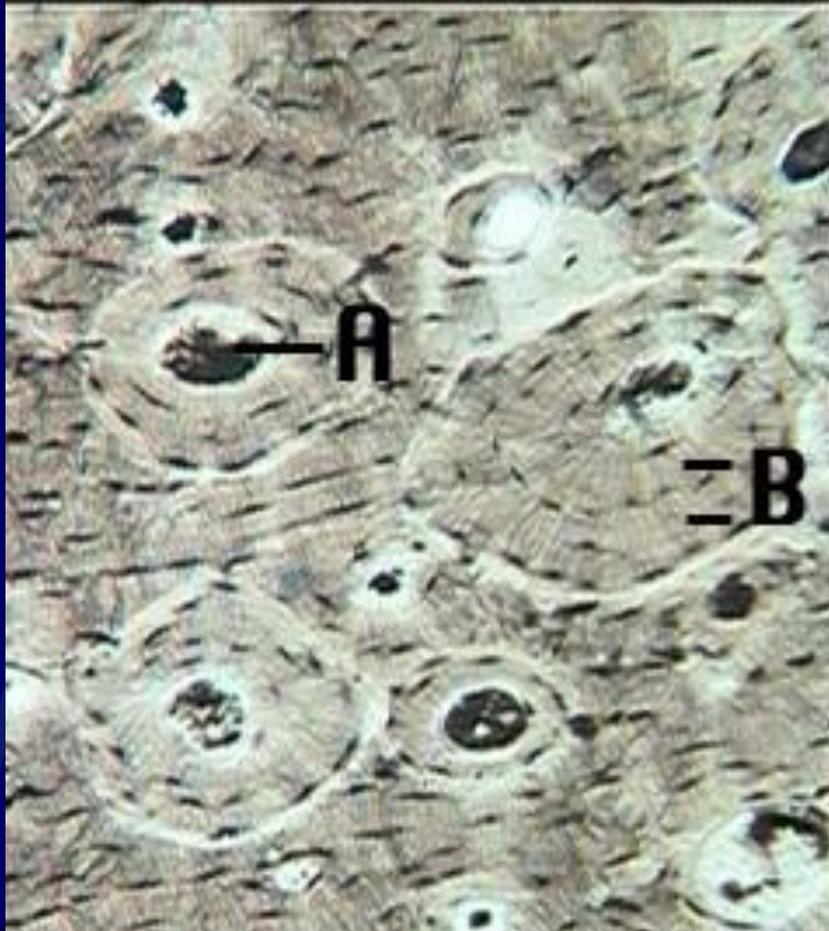


# Dense CTs

- Collagenous tissues: Tendons & Ligaments.



# Supporting CTs: Bone & Cartilage



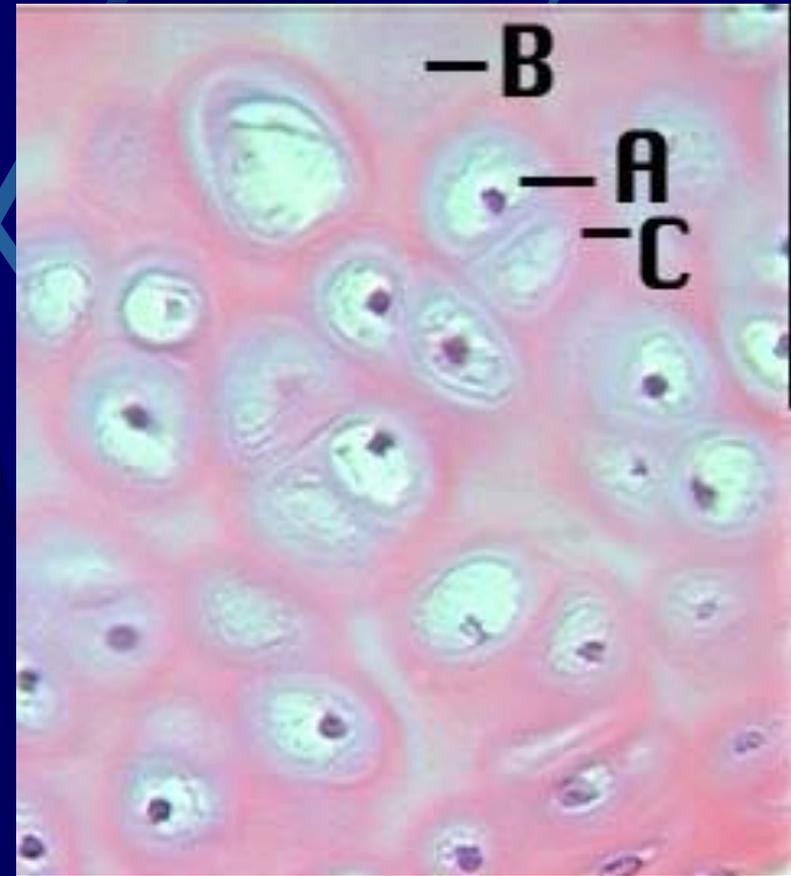
# Supporting CTs

- Cartilage
  1. Hyaline
  2. Elastic
  3. Fibro

# Cartilage

- Cartilage has a thick matrix which is gel like.
- Cartilage cells are called *chondrocytes* and they live in small chambers in the matrix called *lacunae*.
- There are no blood vessels in cartilage. All nutrient & waste product exchange must occur by diffusion.

