CONNECTIVE TISSUE

INTRODUCTION

Connective tissue is one of the four tissues found in the human body. It provides a matrix that supports and physically connects other tissues and cells together to form the organs of the body. Connective tissue is found in between other tissues everywhere in the body, including the nervous system.

- **Connective** tissue is composed of cells, fibers and ground substances (matrix).

- **General functions of the connective tissues:-**
- **1-** Supporting, so some of the connective tissues called supporting tissues.
- **2-** Serving as medium of exchange.
- **3-** Binding the organs to others.
- **4-** Aiding in the defense and protection of the body.
- 5- Forming a site for storage of fat.

connective tissues fibers:

1- Collagenous fibers:

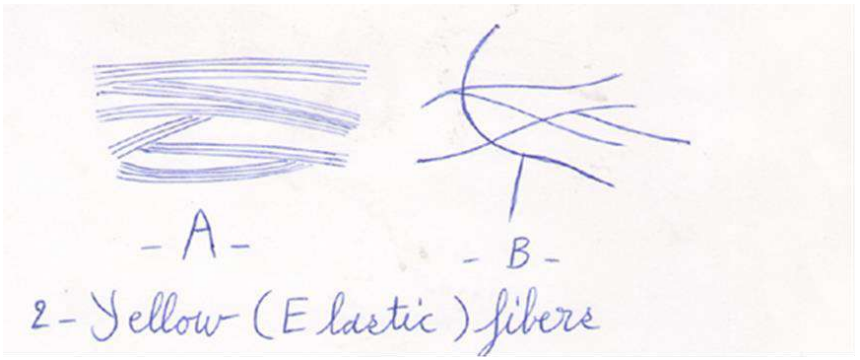
- Are tough, flexible and they resist stretching (inelastic), they are called white fibers and waved unbranched bundles.

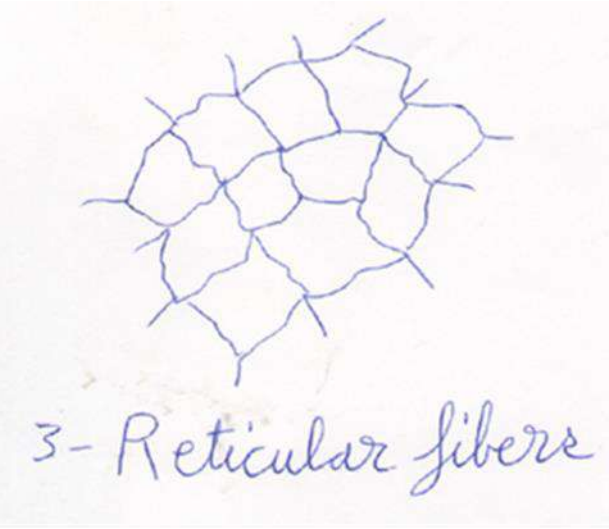
2- Elastic fibers:

- Are thinner than collagenous fibers and they are highly elastic, composed of branched tubular fibers of protein (elastin).They appearing yellow in color.

3- Reticular fibers:

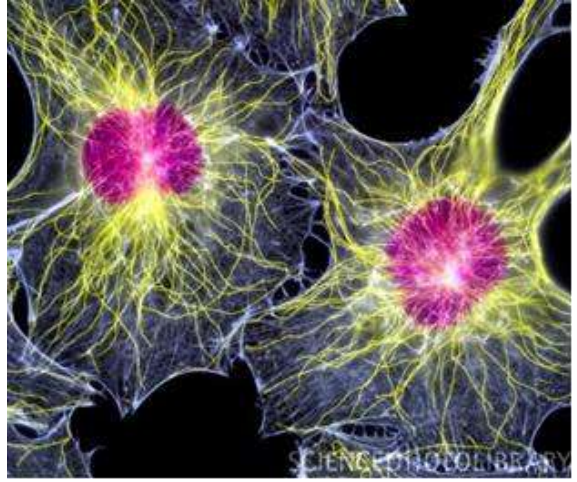
- They are made of thin co-protein, and they appear as net of branched fibers.

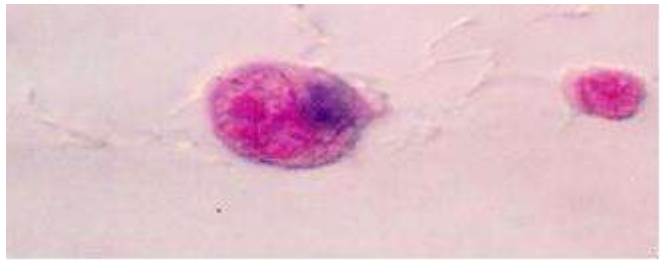


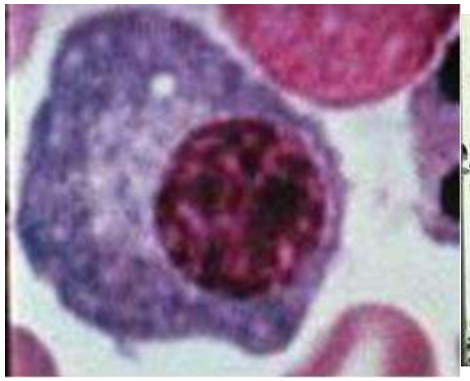


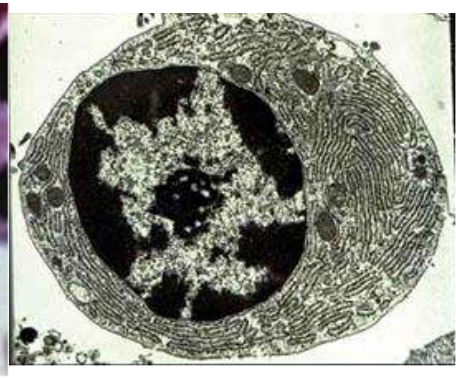
Cells of the connective Tissues:

