

# Module 2 – L04

## Connective Tissue

Dr. Lisa Brinn

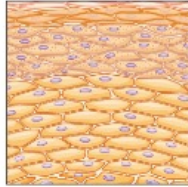
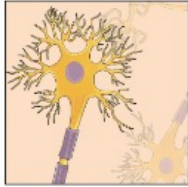






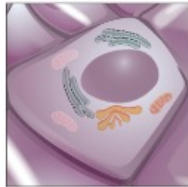
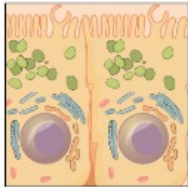
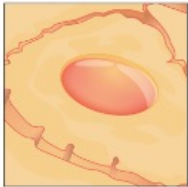
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# Learning Objectives

1. Tissues Types
2. Cell Junctions Types
3. Epithelial Tissue
4. Connective Tissue
5. Comparison Between Epithelial and Connective Tissues
6. Muscular Tissue
7. Neural Tissue
8. Tissue Membranes (Mucous, Serous, Cutaneous, and Synovial)
9. Tissue Growth, Modification, and Repair

## 4. Connective Tissue

- Mesenchyme
  - Embryonic connective tissue
- Derive from mesodermal embryonic layer
- Composed of:
  - Mesenchymal cells – irregular in shape
  - Abundant semifluid extracellular matrix
  - Scattered delicate reticular fibers

Germ Layer	Gives rise to:
Ectoderm	Epidermis, glands on skin, some cranial bones, pituitary and adrenal medulla, the nervous system, the mouth between cheek and gums, the anus    Skin cells      Neurons      Pigment cell
Mesoderm	Connective tissues proper, bone, cartilage, blood, endothelium of blood vessels, muscle, synovial membranes, serous membranes lining body cavities, kidneys, lining of gonads      Cardiac muscle      Skeletal muscle      Tubule cell of kidney      Red blood cells      Smooth muscle
Endoderm	Lining of airways and digestive system except the mouth and distal part of digestive system (rectum and anal canal); glands (digestive glands, endocrine glands, adrenal cortex)    Lung cell      Thyroid cell      Pancreatic cell

# Common Structural Characteristics

## A. Cells

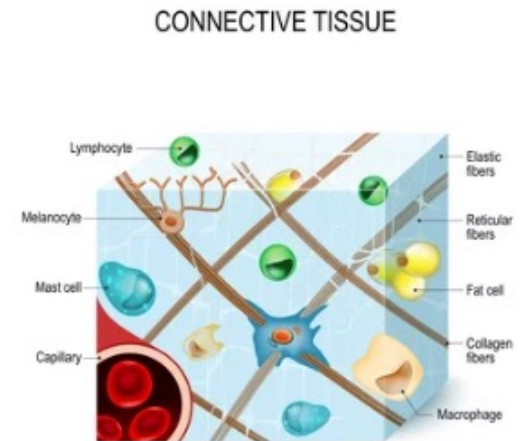
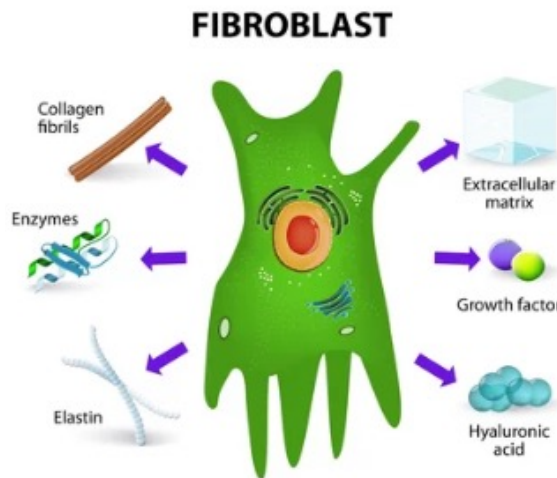
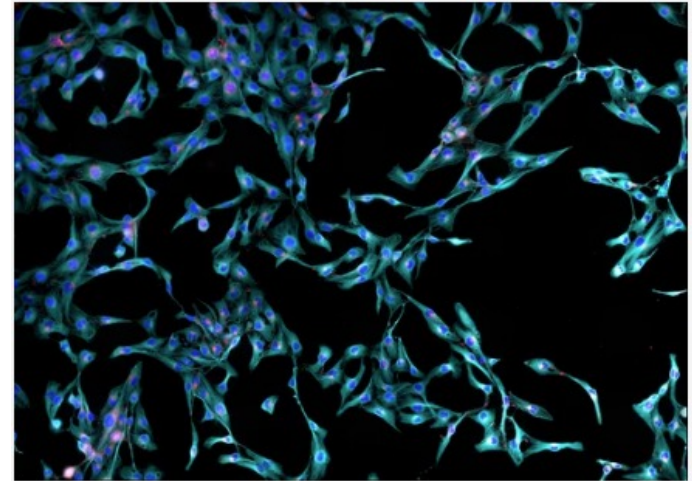
- Originate from mesenchymal cells
- Major type of CT contains immature class of cells that end in blast (bud or sprout)

