Blood, Cartilage & Bone

Lab 7

Blood Connective Tissue

- **Blood is a fluid connective tissue that circulates through the body.**
- **Blood is composed of red blood cells (RBC), white blood cells (WBC), platelets, and plasma.**
- **It is considered a connective tissue for two basic reasons:**

1. Embryologically, it has the same origin (mesodermal).

2. Connects the body system together.

Classification of blood cells

- **Enucleated erythrocyte [Red Blood Cell (RBC)].**
- **Nucleated leukocyte [White Blood Cell (WBC)].**

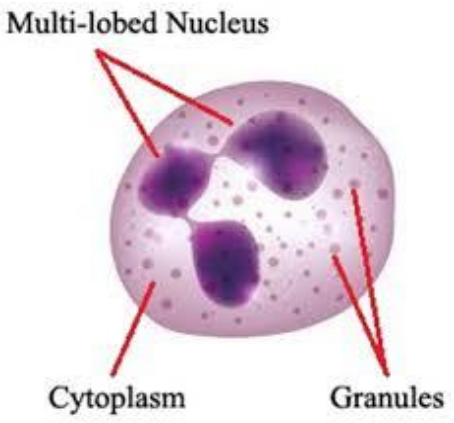
Classification of white blood cells:

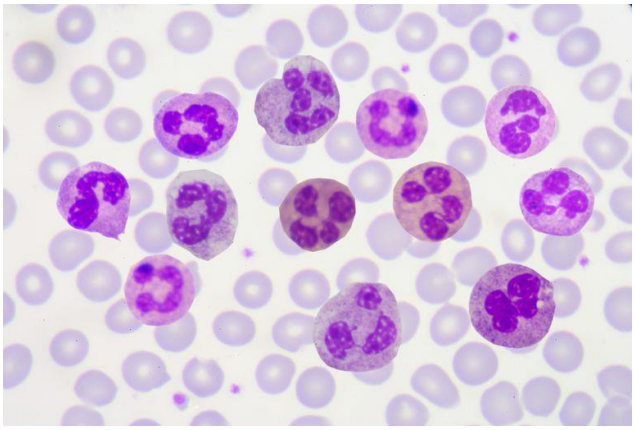
White blood cells are divided into granulocytes & agranulocytes, distinguished by the presence or absence of granules in the cytoplasm.

- **Granulocytes include Neutrophils, basophils and Eosinophils.**
- **Agranulocytes include Lymphocytes and Monocytes.**

Granulocyte = Neutrophil

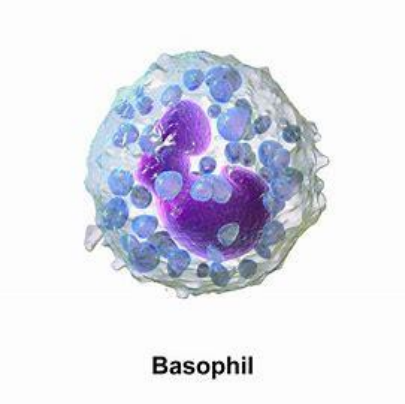
- **60 - 70% of WBCs.**
- **Have 3 - 4 lobes connected by tapering chromatin strands.**

