



Connective tissues

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Connective tissues

- The most diverse, abundant, widely distributed tissue.
- It is designed to support, protect, and bind organs.
- Connective tissue is formed by three components:

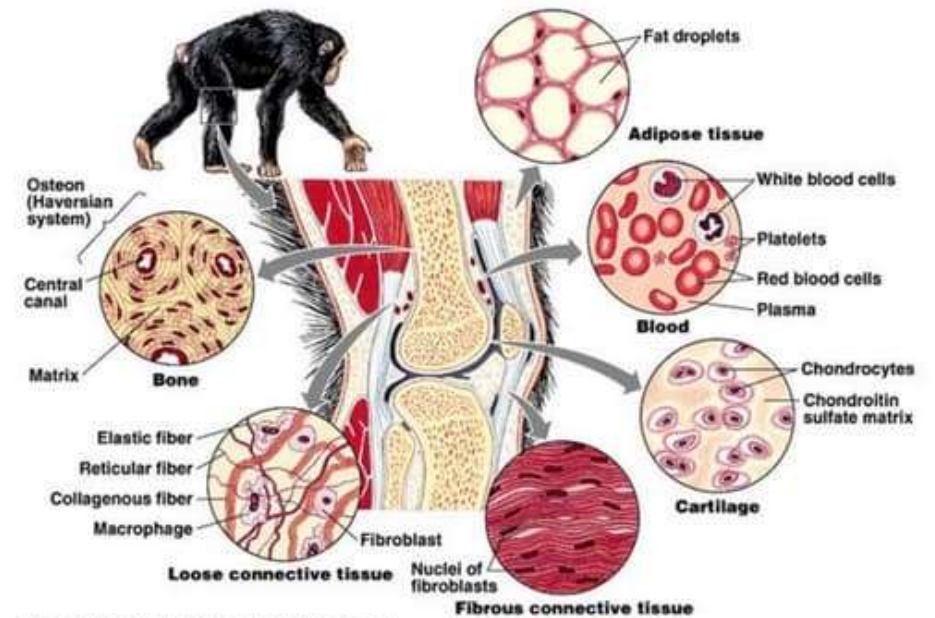
A- Cells

B. Fibers

C. **Ground Substance:** a transparent, homogenous substance, random in shape may be viscous, semisolid or solid.

- The major constituent of connective tissue is the extracellular matrix.

Connective Tissues (pg 6)



Connective tissues

A. Cells:

1. Fibroblast:

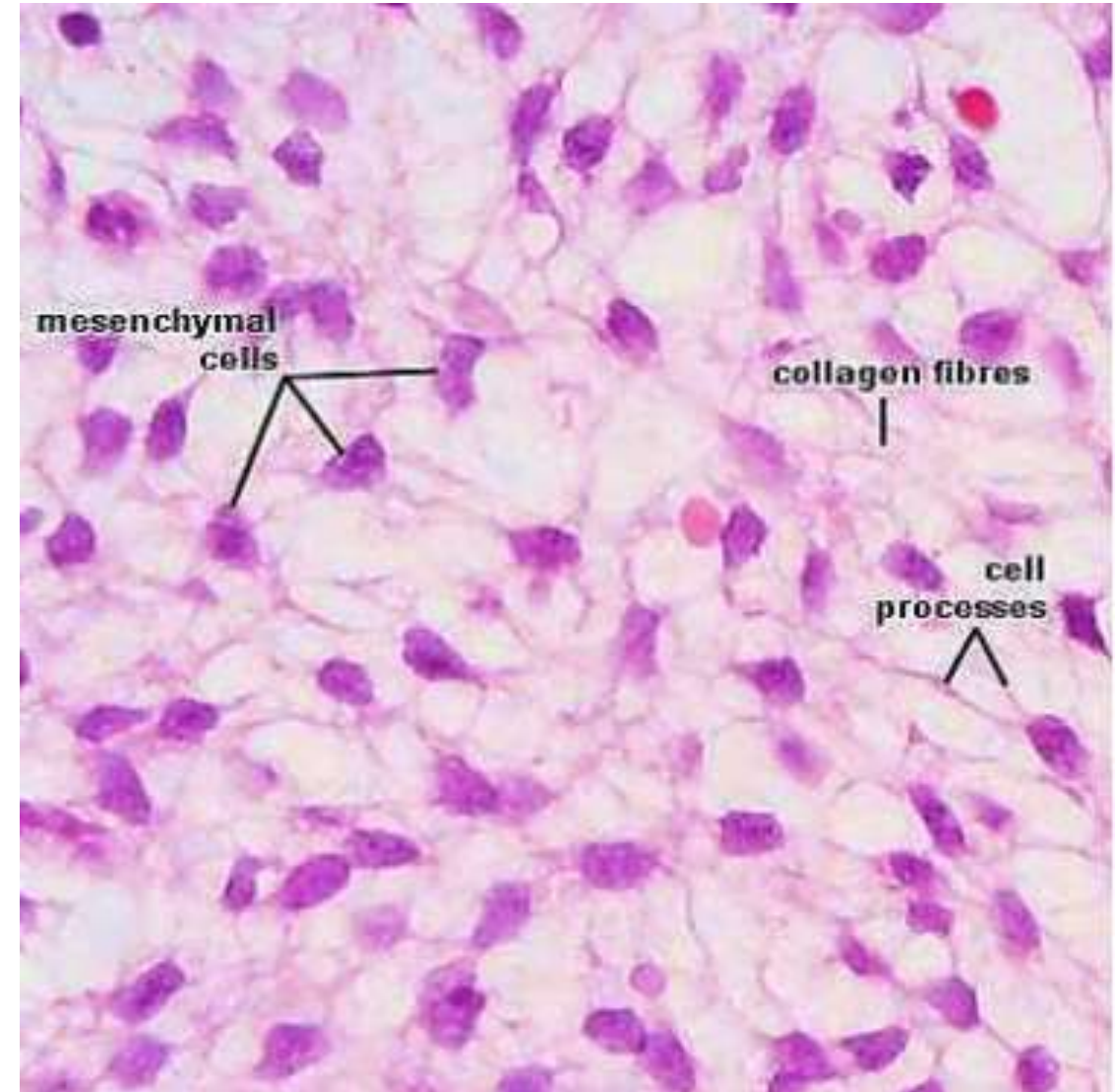
- The most abundant cell in connective tissue proper.
- The nucleus is ovoid, large, and pale staining, with fine chromatin and a prominent nucleolus.
- They produce the fibers and ground substance components