## B. Extracellular Matrix

- Produced by specialized immature cells (ending in blast)
- Consists of:
  - Protein fibers
  - Ground substance

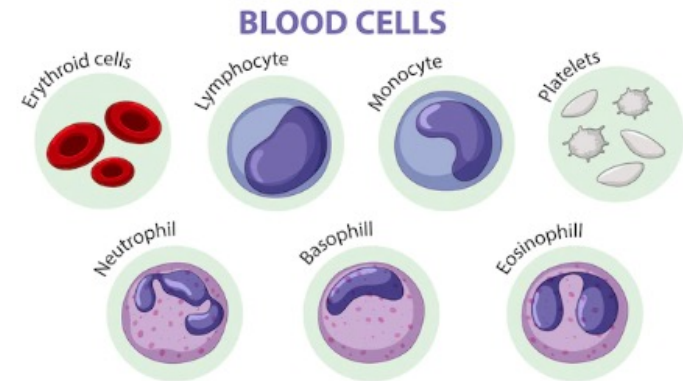
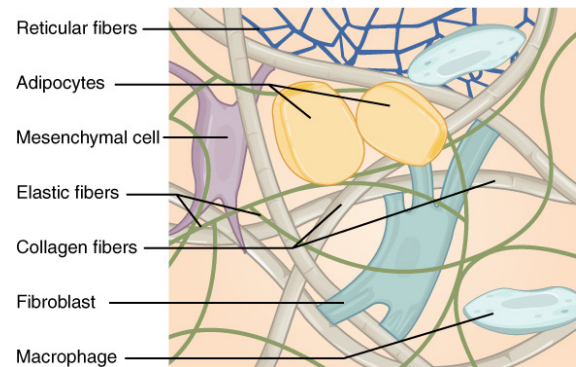
# A. Connective Tissue Cells

- Framework of body
  - Bone cells
    - Osteoblasts
    - Osteocytes
    - Osteoclasts
  - Cartilage cells
    - Chondroblasts
    - Chondrocytes
  - Fibrous cells
    - Fibroblasts
    - Fibrocytes



# Cell Types

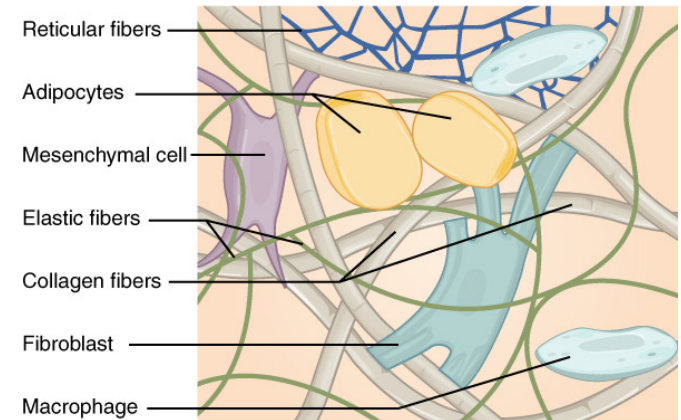
- Fixed cells
  - Fibroblasts
  - Fibrocytes
  - Adipocytes
  - Mesenchymal cells
- Wandering cells
  - Macrophages
  - Mast cells
  - Lymphocytes
  - Plasma cells
  - Phagocytic cells (neutrophils and eosinophils)



Courtesy of Freepik.com

## B. Extracellular Matrix

- Protein fibers
  - Collagen fibers
  - Elastic fibers
  - Reticular fibers
- Ground substance
  - May be fluid, semifluid, gelatinous or calcified
  - Cells - Supports and binds them together
  - Stores water
  - Provides medium for exchange of substances between blood & cells
  - Active role in tissue development, migration, proliferation, change shape and how they carry out their metabolic functions



# Connective Tissue Classification

## A. Embryonic connective tissue

- Mesenchyme
- Mucous (mucoid) connective tissue

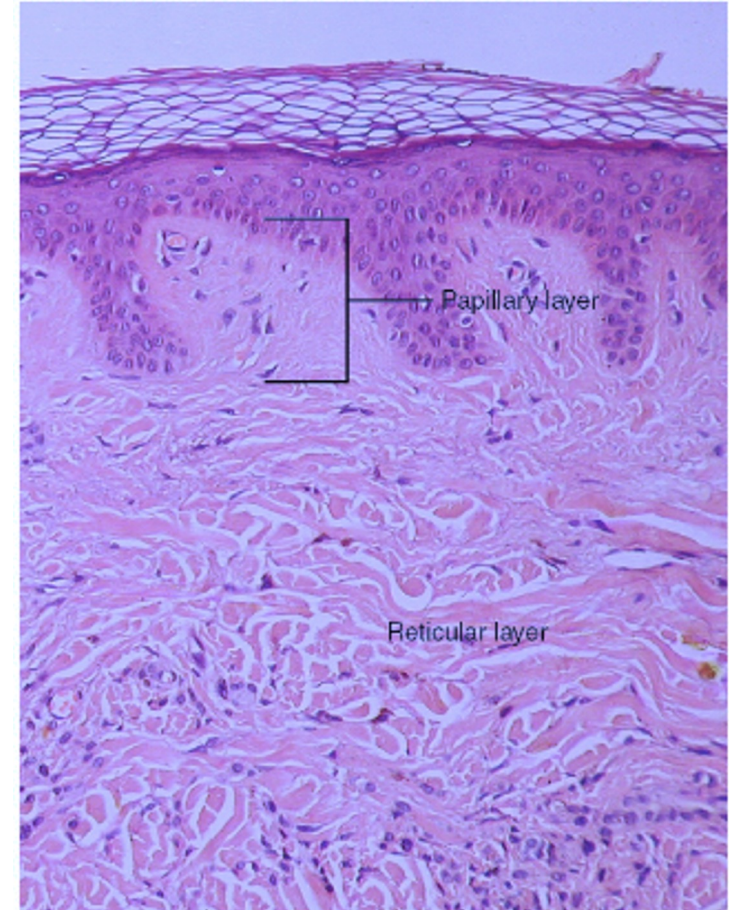
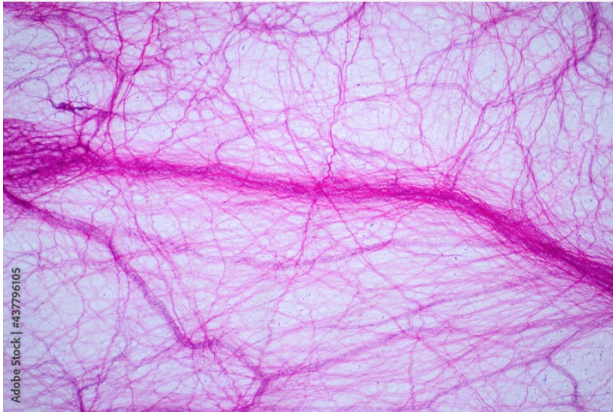
## B. Mature

- Connective Tissue Proper
  - a. Loose
    - 1) Areolar
    - 2) Adipose
    - 3) Reticular
  - b. Dense
    - 1) Regular
    - 2) Irregular
  - c. Elastic
- Supporting Connective Tissue
  - d. Cartilage
    - 1) Hyaline cartilage
    - 2) Fibrocartilage
    - 3) Elastic cartilage
  - e. Bone tissue
    - 1) Compact bone
    - 2) Spongy bone
- f. Fluid Connective Tissue
  - Blood
  - Lymph



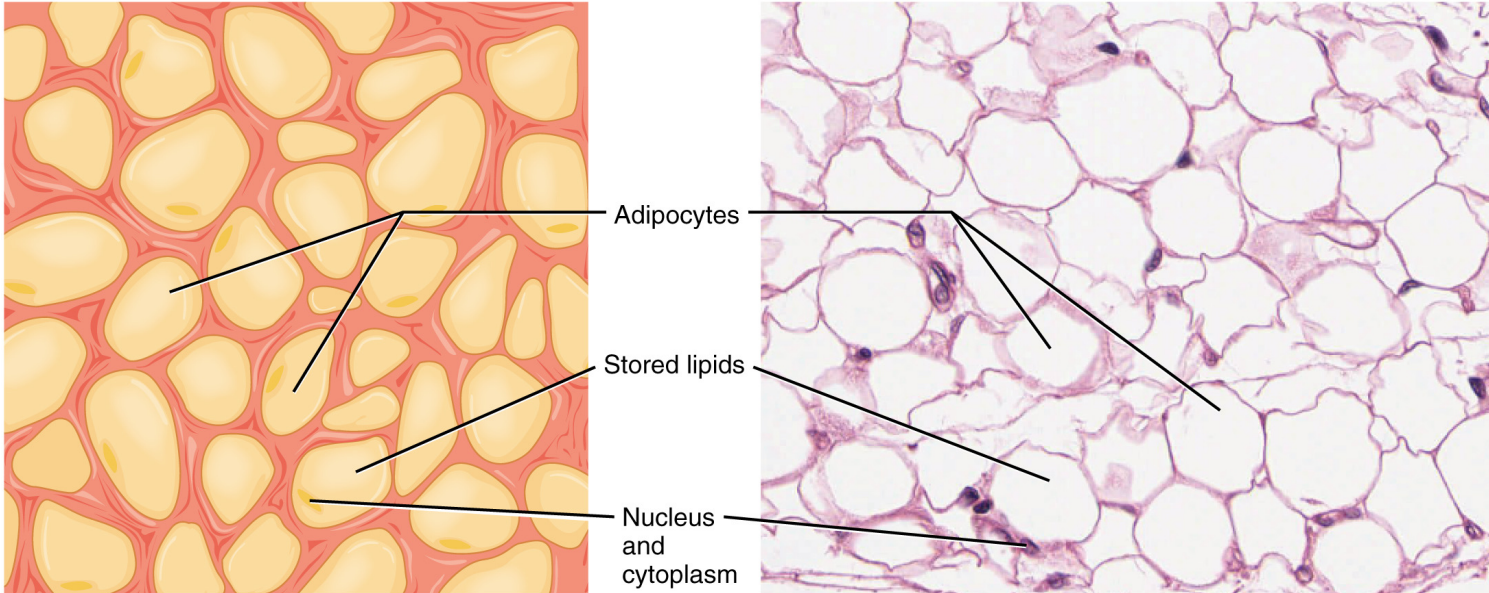
# A1) Areolar Tissue

- Shows little specialization
- Contains all cell types and fibers mentioned that are distributed randomly
  - Web-like structure



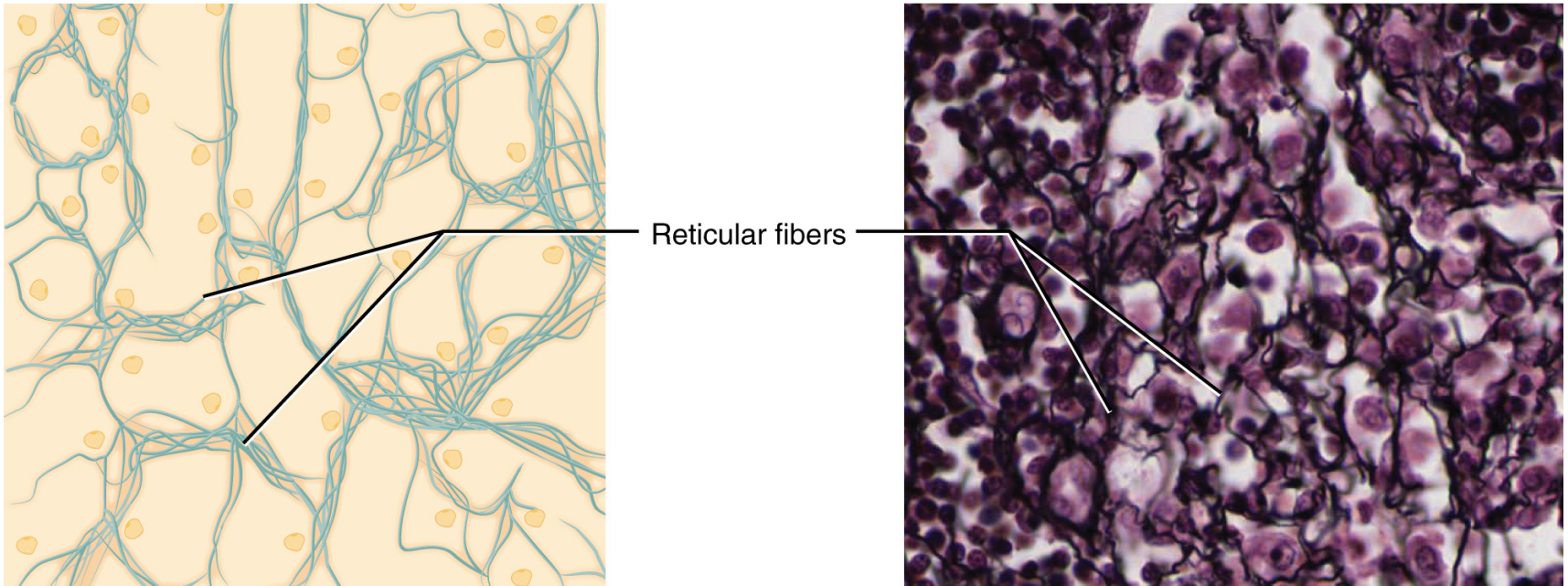
## A2) Adipose Tissue

- Loose connective tissue
- Consists of fat cells with little extracellular matrix
- Stores fat for energy and provides insulation



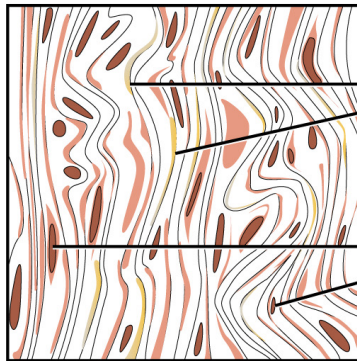
## A3) Reticular Tissue

- Loose connective tissue made up of a network of reticular fibers
- Provides a supportive framework for soft organs





