



Histology Lecture (3)
Connective Tissue

Med433

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• **Objectives:**

By the end of this lecture, the student should be able to:

- 1- Enumerate the general characteristics of C.T.
- 2- Classify C.T.
- 3- Classify C.T. proper (C.T.P.)
- 4- Describe the structure (components) and distribution of different types of C.T.P.
- 5- Discuss clinical applications related to C.T.P.

❖ DEFINITION OF C.T.

It is a **basic type of tissue**, of **mesodermal origin**.

➤ Provides:

- **structural**
 - **metabolic**
- } **support for tissues and organs.**

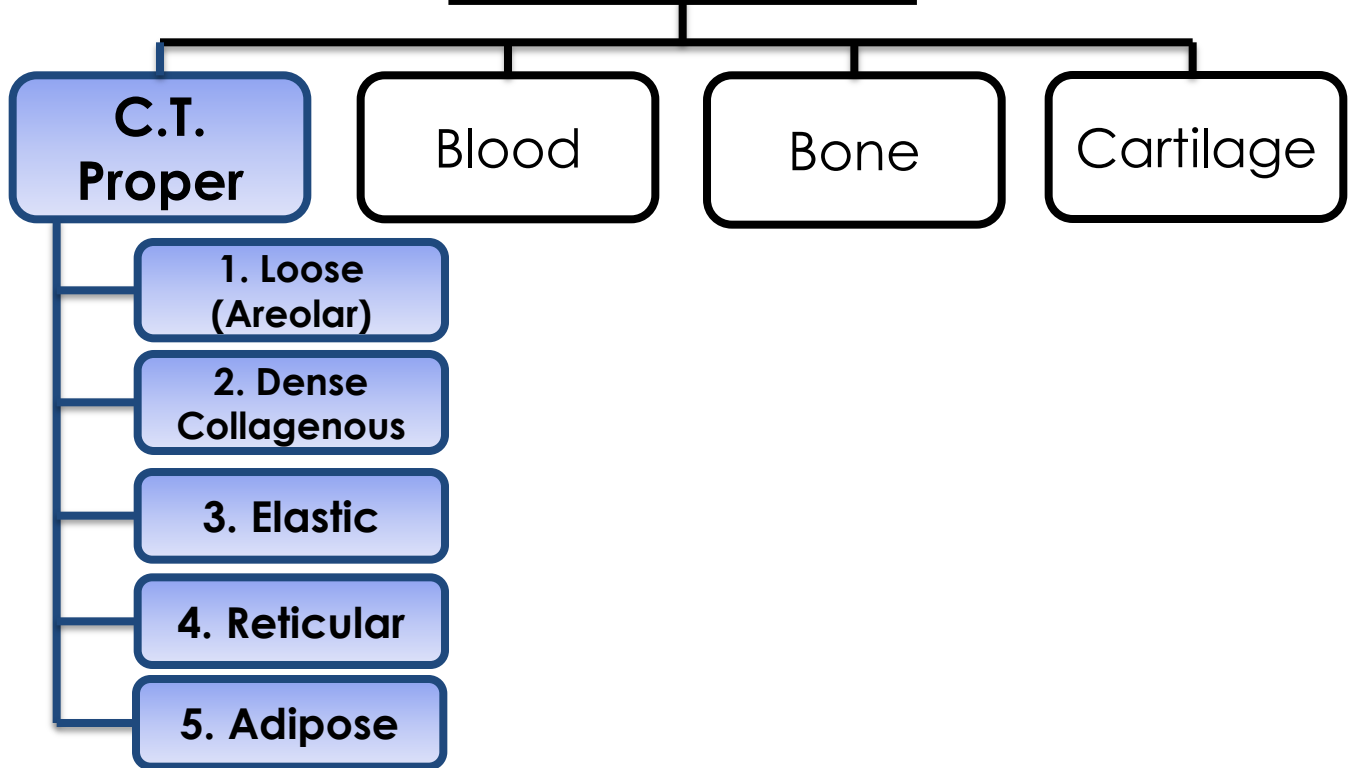
❖ GENERAL CHARACTERISTICS

- 1) Formed of **widely separated few cells** with abundant extracellular matrix.
- 2) most C.T. are **vascular**.