Connective tissues

2. Mesenchymal cell:

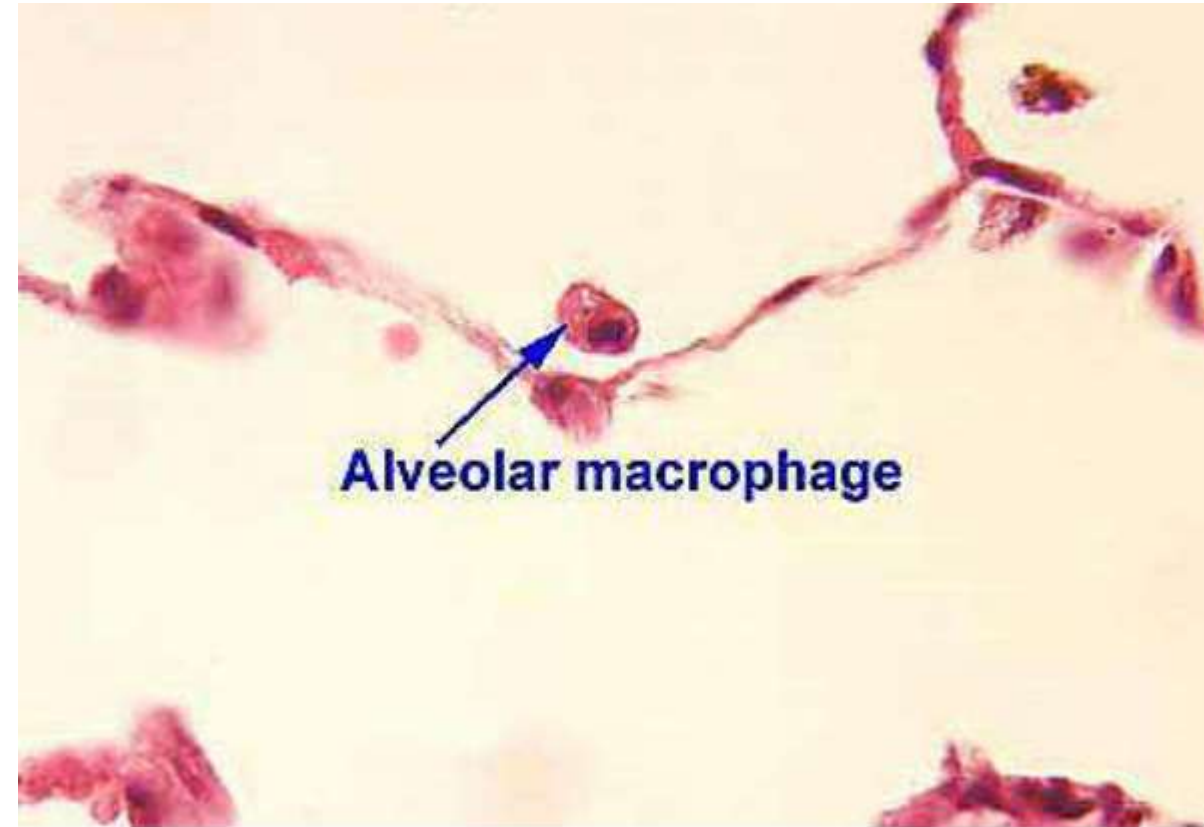
- ✓ A type of embryonic stem cells contained within connective tissue.
- ✓ An elongated cell, similar to fibroblasts but smaller in size.
- ✓ Characterized by an oval nucleus with prominent nucleolus and fine chromatin.
- ✓ It can be seen in embryo sections.



Connective tissues

3. Macrophage:

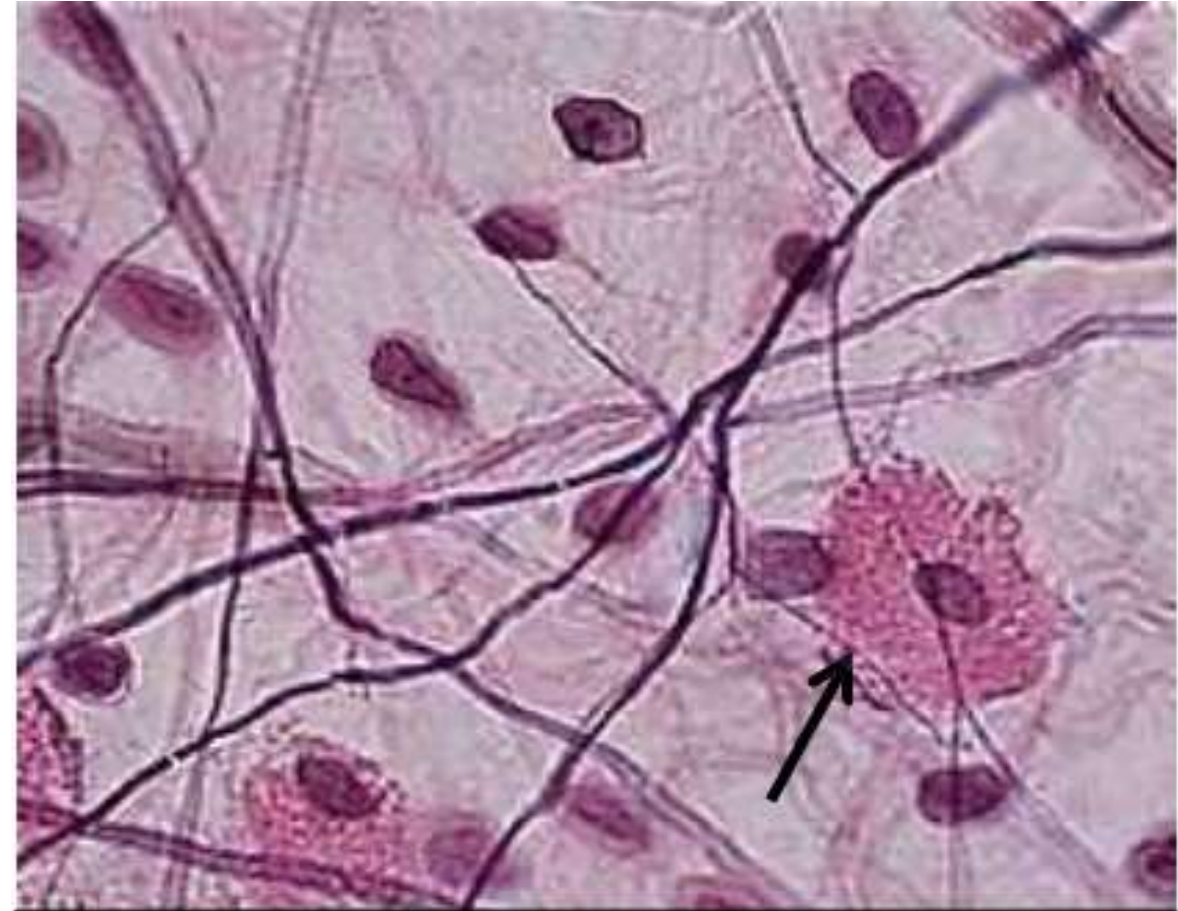
- They are irregular in shape with processes which usually are short.
- The nucleus is ovoid, small and heterochromatic.
- Macrophages are important agents of defense because of their phagocytic activity.
- We can observe it in section of the lung.