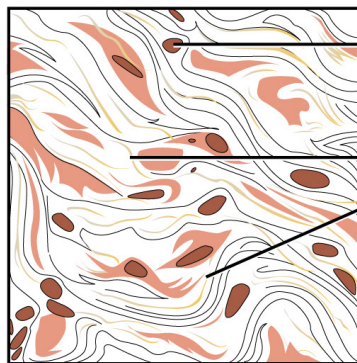
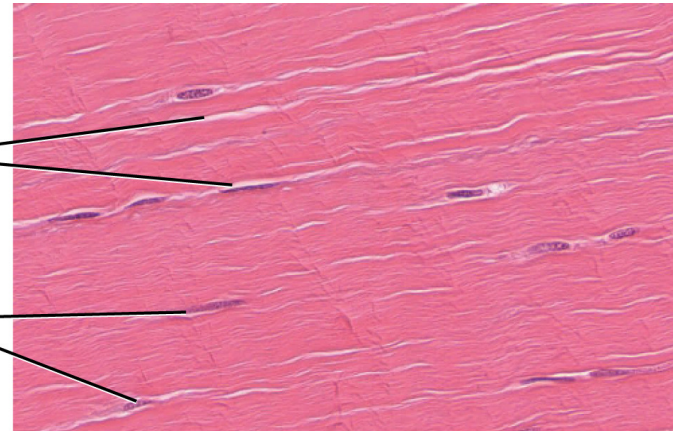
## B. Dense Connective Tissue