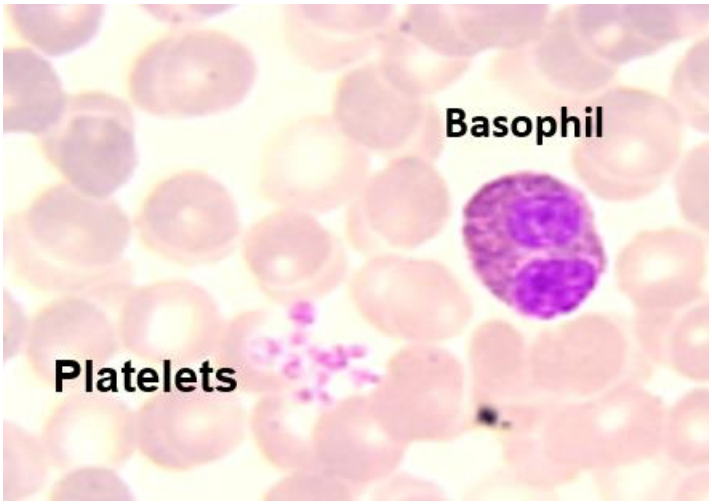




Granulocyte = Basophil

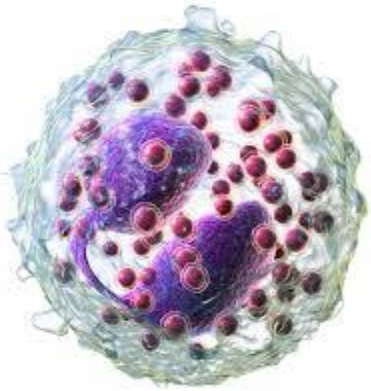
- 0.5 - 1% of circulating WBCs.
- Bilobed.

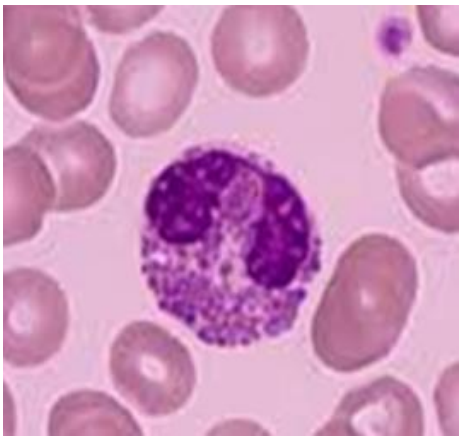




Granulocyte = Eosinophil

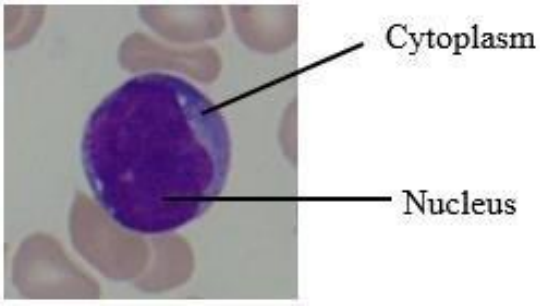
- 1 - 4% of WBCs.
- Are bilobed nucleus.

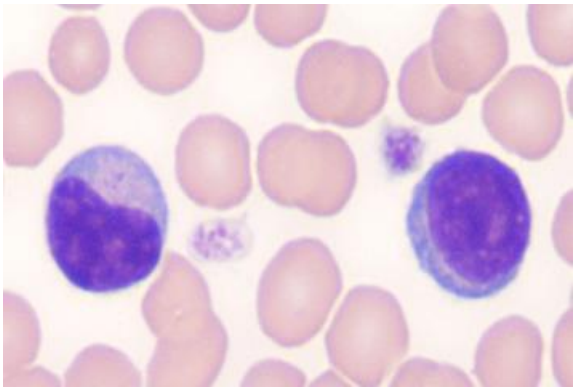




Agranulocyte = Lymphocyte

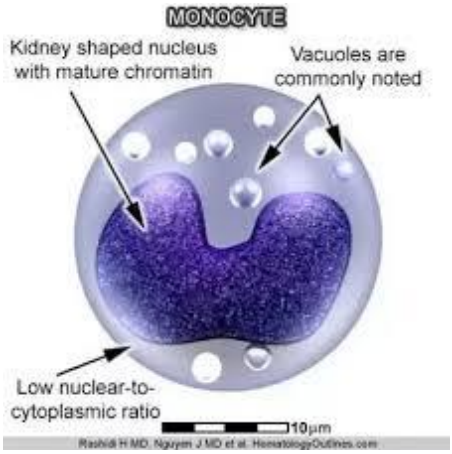
- 20 - 40 % of the WBCs.
- Has a round nucleus and a small amount of cytoplasm.