Connective tissues

4. Mast cell:

- ❖ An oval to round connective tissue cell whose cytoplasm is filled with basophilic secretory granules.
- ❖ Mast cells are identified easily by their contents of cytoplasmic granules.
- ❖ The nucleus is rather small, spherical, centrally situated; and is frequently covered by the cytoplasmic granules.
- ❖ We can see it in Areolar connective tissue.

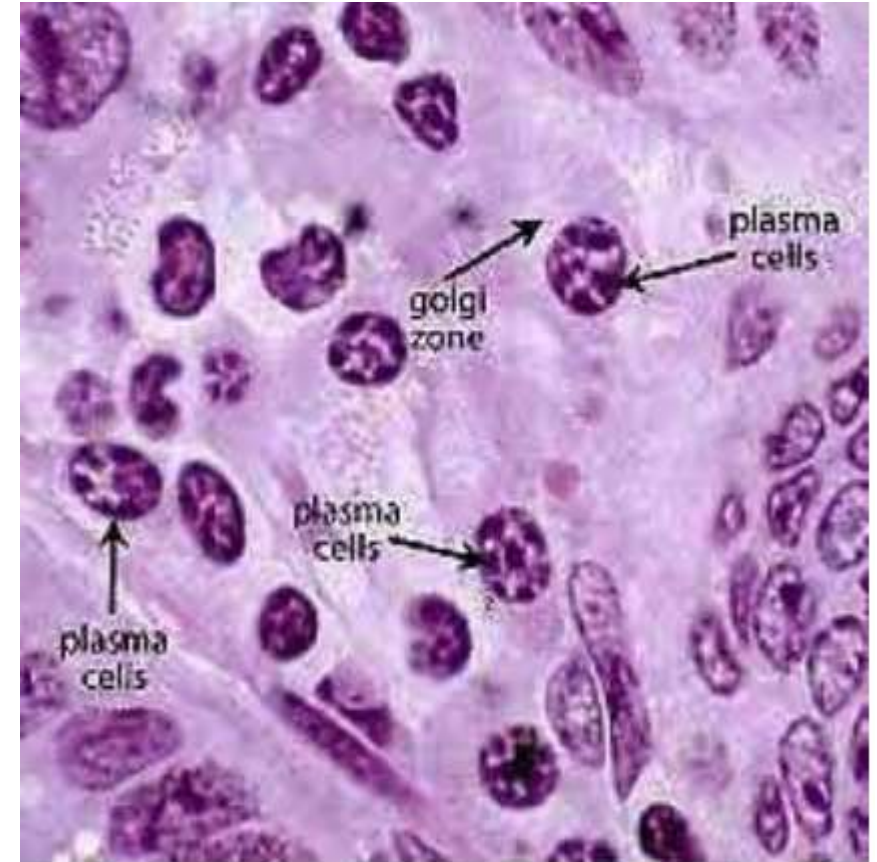


Areolar connective tissue showing mast cell

Connective tissues

5. Plasma cells:

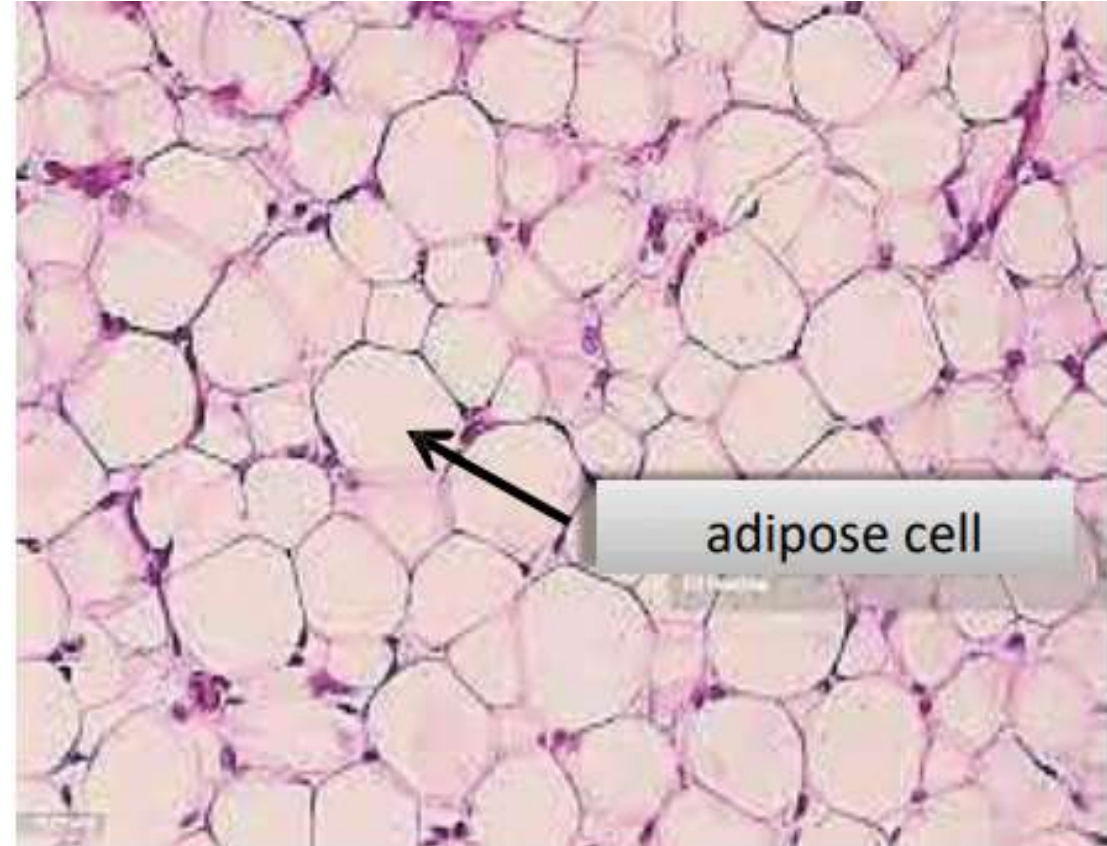
- ❑ Found mainly in lymphoid tissue
- ❑ They are large, ovoid cells that have a basophilic cytoplasm due to their richness in rough endoplasmic reticulum.
- ❑ The nucleus is spherical and eccentrically placed, with chromatin occurs in coarse clumps peripherally, and arrange in pattern like wheel or clock face
- ❑ Plasma cell is responsible for the production of antibodies.