- **1- Fibroblasts:** They are large ovoid in shape with cytoplasmic processes; they produce the fibers and ground substance.
- **2- Microphages (Histocytes):** Are irregular shaped cells, the cytoplasm is granular vaculated with large number of lysozymes. The function of these cells is to remove cellular debris and protection the body against foreign invaders.
- **3- Plasma cell:** Ovoid to spherical cell. It is cytoplasm is intensely basophilic, the nucleus is spherical eccentrically placed which posses heterochromatin radiating out from the center giving it characteristic (clock face) appearance. These cells are antibodies produce cells and found in the inflammed tissue.



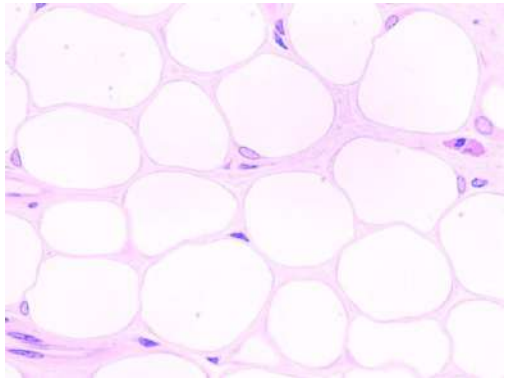


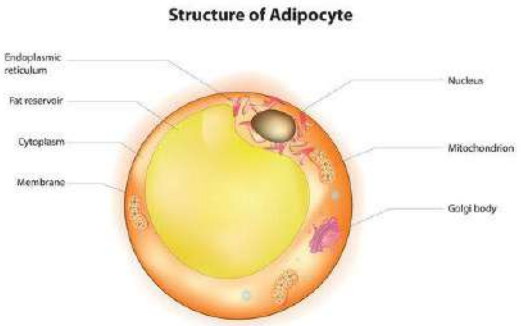


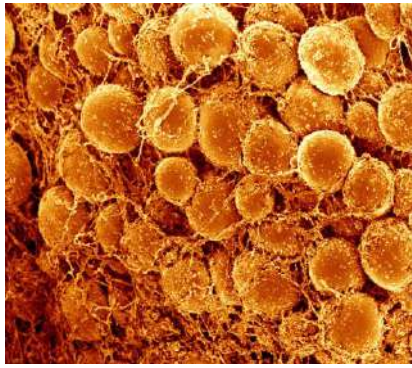


- **4.Mast cells:** Small, ovoid cells with central small nucleus. The presence of numerous granules in the cytoplasm is the identifying characteristic of mast cells. These cells produce heparin and histamine.

- **5- Adipocytes (fat cells):** Large spherical cells that become polyhedral when crowded in small clusters in the adipose tissue. Each adipocyte contains a large triglyceride droplet (their function is storage of triglyceride) that pushes the nucleus to the edge of the cell adjacent to plasma membrane and the cytoplasm displaced peripherally against the plasma membrane, thus giving the cell the ring shape.



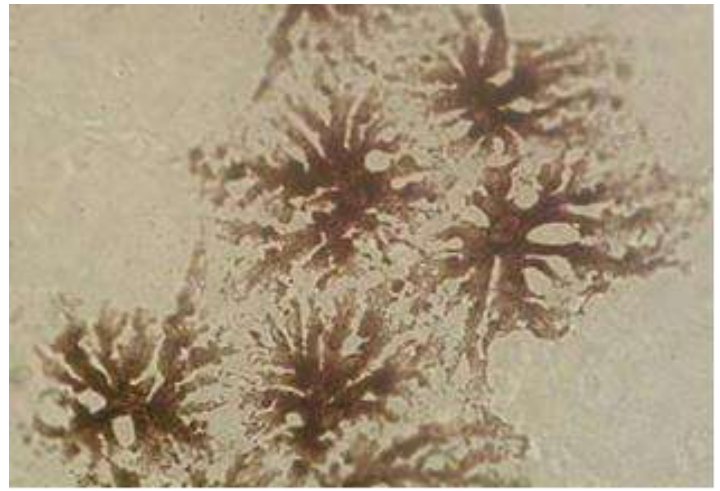




- **6- Mesenchymal cell:** It same as the fibroblast but it is smaller, present in the embryo.

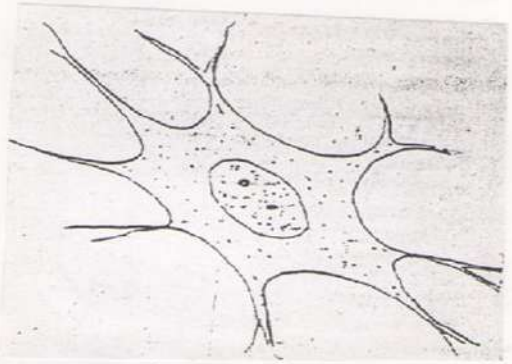
- **7- Reticular cell:** It same as the mesenchymal cell but it is dendrites branching and contact with the branches of the other cells.

8- Pigment cell: The cytoplasm has melanin granules which cover the nucleus.

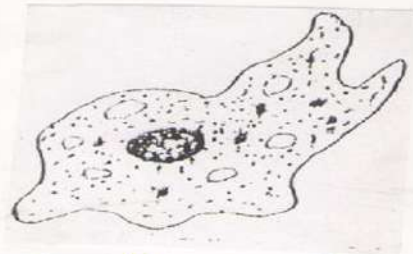


- 9- Eosenophil.
- 10- Neutrophil.
- 11- Lymphocyte.