# Hyaline Cartilage



Note the matrix, lacunae, & chondrocytes

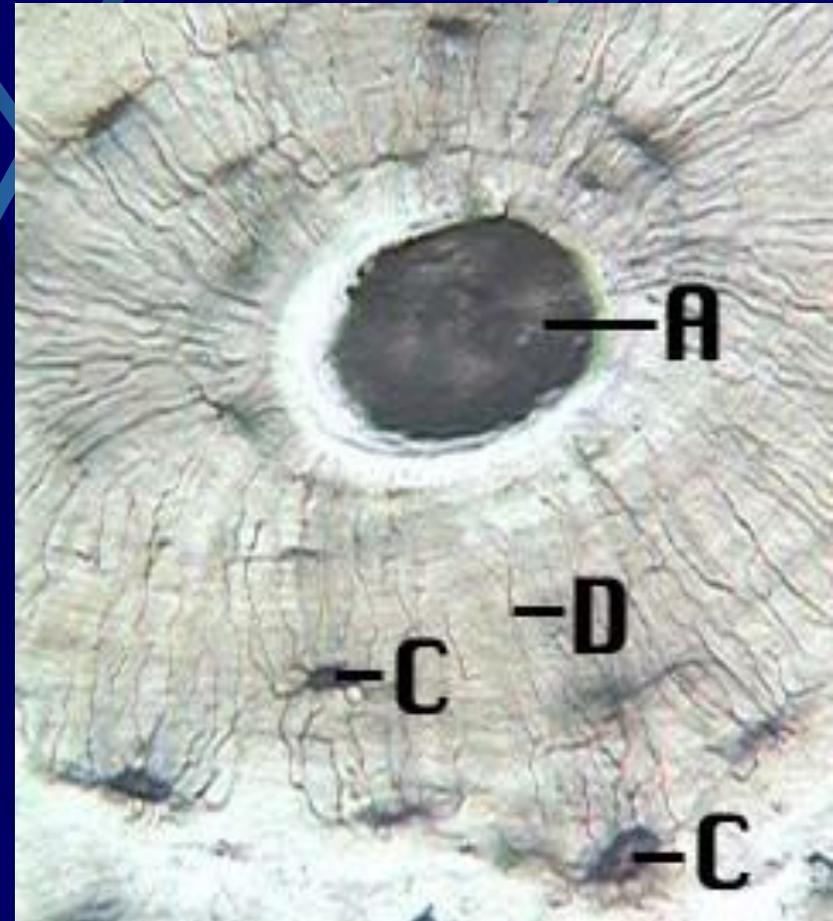
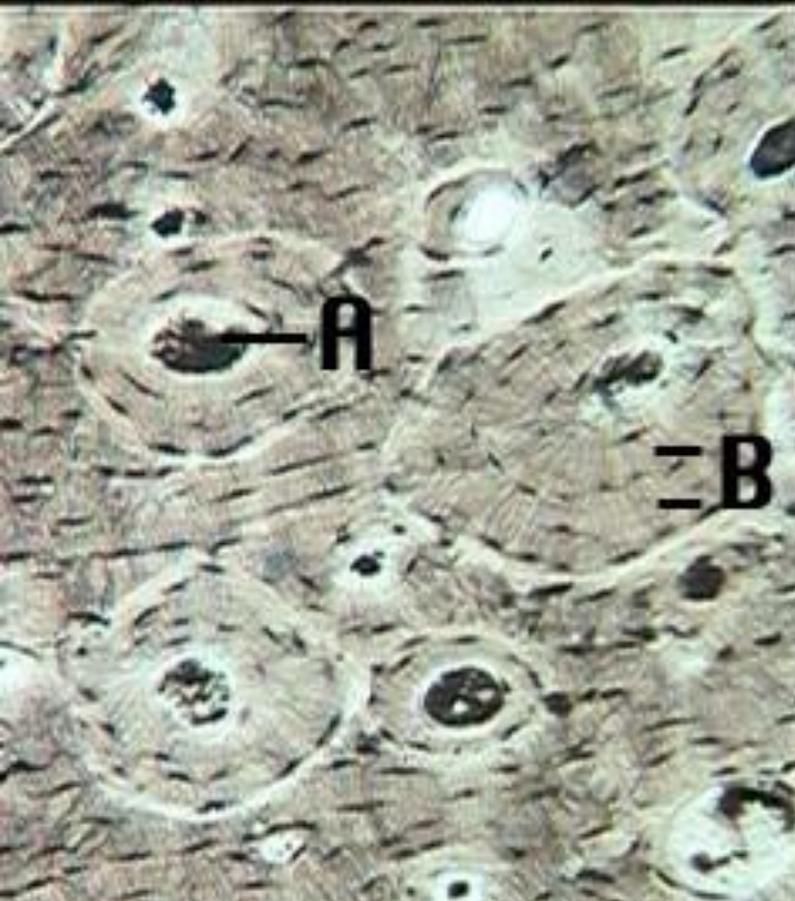
# Bone

- The matrix in bone is rigid due to collagenous fibers and calcium salts.
- The two calcium salts are *calcium phosphate* and *calcium carbonate*.
- Bone cells are called *osteocytes* and they live in lacunae.

# Bone (continued)

- Since the lacunae are surrounded by dense bone the osteocytes communicate through channels.
- The channels are called *canaliculi*.
- The canaliculi are all connected to the *central* or *haversian canals*, which contain blood vessels & nerves.

# Bone



Note central canal, osteocytes, canaliculi.

# Tissues To Know

- Blood
- Adipose
- Areolar
- Fibrocartilage
- Elastic Cartilage
- Hyaline Cartilage
- Bone
- Ligament
- Tendon
- Reticular