Connective tissues

6. Adipose cells:

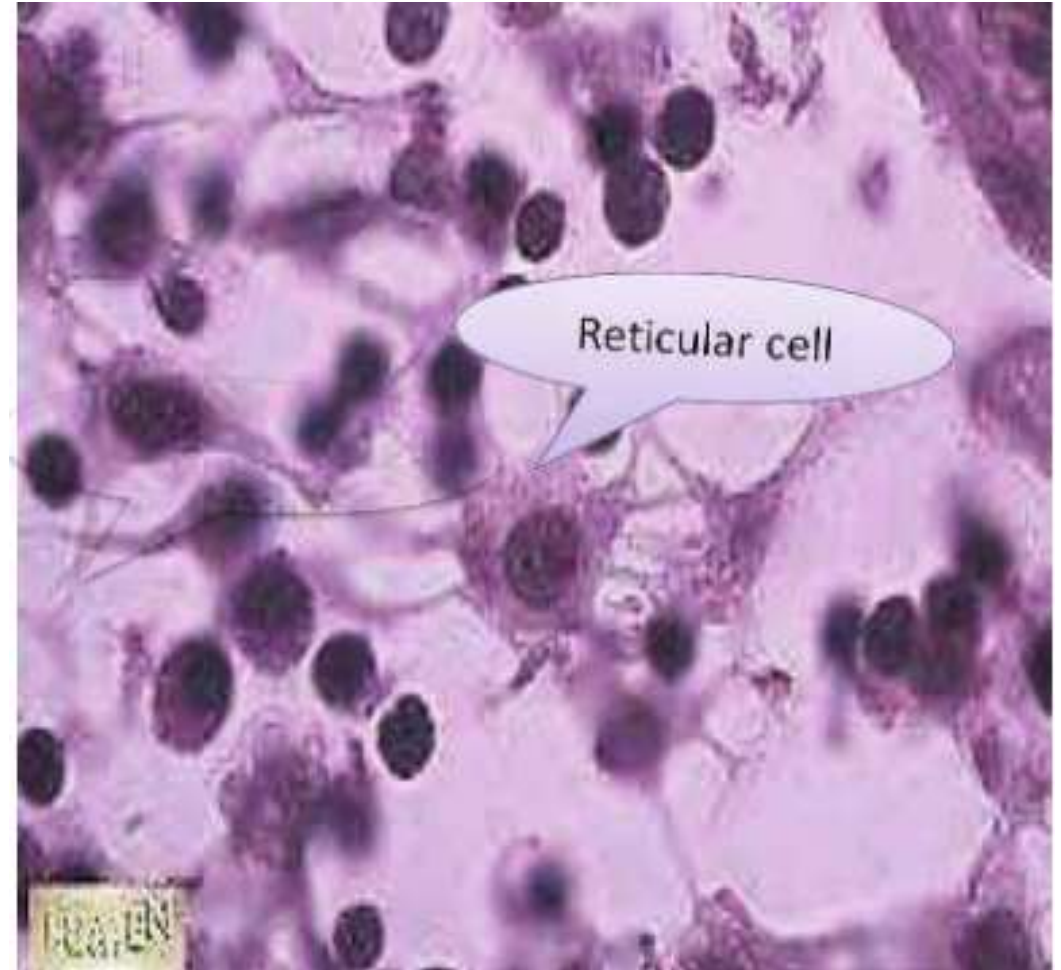
- Also called fat cells.
- Spherical to ovoid in shape.
- Contain a single large droplet of fat and thin rim of cytoplasm which contains in one area the flattened nucleus.
- They are specialized for storage of fat.



Connective tissues

7. Reticular cells:

- Stellate in shape, have long cytoplasmic extensions, which appear to join with other cells' extensions.
- The cell has a pale, large nucleus, and basophilic cytoplasm.
- It is found in lymph node.