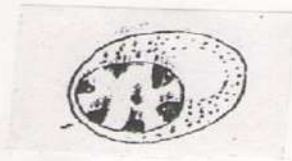
Types of cells in connective tissues



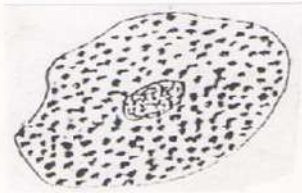
Fibroblast
-1-



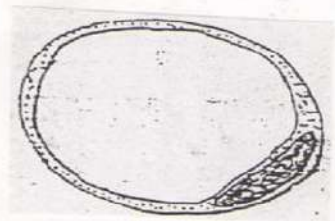
2 - Macrophage



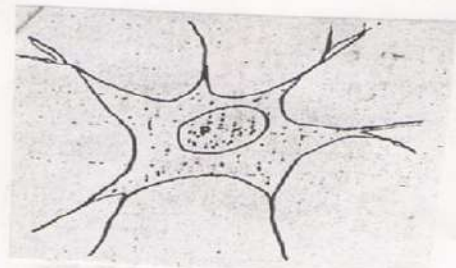
3 - Plasma cell



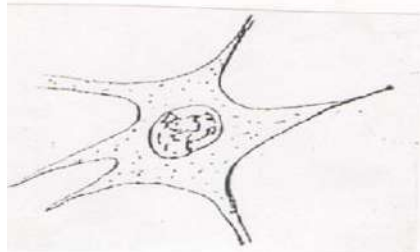
Mast cell
-4-



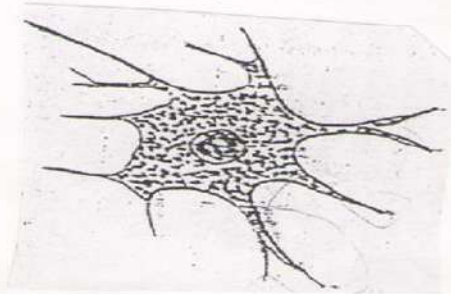
5 - Adipocyte



6 - Mesenchymal cell



Reticular cell
-7-



8 - Pigment cell

Classification of connective tissue

1- General or proper connective tissues:

A- Loose connective tissue.

1. Areolar connective tissue.
2. Adipose connective tissue.
3. Mesenchymal connective tissue.
4. Mucoid connective tissue.
5. Reticular connective tissue.

B- Dense connective tissue.

1. Irregular dense connective tissue.
2. Regular dense connective tissue.
    I. Elastic regular dense connective tissue.
    II. White fibrous regular dense connective tissue.

2- Special connective tissues:

1- Skeletal connective tissue.

a- Cartilages.

- Hyaline cartilage.
- Elastic cartilage.
- White fibro-cartilage.

b- Bones.

- Compact bones.
- Spongy bones.

2- Blood.

3- Lymph.

4- Haemopoietic tissue.

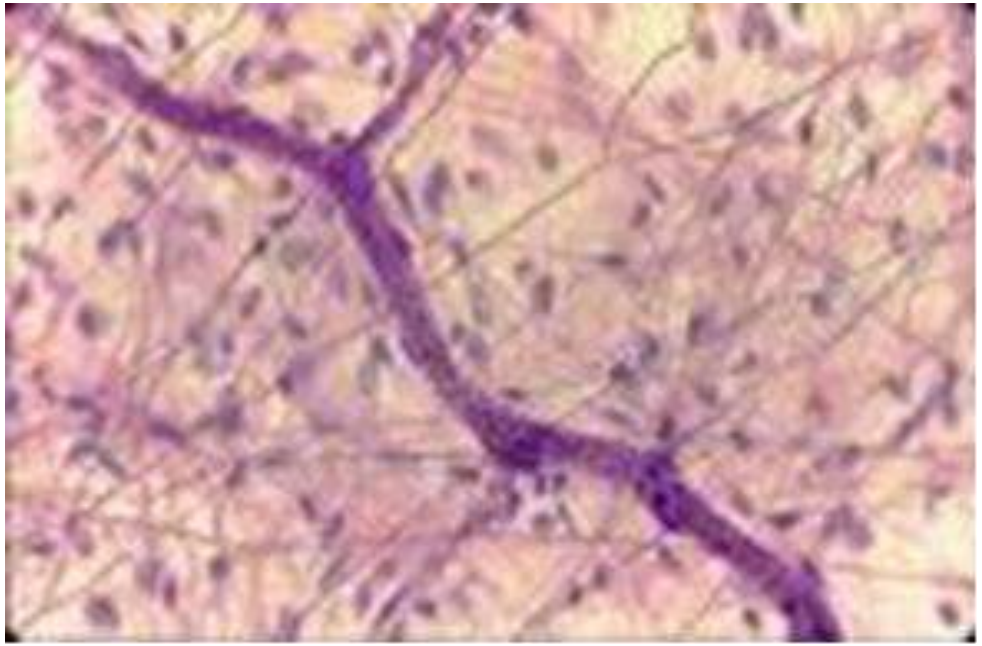
- Myeloid tissue.
- Lymphoid tissue.