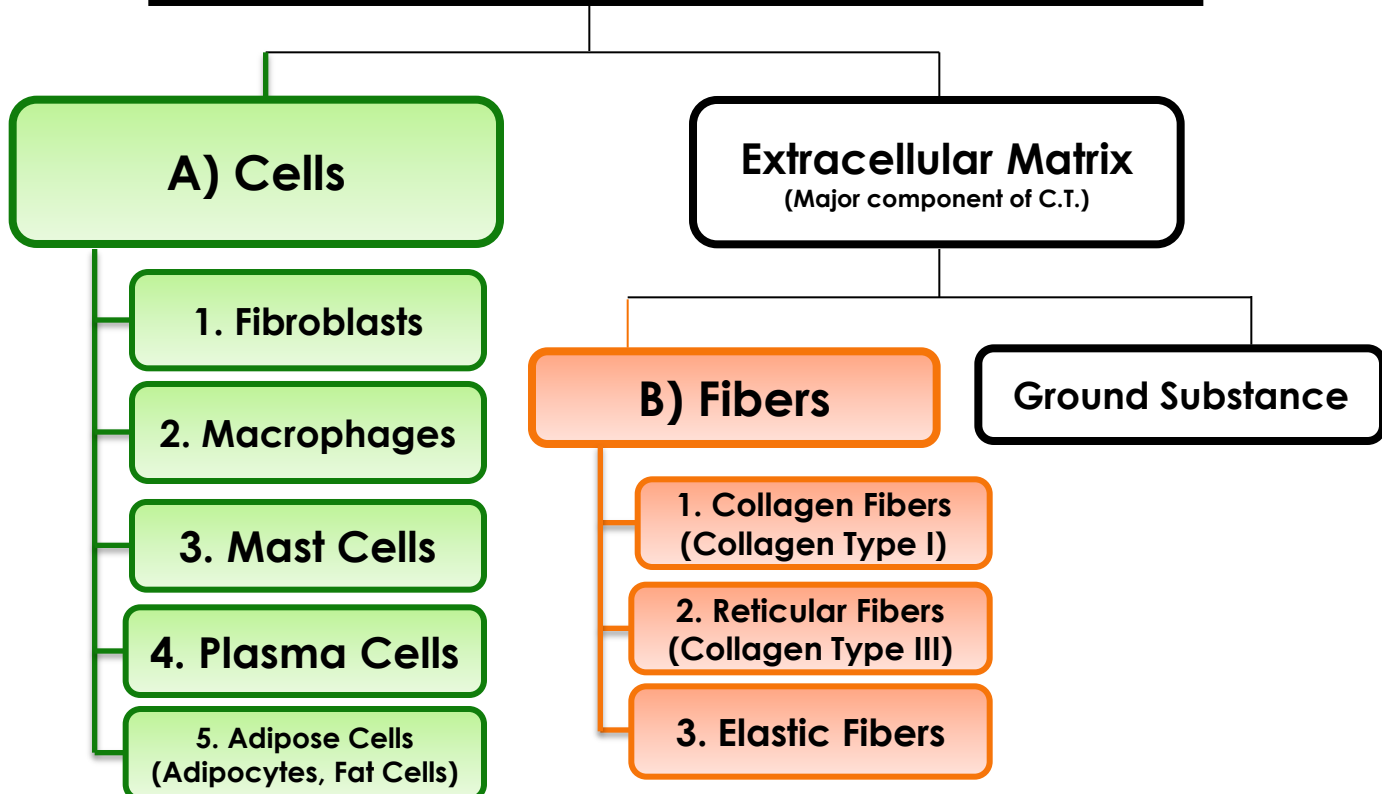
What is the difference between Epithelial Tissue and Connective Tissue? (This is extra **من اجتهاد الطلاب**)

<u>Epithelial Tissue:</u>	<u>Connective Tissue:</u>
1. It is made up of cells and negligible amount of extracellular matrix.	1. It is made up of cells and a large amount of extracellular matrix.
2. The cells are arranged in one or more layers.	2. The cell are scattered in the matrix.
<u>3. Avascular</u>	<u>3. Vascular</u>
4. It is not surrounded by blood capillaries	4. The cells are surrounded by blood capillaries.
5. Epithelial tissue lie above the basement membrane.	5. Connective tissue which lie below the basement membrane are called lamina propia.
6. It develops from the ectoderm or mesoderm or endoderm .	6. It develops from mesoderm only .
7. It mainly forms external and internal covering of the organs	7. It connects anchors and support other tissues or organs.

TYPES OF C.T.



COMPONENTS OF C.T. PROPER



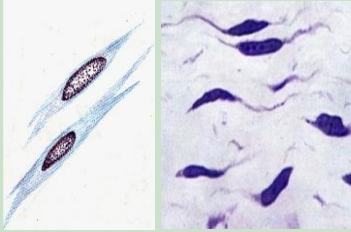
A) Cells

TYPE

L/M

FUNCTION

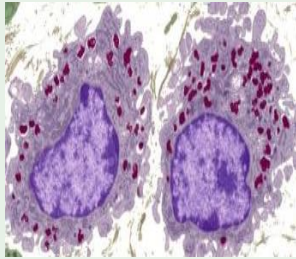
1. Fibroblasts



- Flat branched cells (spindle-shaped) with **basophilic** cytoplasm.
- They can divide.
- Old fibroblasts are called *fibrocytes*.

1- Formation of proteins of extracellular matrix.
2- Healing of wounds.
Because they divide quickly

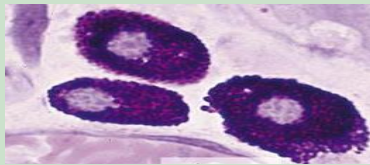
2. Macrophages



- Basophilic cytoplasm, rich in lysosomes (Contains Digestive enzymes).
- Irregular outlines. (To move)
- They can divide.
- They originate from monocytes (WBC).

Phagocytosis – Cleans C.T.

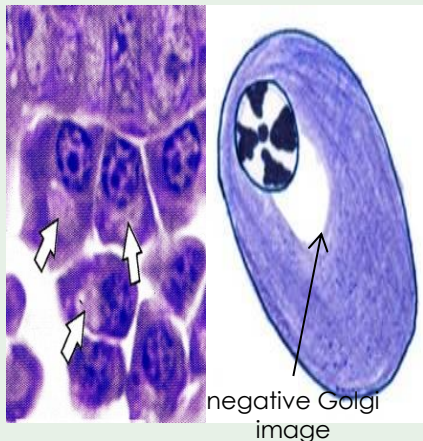
3. Mast Cells



- Cytoplasm contains numerous cytoplasmic **granules**. (The granules store heparin & histamine)

Secrete heparin & histamine.
Histamine has sensitivity from antibodies of proteins
→ Causes allergic reactions and irritation .

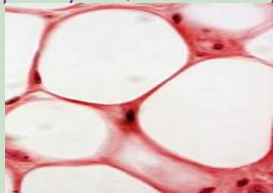
4. Plasma Cells



- Basophilic cytoplasm with a *negative Golgi image*.
- Nucleus: spherical, eccentric with a **clock-face appearance** of chromatin. (Euchromatin & Heterochromatin)
- Derived from B-lymphocytes. (They are the active form of B-cells)

Secretion of antibodies (immunoglobulins).

5. Adipose Cells (Adipocytes, Fat cells)



- Large spherical, with a single large fat droplet.
- **Thin rim of cytoplasm at the periphery.**
- **Nucleus: flattened, peripheral.**

Storage **and secretion** of **fat** And **energy** (According to intake)

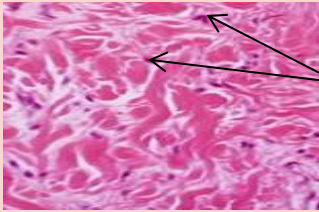
B) Fibers

Most abundant protein in the body is: **Collagen

FIBERS

CHARACTERISTICS

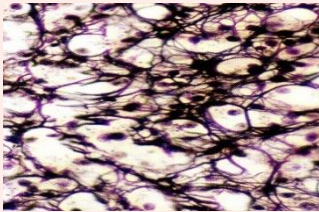
1) Collagen Fibers (Collagen type I)



In between the fibers we have Fibroblasts, which explain the presence of nuclei

- **Non-branched** fibers, arranged in **bundles**. (Like in tendons)
- **Acidophilic**.

2) Reticular Fibers (Collagen type III)



- Form a **network**.
- Stained black with silver stain.