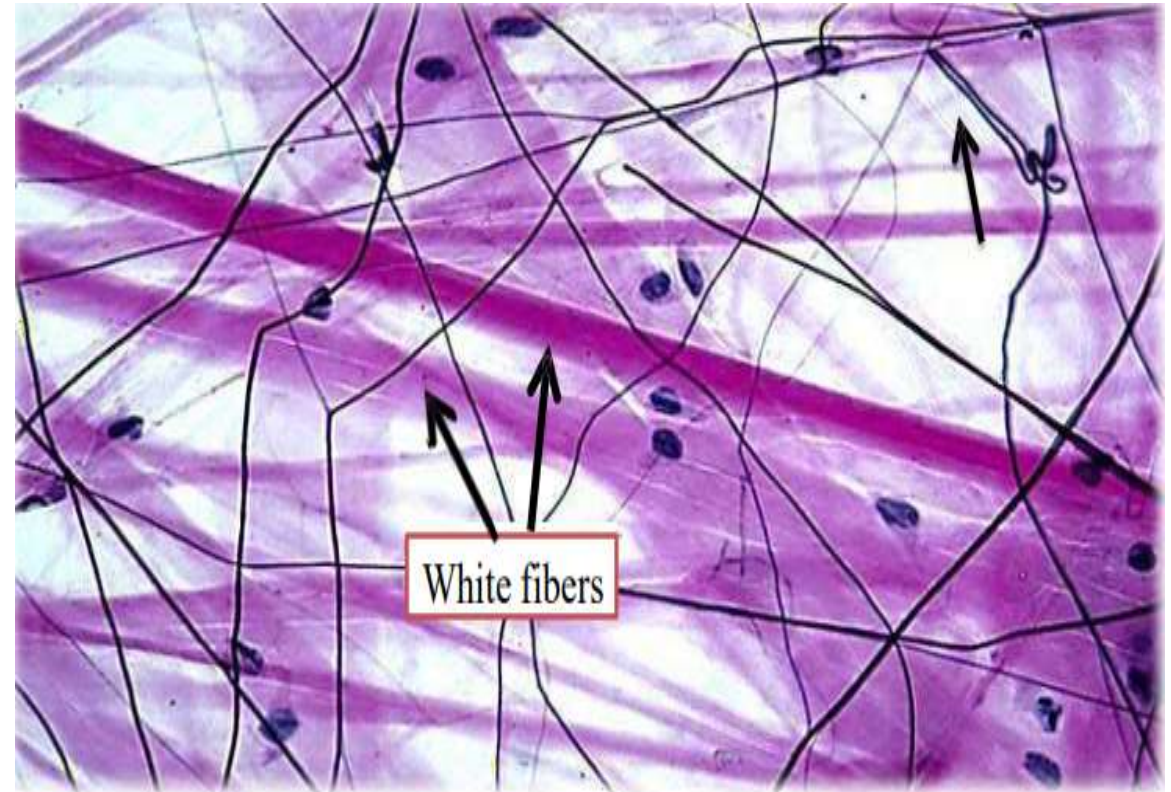


Connective tissues

B. Fibers: There are 3 types of protein fibers found in connective tissue:

1. White (collagenous) fibers:

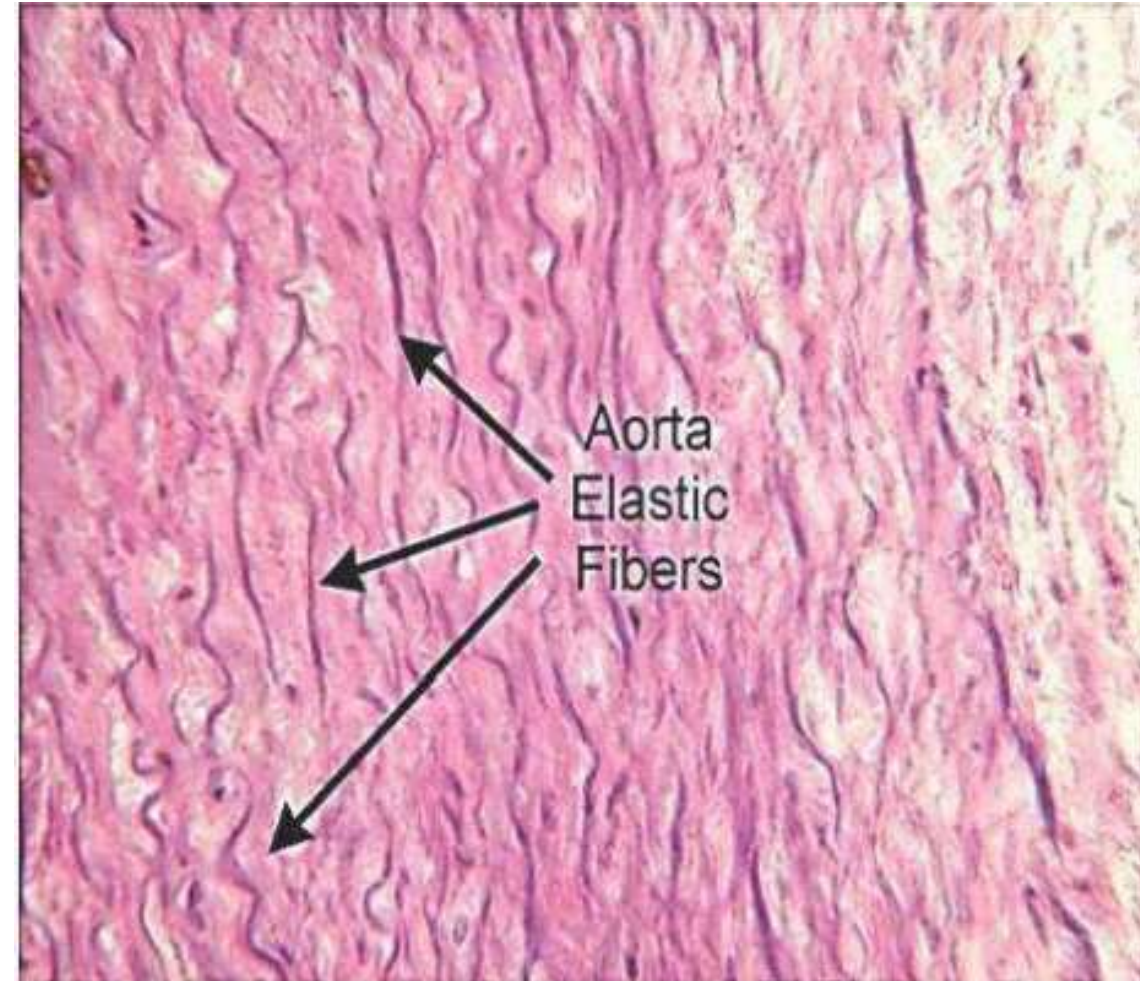
- ❖ Long, wavy, unbranched fibers composed of collagen.
- ❖ In tissue sections stained with hematoxylin and eosin, collagen fibers appear pink.
- ❖ We can see it in dermis of skin.



Connective tissues

2. Yellow (elastic) fibers:

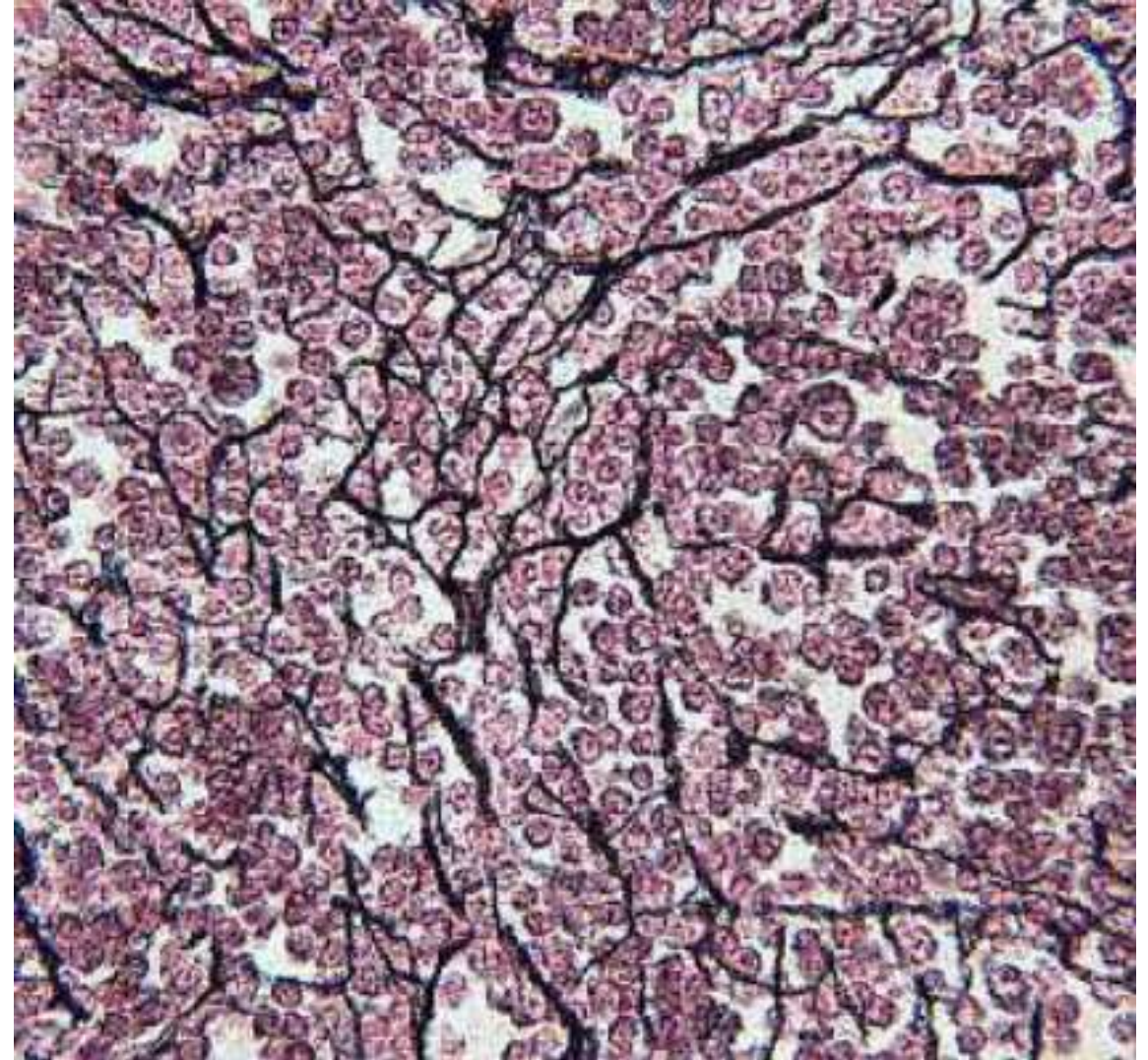
- ✓ They are made of the protein elastin and are thinner than collagen fibers.
- ✓ Long, thin, branched single threads , in fresh state they have a yellowish color.
- ✓ • Yellow fibers are elastic and easily to stretching , branch then rejoin.
- ✓ • We can notice them in cross section in aorta.