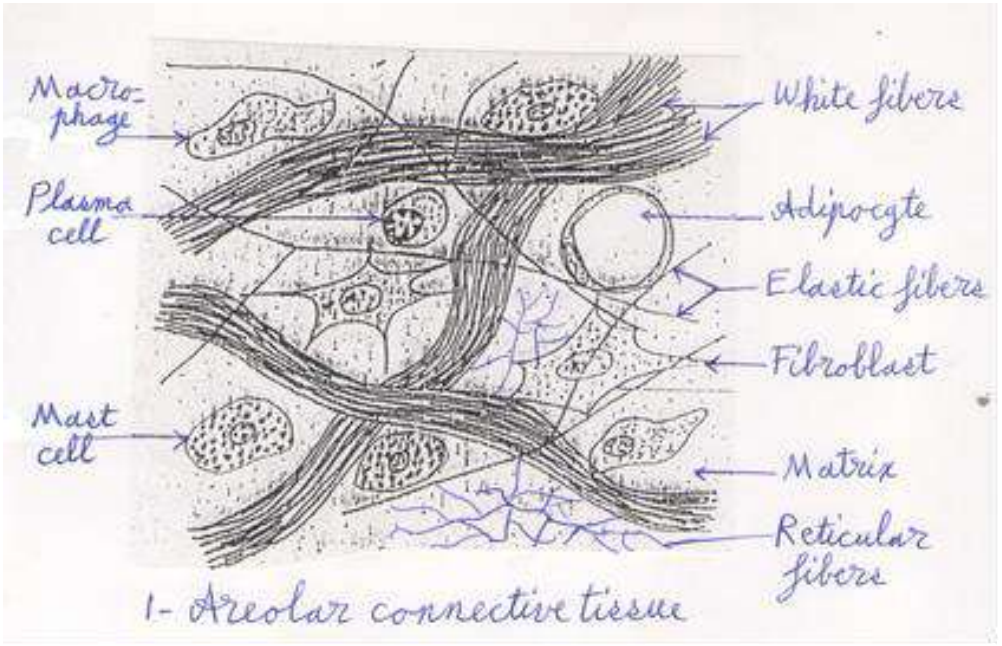
1- General or proper connective tissue:

A- Loose connective tissue:

1-Areolar connective tissue.

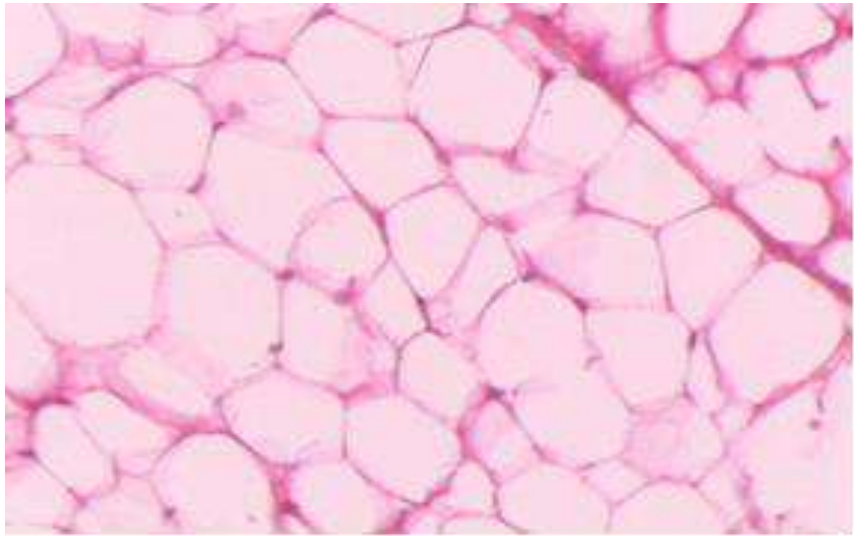
Surrounding blood vessels and nerves and sometimes penetrates into the small spaces of muscles and adipocytes. It is characterized by abundant ground substances and extracellular fluid housing the fixed connective tissue cells: Fibroblasts, adipocyts, macrophages and mast cells, as well as undifferentiated cells. Also collagen, reticular and elastic fibers.