1) Regular dense

Collagen  
fibers

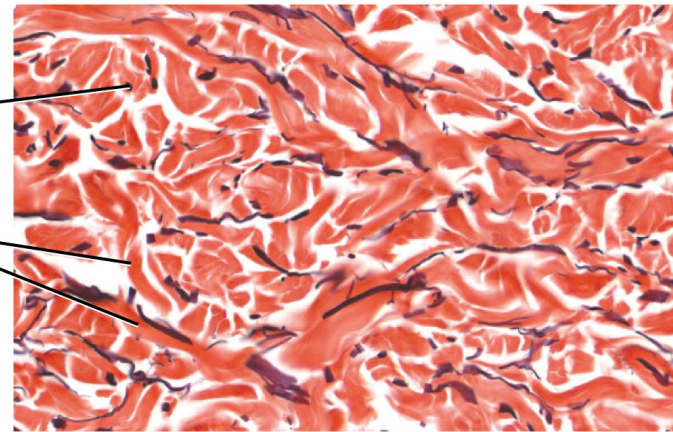
Fibroblast  
nuclei



2) Irregular dense

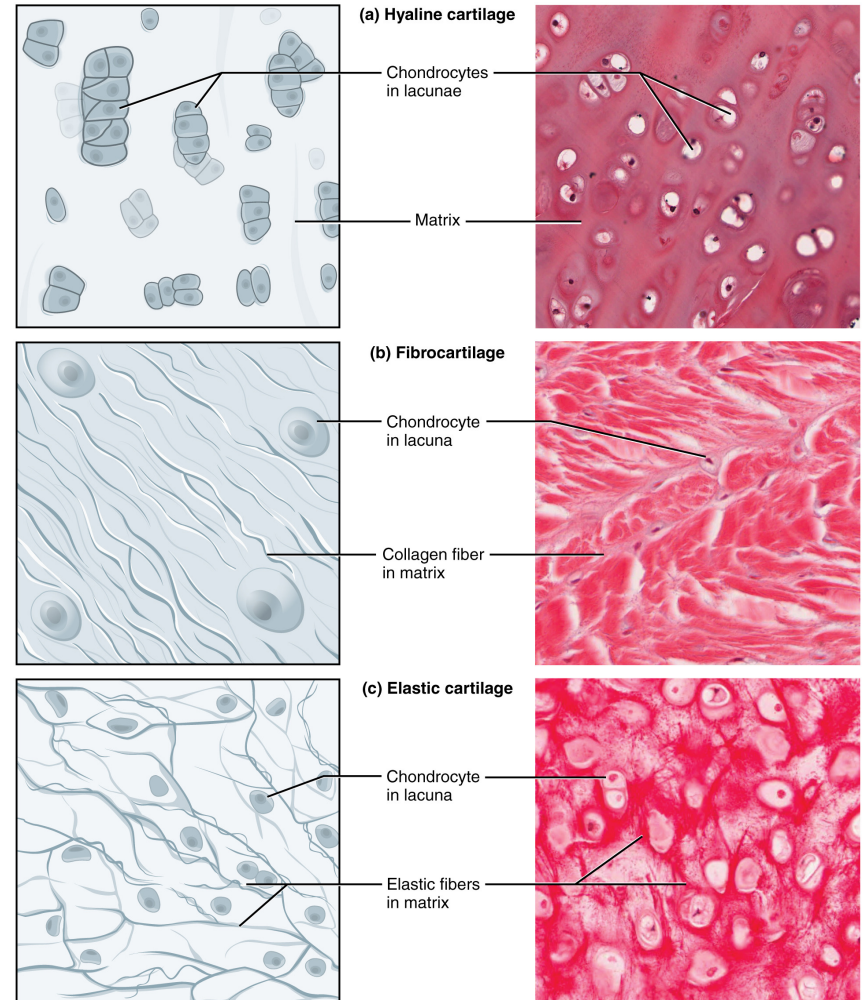
Fibroblast  
nuclei

Collagen  
fiber  
bundles



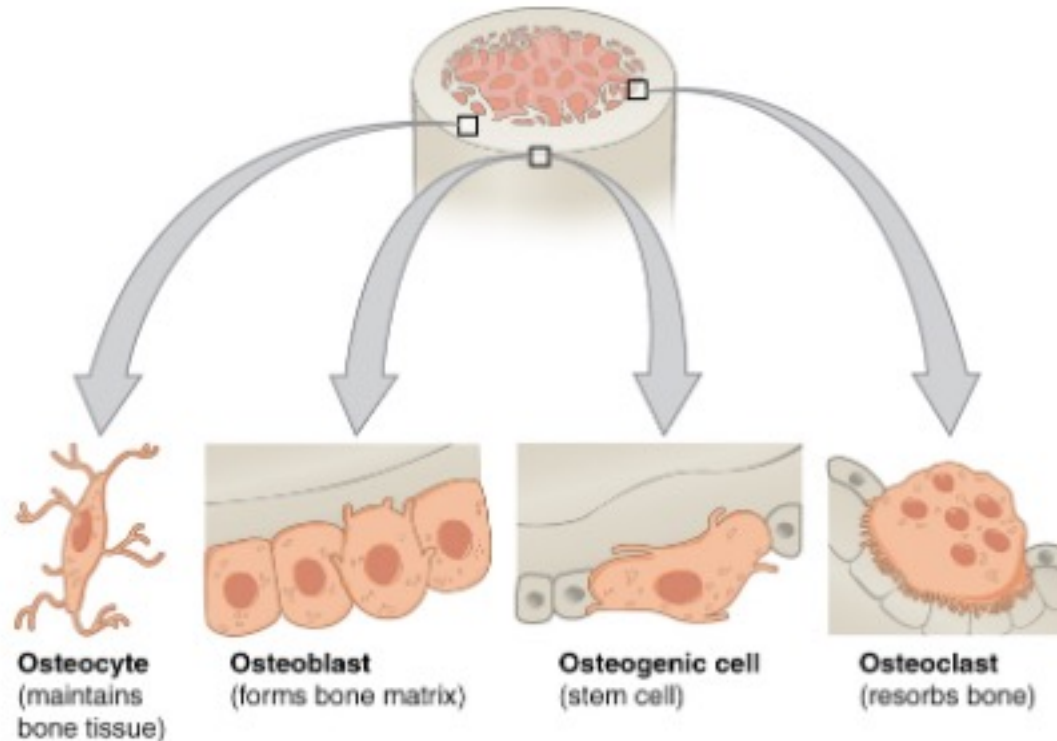
# d1) Supporting Connective Tissue

Cartilage is a connective tissue consisting of collagenous fibers embedded in a firm matrix of chondroitin sulfates.



## d2) Bone

- Hardest connective tissue
- Provides protection for internal organs



## f. Fluid Connective Tissue

- Blood is a fluid connective tissue containing erythrocytes and various types of leukocytes that circulate in a liquid extracellular matrix.