Connective tissues

3. Reticular fibers:

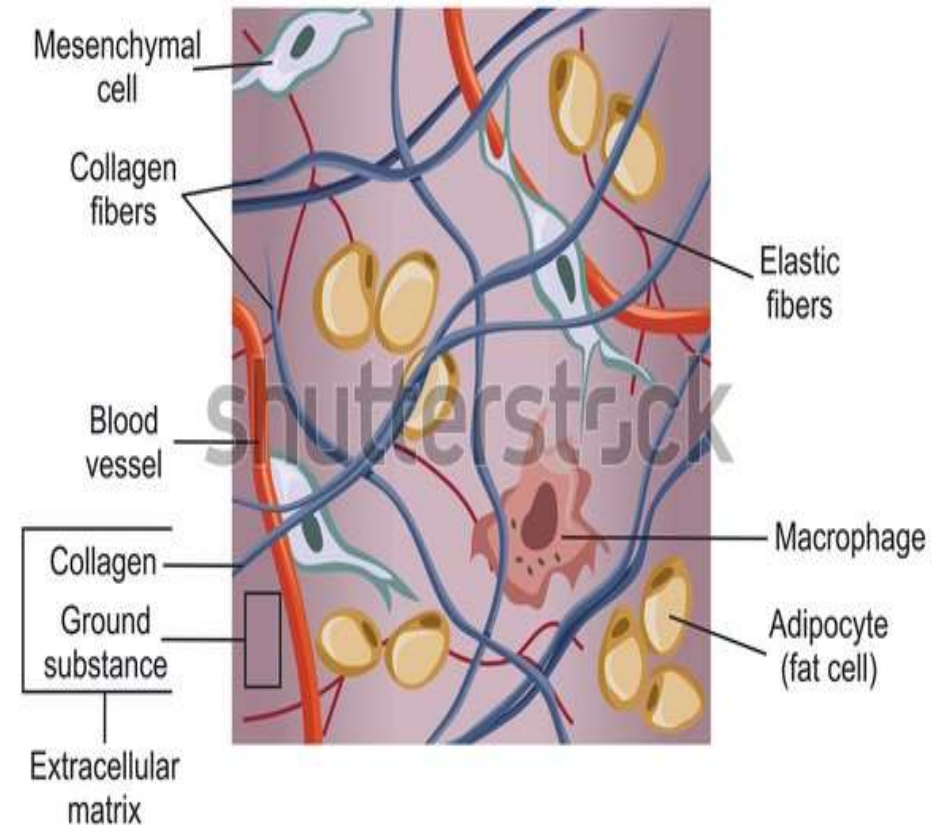
- They are extremely thin, and they form an extensive network in certain organs.
- They are not visible in H&E preparations, but can be easily stained black by impregnation with silver salts.
- These fibers form a branching interwoven framework that is tough but flexible.
- Can be seen in lymph nodes, spleen & red bone marrow).



Connective tissues

Loose connective tissue

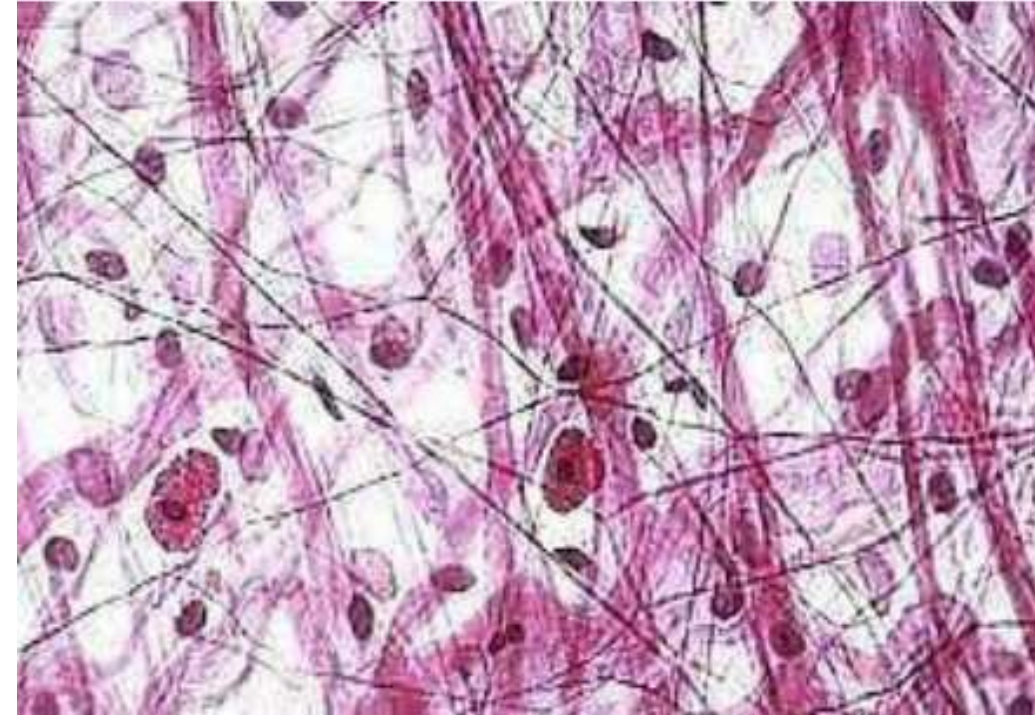
- Loose connective tissue comprises all the main components of connective tissue proper.
- It fills spaces between groups of muscle cells, supports epithelial tissue, and forms a layer that sheathes the lymphatic and blood vessels
- Characterized by loose arrangement of collagen, elastic, and reticular fibers.
- It can be subdivided as follows:



Connective tissues

Areolar connective tissue

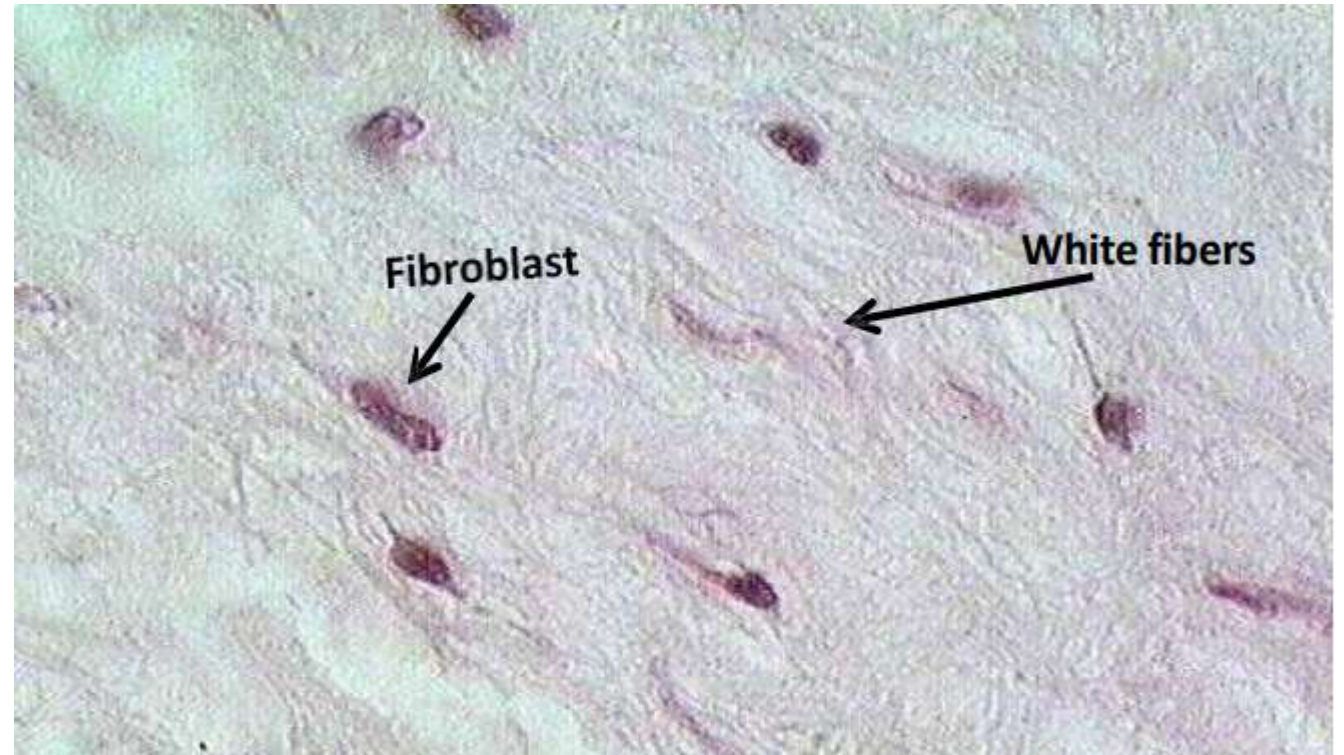
- Highly variable in appearance and the least specialized connective tissue in the body.
- Contains vacuoles (intercellular spaces) in the ground substance which remain unstained during tissue preparations.
- The ground substance is a viscous, contains yellow & white fibers, with little amount of reticular fibers.
- Contains all the cell types of connective tissue proper; although, the predominant cell is the fibroblast.
- It surrounds nerves, blood vessels, and individual muscle cells. It is also a major component of the subcutaneous layer deep to the skin.



Connective tissues

Muroid connective tissue:

- It is a jelly-like tissue, has an abundance of ground substance containing fibroblasts with few collagen fibers .
- It is found in umbilical cord.



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3. Reticular connective tissue:

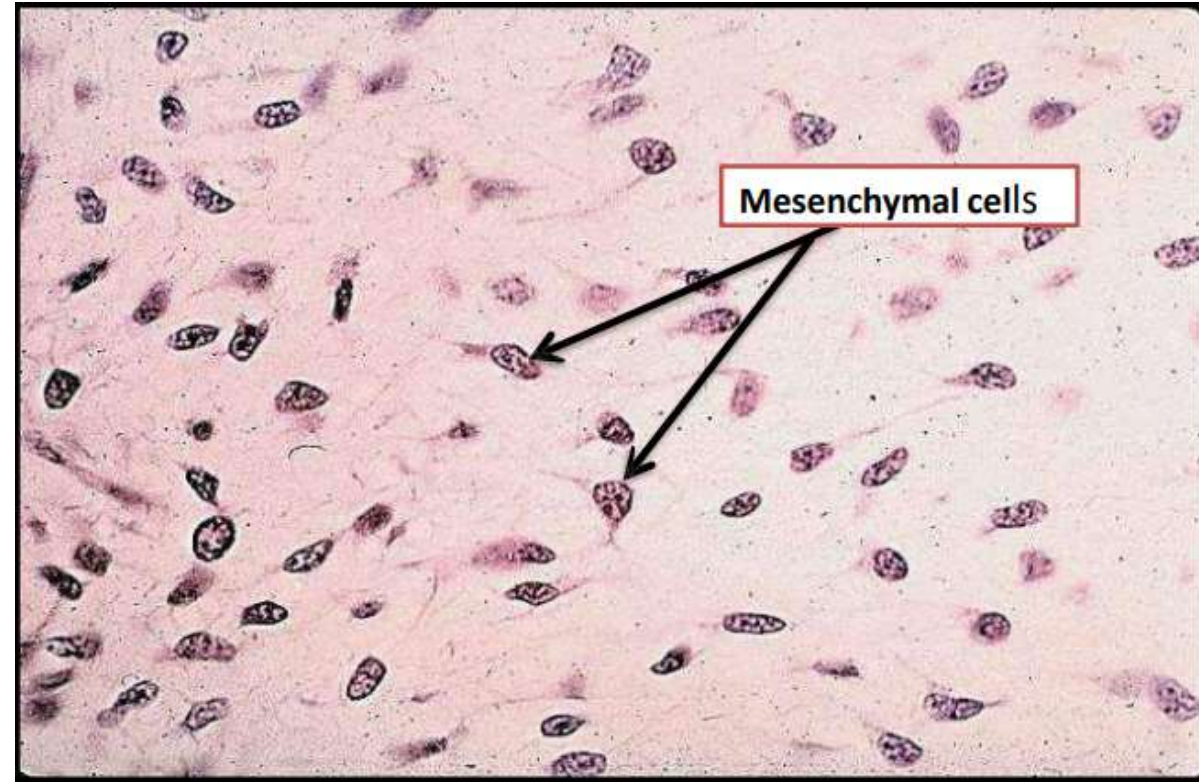
- Characterized by the presence of network of reticular fibers, associated with reticular cells.
- Also it contains lymphocytes which have a dark nucleus that occupied most of the cell volume.
- This connective tissue forms the stroma of many lymphatic organs such as the spleen, thymus, lymph nodes, and bone marrow.