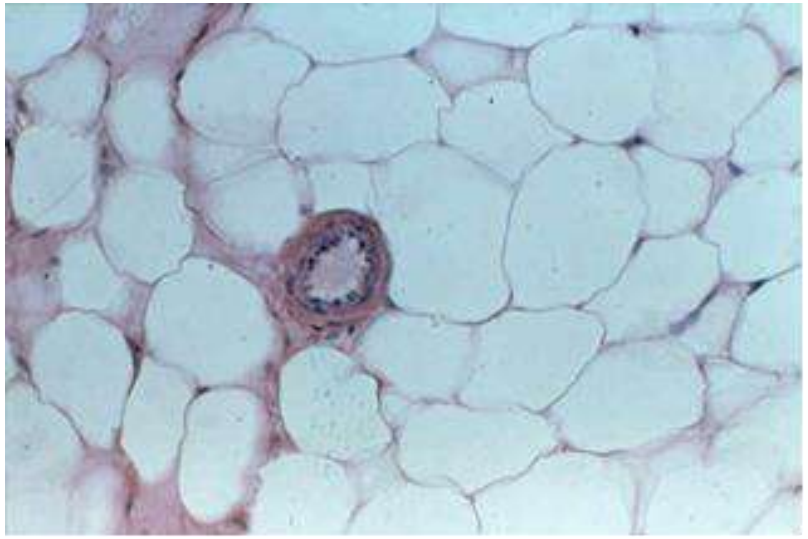


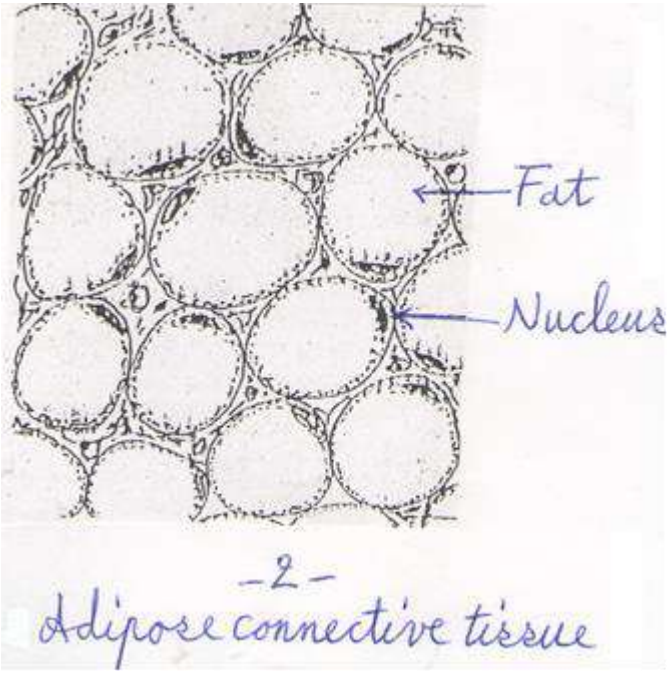


2- Adipose connective tissue.

We can see this tissue clearly within the skin and muscles in layer called (subcutaneous fat). It's composed of fat cells (adipocytes) contain a single lipid droplet, blood vessels and some reticular fibers.

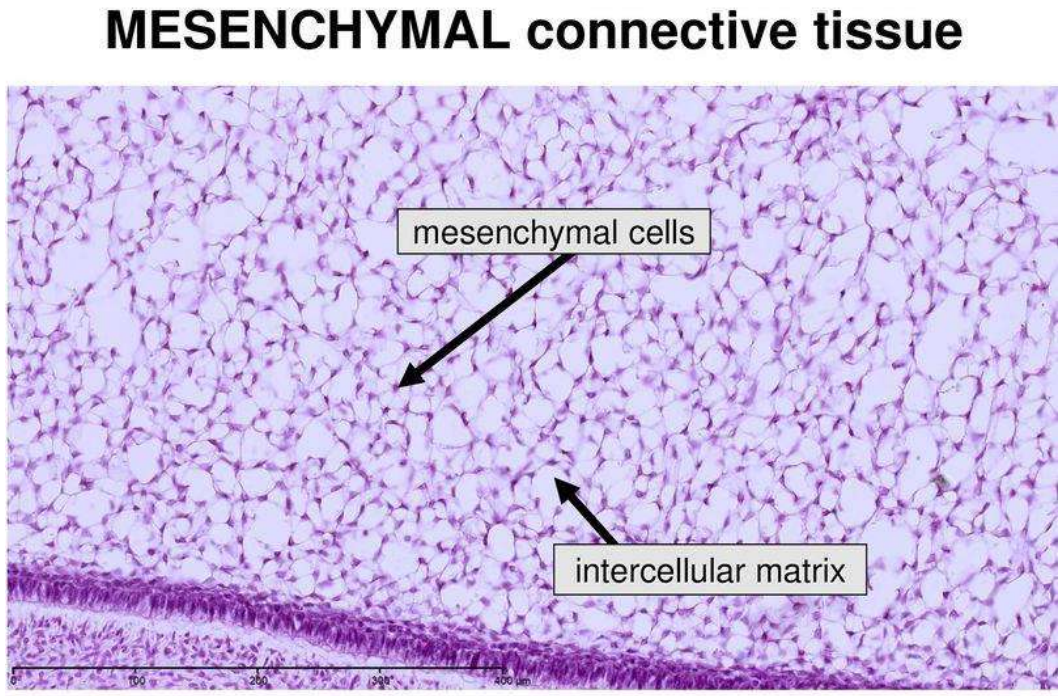


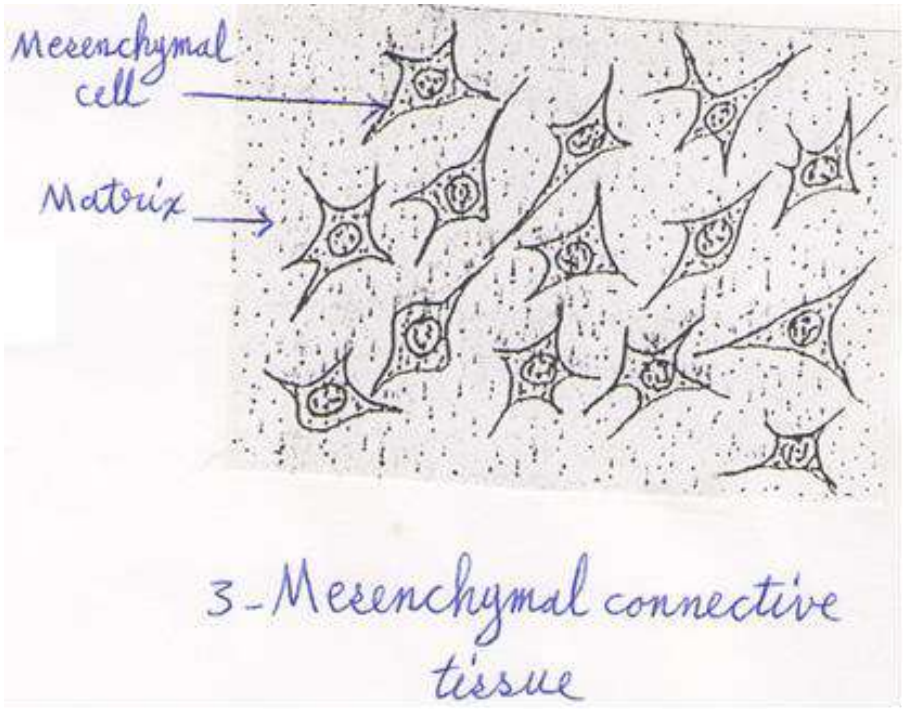




3-Mesenchymal connective tissue.

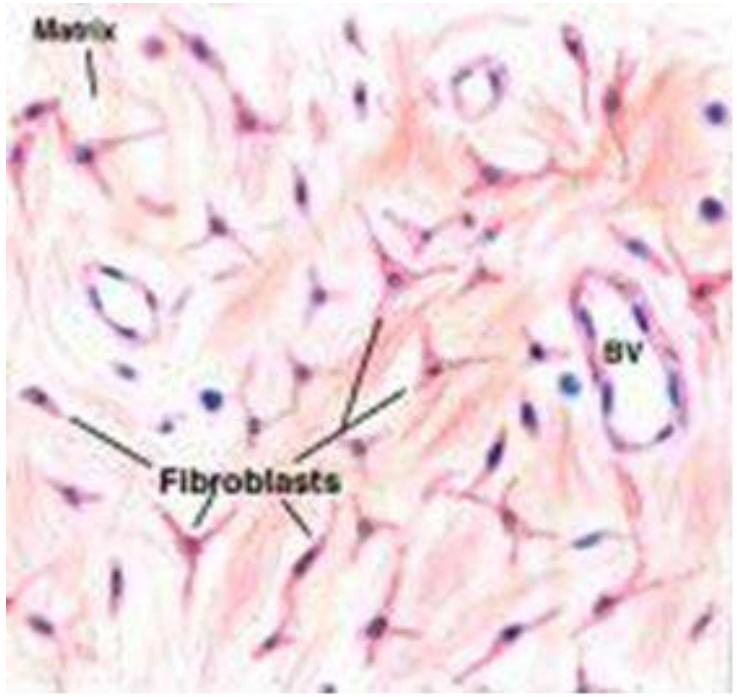
The embryonic mesoderm gives arise to an embryonic connective tissue (mesenchymal connective tissue) which produces all prominent connective tissue. It consists of mesenchymal cells in a jelly-like matrix.

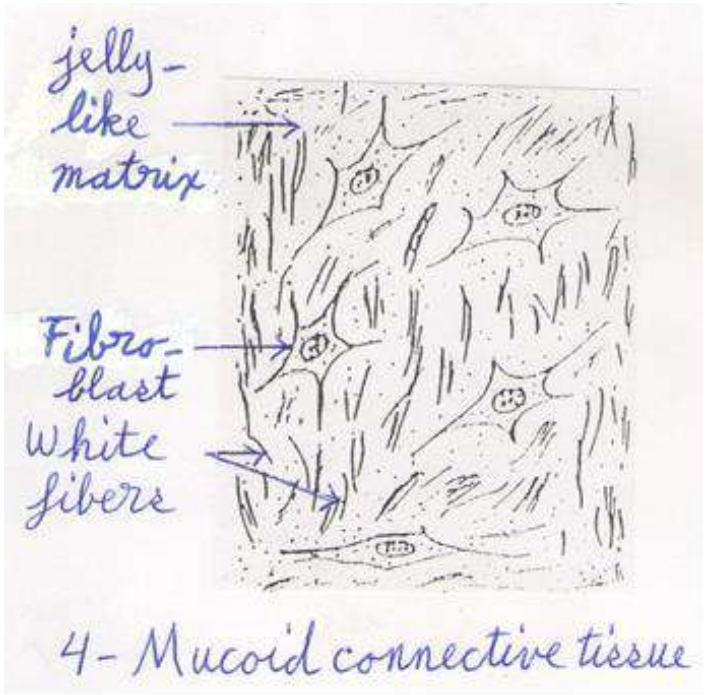




4- Mucoid connective tissue.

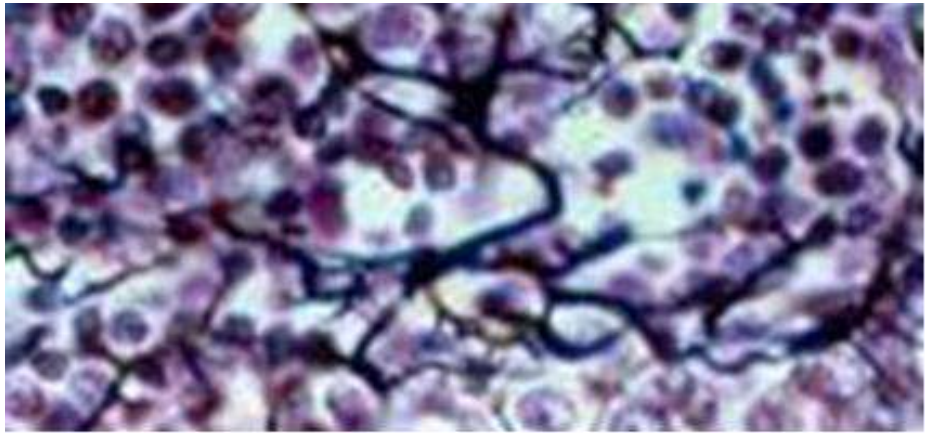
Like mesenchymal connective tissue found in the embryo (in the umbilical cord and subdermal connective tissue of the embryo), but mucoid is temporary it exist only in the fetus and never gives arise to prominent tissue. It consists of jelly-like matrix with white fibers and fibroblasts.

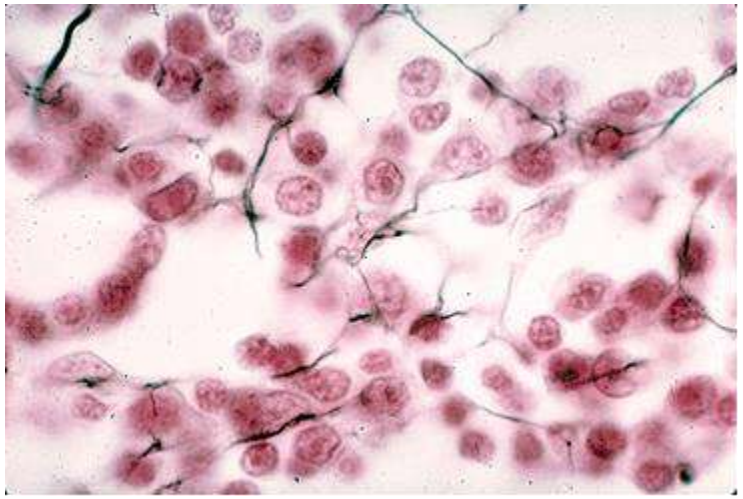


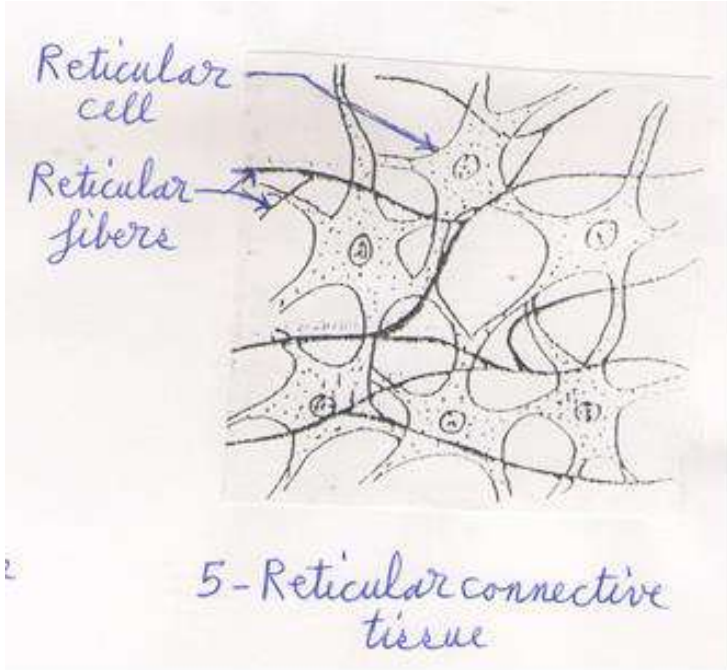


5- Reticular connective tissue.

Forms the architectural framework of liver sinusoids, adipose tissue, bone marrow, lymph node, spleen, smooth muscles and the islets of langerhans. In a section in lymph node we can see: Reticular fibers are the major fibers component of the tissue, so that the reticular cells. The spaces amid the fibers are filled with blood cells (lymphocytes in lymph node).