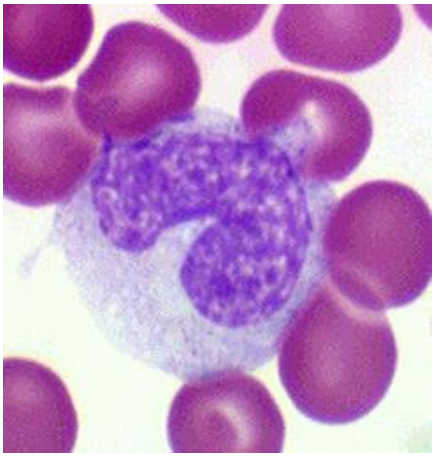




Agranulocyte = Monocyte

- 1 - 10% of the circulating WBCs.
- Their nucleus is large and kidney bean-shaped.





Supporting connective tissue

- Cartilage is a relatively solid, non-vascularized tissue.
- During the development of the fetus, it plays a major role since most of axial skeleton is laid down as cartilage in the embryo.
- This cartilage is replaced by bone. After post-natal growth ceases.
- Cartilage is found in only two general areas of the body:

1. Extra-skeletal (nose, ear & trachea).
2. Covering the caps of bones in movable joints.

Cartilage:

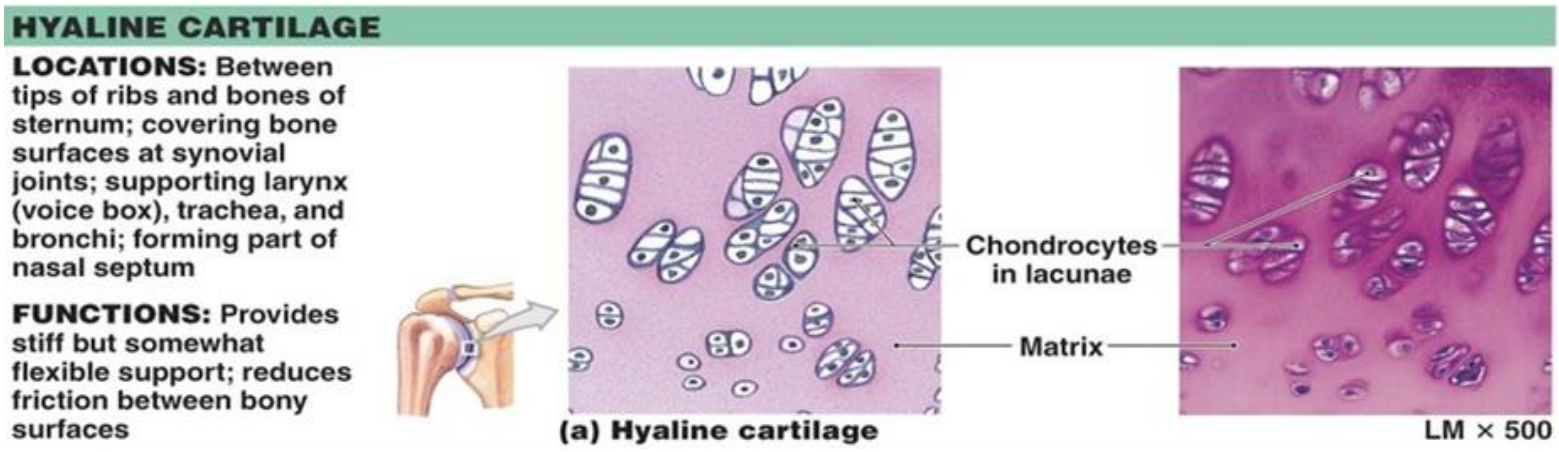
- Jelly-like matrix (chondroitin sulfate) containing collagen & elastic fibers and chondrocytes surrounded by a membrane called the perichondrium.
- Unlike other CT, cartilage has NO blood vessels or nerves except in the perichondrium.
- The strength of cartilage is due to collagen fibers and the resilience is due to the presence of chondroitin sulfate.
- Chondrocytes occur within spaces in the matrix called lacunae.