Connective tissues

4. Mesenchymal connective tissue

- An embryonic tissue formed by elongated cells, the mesenchymal cells immersed in an abundant and viscous extracellular substance containing few fine sparse fibers.
- This tissue gives rise to all other connective tissue types.
- It is found in embryo sections.

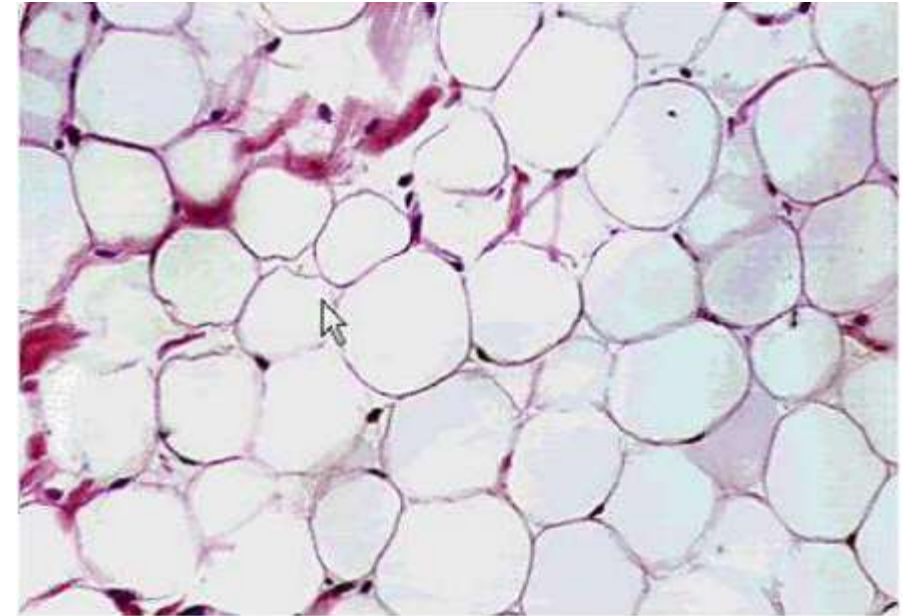


Connective tissues

Adipose connective tissue

Each fat cell is surrounded by a web of different fibers and fibroblasts.

- Adipose connective tissue is commonly found throughout the body in such diverse locations as a fat capsule surrounding kidney, pericardial and abdomino-pelvic cavities and subcutaneous layer.

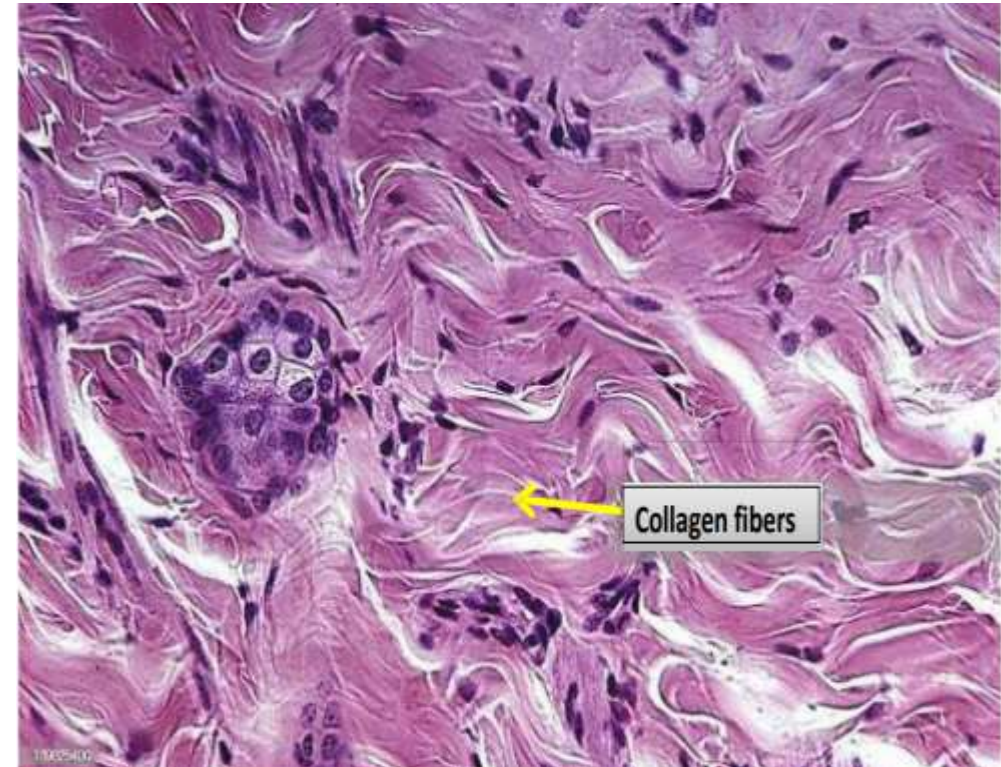


Connective tissues

Dense Connective Tissue

1- Dense irregular connective tissue

- ✓ In this tissue the collagen fibers are arranged in bundles extended in all directions without a definite orientation comprising a three-dimensional network and provide resistance to stress from all directions.
- ✓ It can be seen in the dermis of skin.



Connective tissues

II. Dense regular connective tissue

- Also called whitefibrous connective tissue or collagenous tissue, because collagen fibers are the dominant type.
- Consists of collagen fibers aligned with the linear orientation of fibroblasts in response to prolonged stresses exerted in the same direction; consequently they offer great resistance to traction forces.
- Tendons are the most common example of dense regular connective tissue:

