HISTOLOGY

DONE BY:

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The cells of the connective tissue:

<table>
<thead>
<tr>
<th>Type</th>
<th>Endowment</th>
<th>Characteristics</th>
</tr>
</thead>
</table>
| fibroblast (active)           | originate outside CT then remain in the CT long period | - active myofibroblasts have contractile ability
| Fibrocyte (inactive)          | originate outside CT then remain in the CT short period | - smaller than fibroblasts, less cytoplasmic processes, nucleus smaller and darker, Less RER
| myofibroblasts                | originate and remain in the CT all their lives | - has contractile ability

Cells of CT are usually not regularly arranged.
<table>
<thead>
<tr>
<th><strong>macrophage</strong></th>
<th><strong>mast cells</strong></th>
<th><strong>plasma cells</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Surface indentations and protrusions</td>
<td>Lysosomes</td>
<td>Blood vessel</td>
</tr>
<tr>
<td>Ecchentric oval/ kidney shaped nucleus</td>
<td>Pseudopodia</td>
<td>Large, oval, round cells</td>
</tr>
<tr>
<td>Many RER and a well developed Golgi</td>
<td></td>
<td>Cytoplasm basophilic with secretory granules</td>
</tr>
<tr>
<td>Debris</td>
<td>Residual bodies</td>
<td>Nucleus small spherical centrally located</td>
</tr>
<tr>
<td>Debris and the process of phagocytosis</td>
<td>Phagosome</td>
<td>Lighter region for golgi and centriole</td>
</tr>
<tr>
<td>Fibroblasts</td>
<td>Phagocytosis, destruction of red blood cells, antigen presentation to lymphocytes, release cytokines and collagenase.</td>
<td>Production of antibodies</td>
</tr>
<tr>
<td>Macrophages</td>
<td>Mast cells</td>
<td>Plasma cells</td>
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<td>Heparin, histamine and various inflammatory molecule.</td>
<td>Production of antibodies</td>
<td></td>
</tr>
</tbody>
</table>
Fibers of the Extracellular Matrix

Collagen fibers from protein Collagen

Reticular fibers

Elastic fibers from protein Elastin
Collagen turn-over is slow in some organs, like tendons where the collagen is stable. In the periodontal membrane (which holds the teeth in their sockets), collagen has a high turn-over rate.
Reticular fibers

Formed by a type of collagen protein that is heavily glycosylated.

Thinner than Collagen fibers.

Stain black with silver impregnation (argyrophilia).

Locate in:
- Lymph nodes
- Liver
- Bone marrow
- Spleen
- Allow organs to stretch arteries, uterus
Elastic fibers are thinner than collagen fibers and form a network dispersed between collagen bundles in organs subject to stretching and bending. Elastic fibers may form fenestrated sheets in the walls of large blood vessels called Elastic lamellae. They provide elasticity for the organ and are synthesized by fibroblasts and smooth muscle cells.
Ground Substance

- **Glycosaminoglycans (GAG)**
  - largest GAG is hyaluronic acid

- **Proteoglycans**

- **Glycoprotein**

  - **Laminin** (in basal lamina).
  - Glycoproteins can bind to various components
Classification of Connective Tissue

Connective Tissue

Adult
  Proper
    Loose
      Areolar
      Adipose
      Reticular
    Dense
      Collagenous
      Irregular
      Regular
  Dense
    Elastic

Embryonic
  Supportive
    Bone
      Hyaline
      Elastic
    Cartilage
      Elastic
      Fibrocartilage
  Fluid
    Blood
    Lymph
Proper connective tissue forms the ECM is the fibroblast.

Loose connective tissue
- Areolar
- Adipose
- Reticular
  - Forming a network

Dense connective tissue
- Densely packed
- Elastic
- Collagenous
  - Irregular
  - Regular
Areolar connective tissue

**Found in**
- Under epithelia
- Around glands
- Spaces between muscle and nerve fibers
- Around blood and lymphatic vessels
- Fills many small spaces

**Functions**
- It gives organs their shape
- It is a medium for the diffusion of gases, nutrients, and waste products
- It is usually the first tissue where microorganisms and foreign particles enter the body; it’s an important site for immune and inflammatory responses

Contains all three types of fibers arranged loosely: Collagen fibers, reticular fibers, and elastic fibers.

All types of connective tissue cells (especially fibroblasts and macrophages) are found in it.

It’s highly vascular.
Reticular

Loosely arranged

In Haematopoietic organs (bone marrow, spleen) and lymph organs

Formed by Reticular cells modified fibroblasts

cytoplasmic processes extend on the reticular network forming a cell-lined sponge-like structure

Dense Collagenous Connective Tissue

few cells and ground substance. Highly resistant to stress.

Irregular

no specific orientation

3-dimensional network

resist stress

regular

flattened fibroblasts dispersed between them

parallel

in tendons and some ligaments
Dense Elastic Tissue

- Composed mainly of elastic fibers
- Found in aorta ligaments true vocal cords
- Gives the organ elasticity