Types of cartilage

- Hyaline cartilage
- Fibrous cartilage
- Elastic cartilage

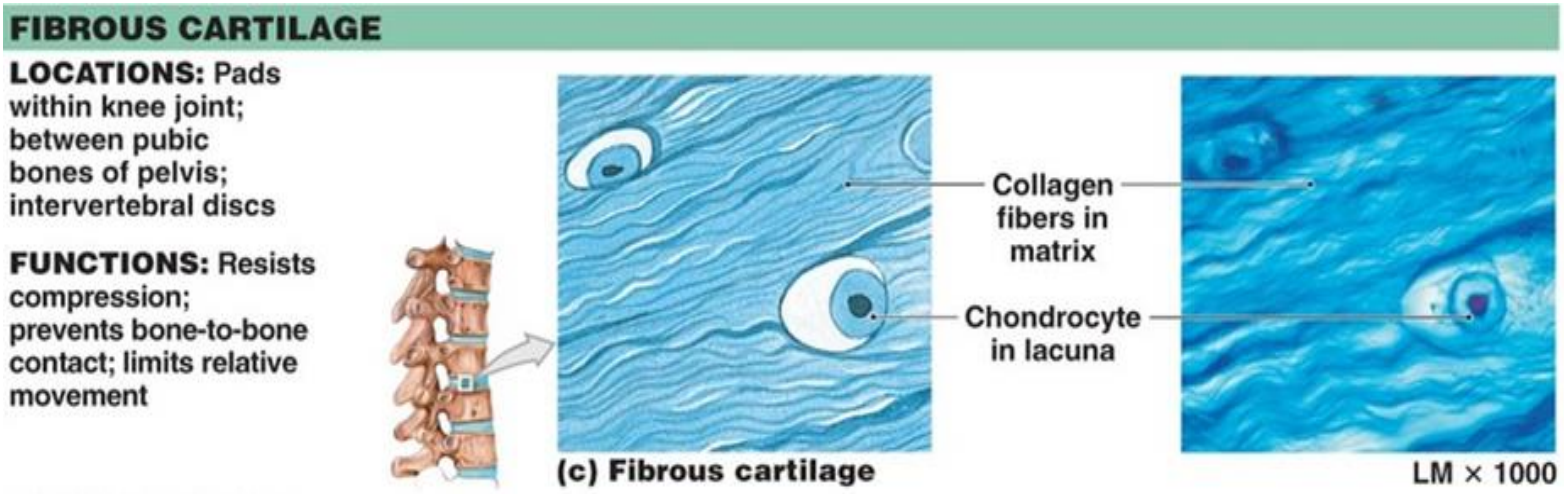
Hyaline Cartilage (most abundant type)

- Fine collagen fibers embedded in a gel-type matrix. Occasional chondrocytes inside lacunae.
- Found in embryonic skeleton, at the ends of long bones, in the nose and in respiratory structures.
- Function: flexible, provides support, allows movement at joints.



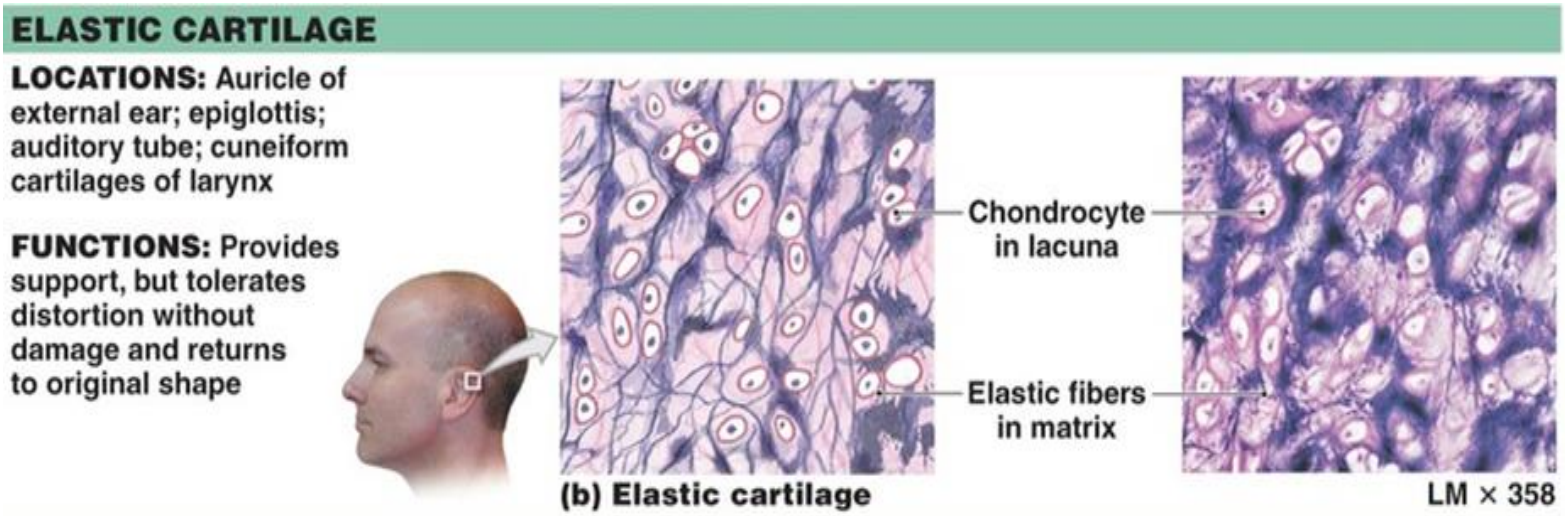
Fibrous cartilage

- **Contains bundles of collagen in the matrix that are usually more visible under microscopy.**
- **Found in the pubic symphysis, intervertebral discs, and menisci of the knee.**
- **Function: support and fusion, and absorbs shocks.**

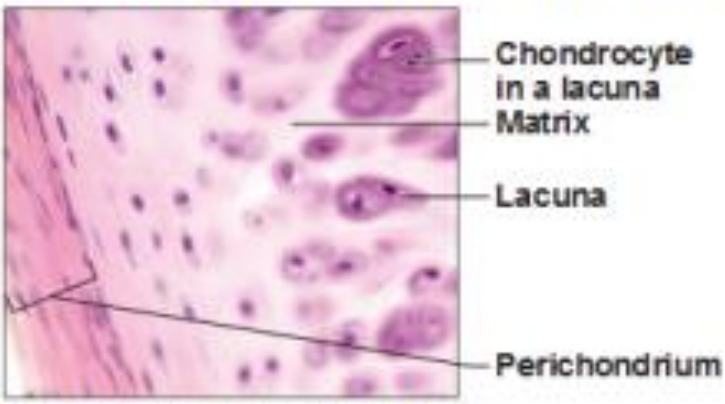


Elastic Cartilage

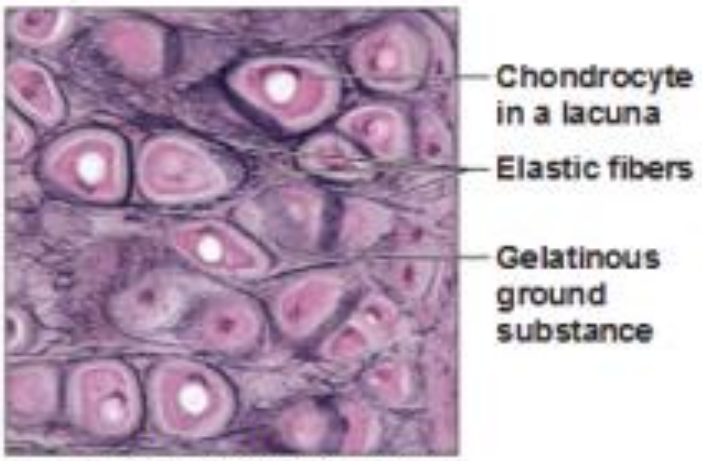
- **Threadlike network of elastic fibers within the matrix.**
- **Found in external ear, auditory tubes & epiglottis.**
- **Function: gives support, maintains shape, allows flexibility.**