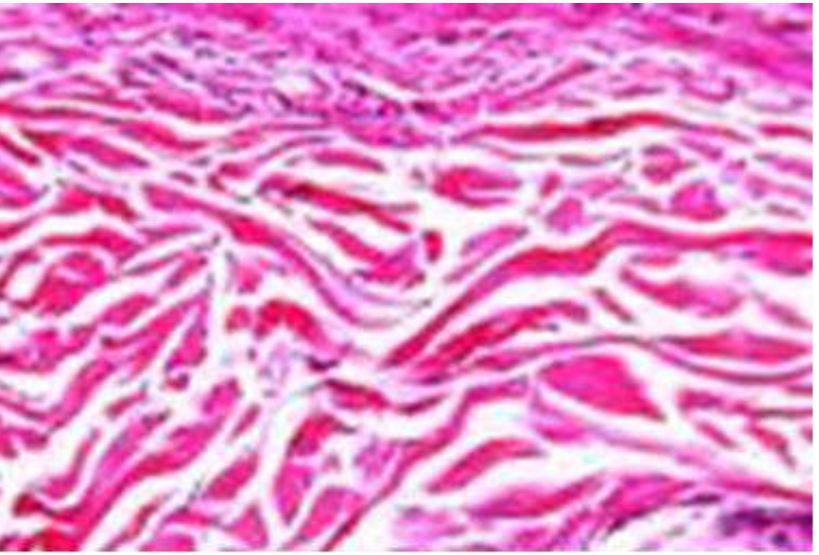


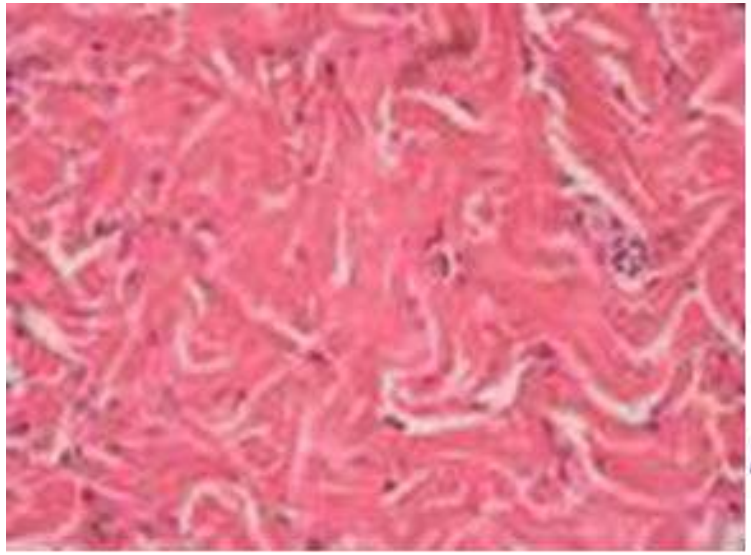


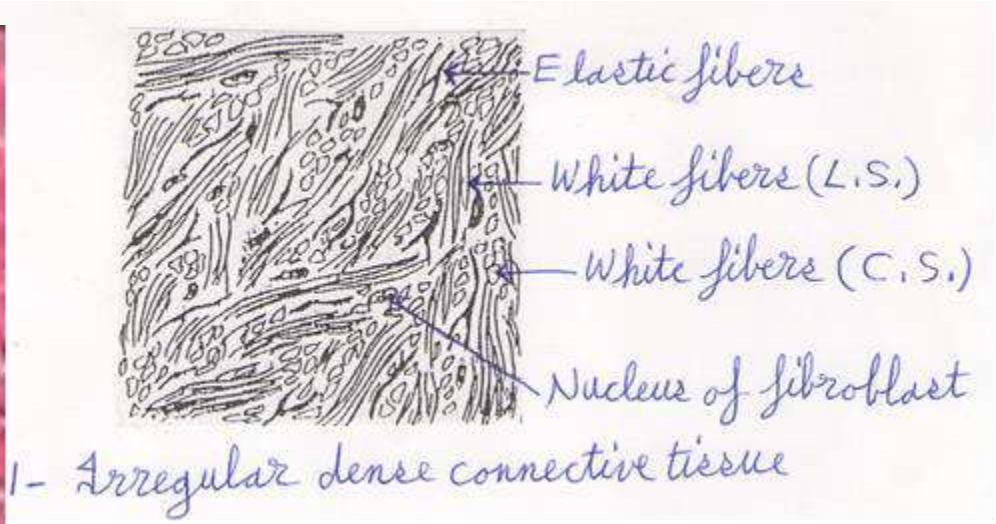
B- Dense connective tissue:

1- Irregular dense connective tissue:

Thick bundles of collagen fibers with little cells (fibroblasts), elastic fibers and ground substance. Collagen bundles run in a random directions which enable to resist stress. Found in dermis of skin, the sheaths of nerves, and the capsules of spleen, ovary, kidney, and lymph nodes.





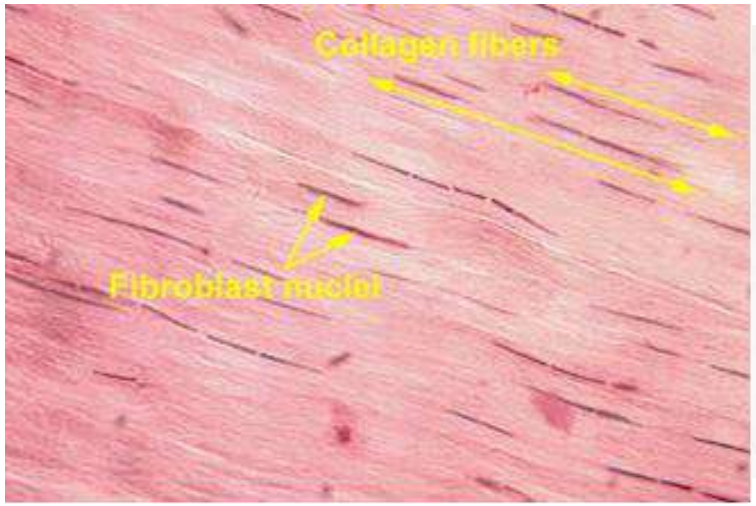


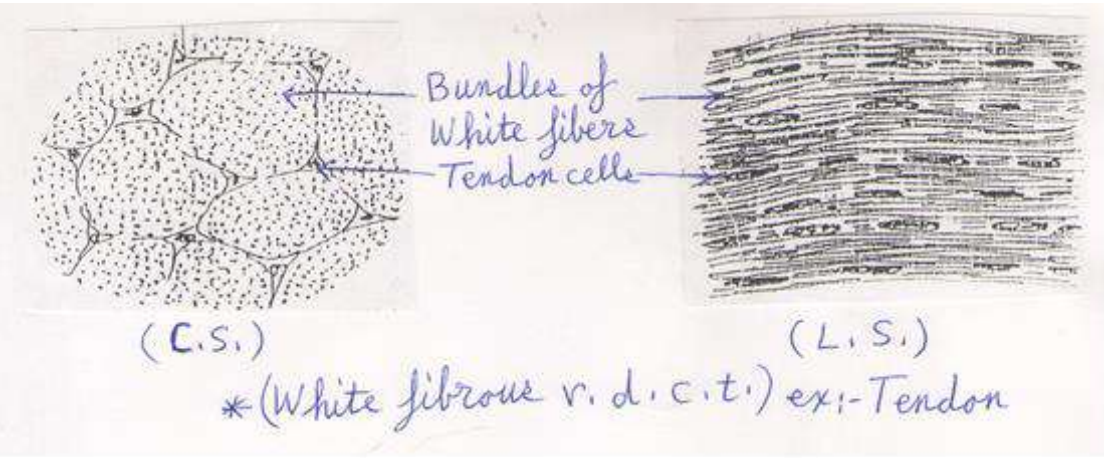
2- Regular dense connective tissue:

- All fibers in one direction, parallel to each other. The cells are only fibroblasts.

a. White fibrous regular dense connective tissue :

This is found in tendon, the collagen fibers in it are parallel to each other, thin, sheet-like. Fibroblasts are located between bundles of collagen.





b. Elastic regular dense connective tissue:

Composed from branched elastic fibers arranged parallel to each other and form either thin sheets or fenestrated membrane.

There are a few fibroblasts and white fibers. This is found in true vocal cord and ligaments.