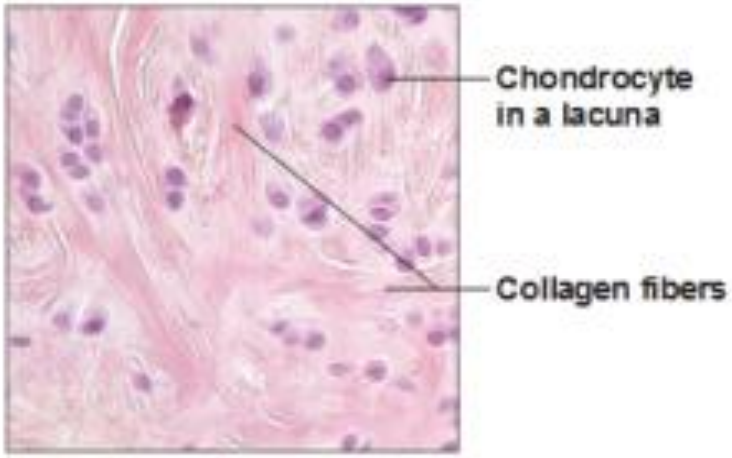
Cartilages in the Adult Body



(a) Hyaline cartilage (180×)



(b) Elastic cartilage (470×)



(c) Fibrocartilage (285×)

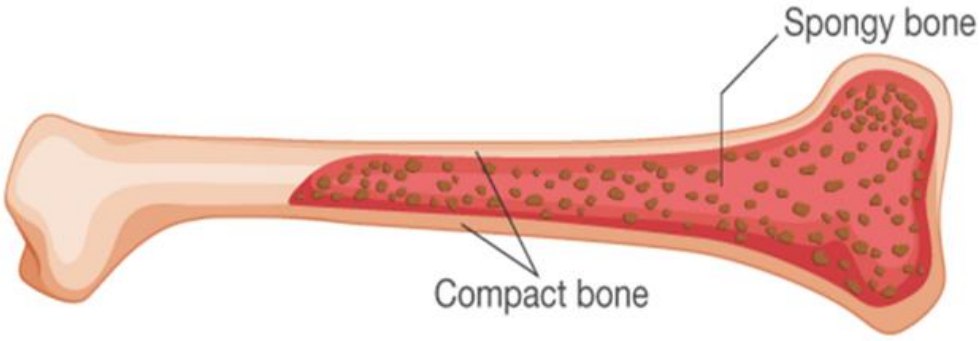
Bone

- **Composes most of the adult skeleton. Its rigidity is produced by the decrease of amorphous matrix components, an increase in collagenous fibers and the calcification of the matrix.**
- **Two types of bone, based on the density or amount of space between calcified tissues, are found in the body:**

1. Compact (dense) bone.

2. Spongy (cancellous) bone.

Difference between Spongy and Compact bones

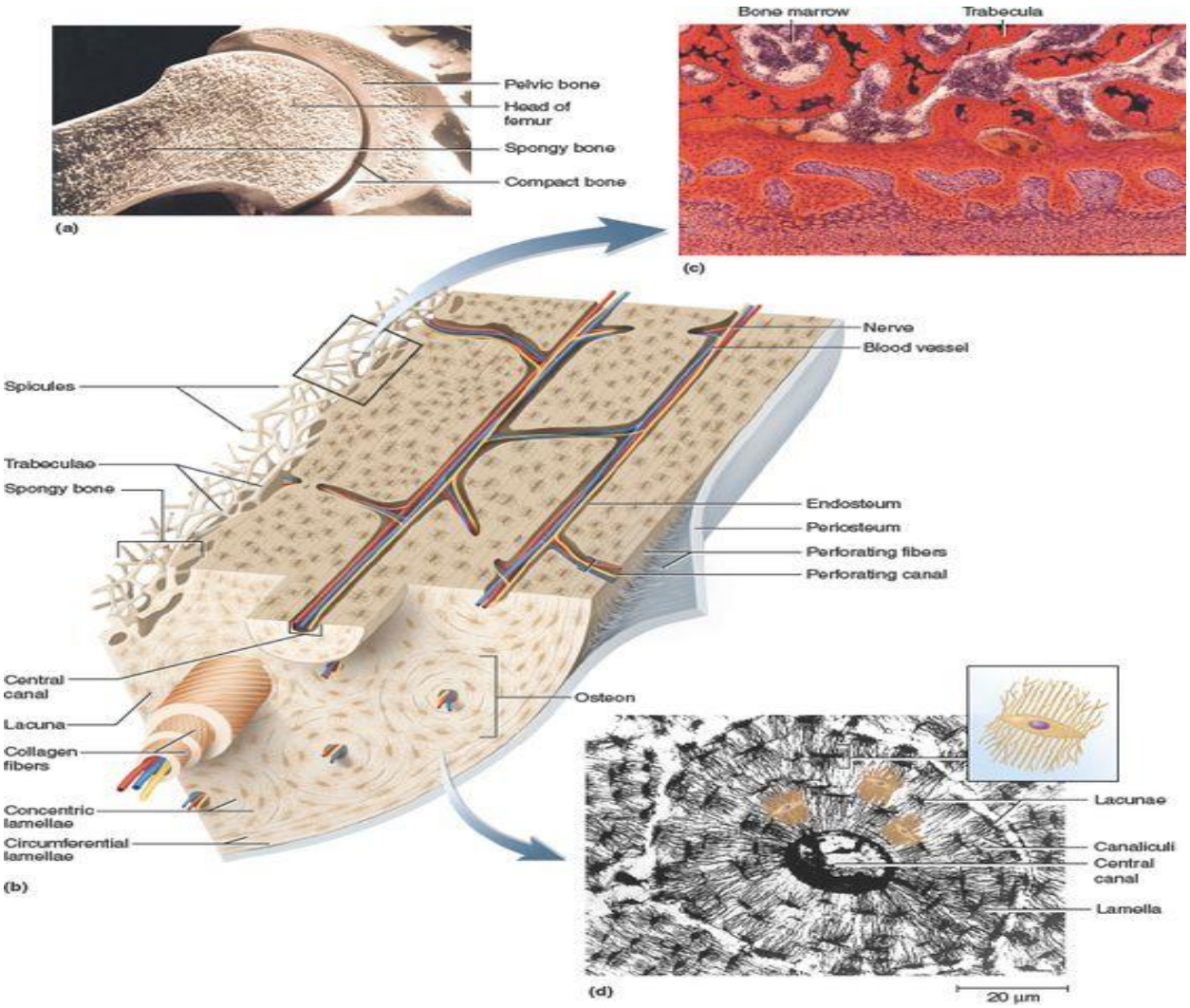


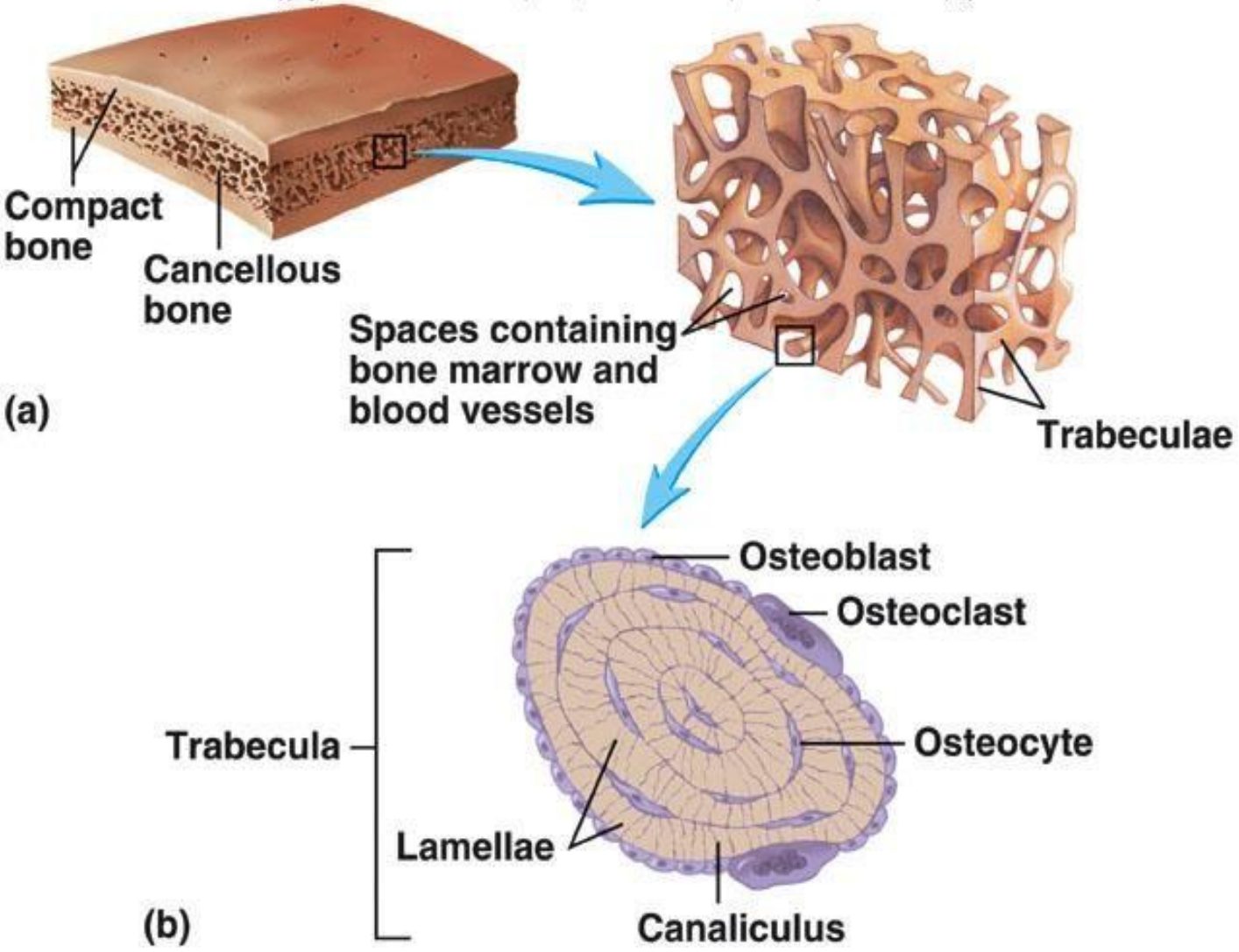
SPONGY BONE

- Spongy bone is also called cancellous or trabecular bone. It is found in the long bones and it is surrounded by compact bone.

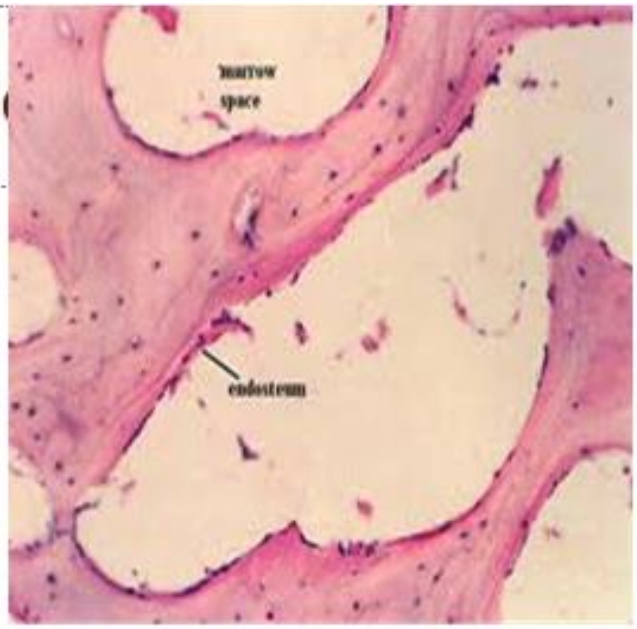
COMPACT BONE

- Compact bone, also called cortical bone, surrounds spongy bone. They are heavy, tough and compact in nature





Compact (dense) bone



Spongy (cancellous) bone