3) Elastic Fibers



- **Branched**.
- Stained brown with Orcein

❖ Other important types of collagen include:

- **type II** → in cartilage
- **type IV** → in basement membranes

C.T. Proper

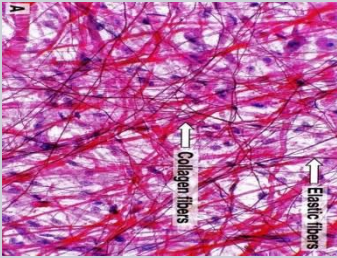
TISSUE

L/M

SITES

1) Loose (Areolar) C.T.

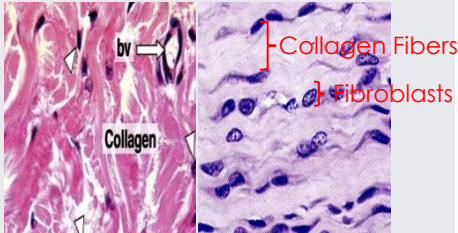
(Called "areolar" = air, because long ago they thought the fluid was air)



- Contains all the main components of C.T.P. (no predominant element in loose C.T.)
- Vascular – Rich with blood capillaries

- Subcutaneous (تحت الجلد) tissue. (this explains bruising)
- The most common type of C.T.P.

2) Dense Collagenous C.T.



1

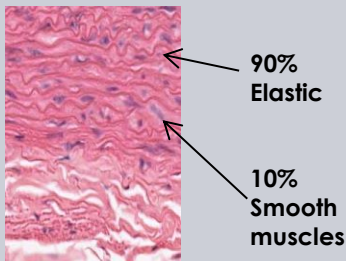
2

- Predominance of collagen fibers + Fibroblasts
- Avascular (makes tendons hard to heal, unlike bones)

dense collagenous C.T. :

1. **Dense irregular**
e.g. dermis of the skin, capsule.
2. **Dense regular**
e.g. tendons, ligaments.

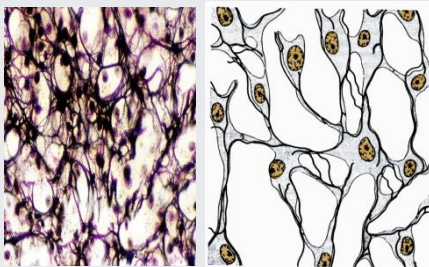
3) Elastic Tissue



- Branching **Elastic fibers** (membranes) + **Fibroblasts** (smooth muscle cells).

- Aorta
- Lungs
- skin

4) Reticular Tissue (شبكة)

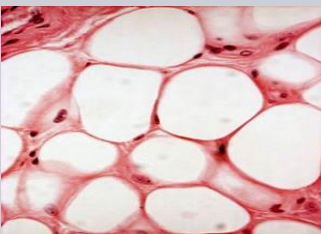


- Reticular fibers + Reticular cells (specialized fibroblasts).

- Stroma of organs: e.g. liver, lymph node, spleen.

5) Unilocular Adipose Tissue

(White Adipose Tissue)



- Is formed of lobules of unilocular adipose cells.
- **Function:**
- Synthesis, storage & release of fat

- **Subcutaneous layers** especially in buttocks & hips.
- Abdominal wall.
- Female breast.
- Around the kidney.
(For protection & heat saving)

Clinical Applications

Bronchial Asthma

(excessive secretion of histamine in mast cells)

Exposure to allergen → stimulation of **mast cells** in the lung → **Release of histamine** & other chemicals → contraction of smooth muscle fibers in the wall of the bronchioles (bronchospasm) → dyspnea (difficulty in breathing)

Obesity

1- Hypertrophic obesity → **Increase in size**

It results from the accumulation and storage of fat in the unilocular fat cells (white adipocytes). These cells may increase in size up to four times.

2- Hypercellular obesity → **Increase in number**

It results from an increase in number of adipocytes, which may be attributed to increased number of adipocyte precursors in infancy.

MCQS

1. Bronchial Asthma is caused by excessive secretion of:
 - a) Histamine
 - b) Heparin
 - c) Cortisone
 - d) Both a+b
2. They can divide quickly and heal wounds:
 - a) Mast cells
 - b) Collagen fibers
 - c) Fibroblasts
 - d) Elastic tissue
3. Derived from B-lymphocytes and have a negative Golgi image:
 - a) Adipocytes
 - b) Plasma cells
 - c) Adipocytes
 - d) Reticular Fibers
4. Hypertrophic Obesity is:
 - a) Increase in size
 - b) Decrease in size
 - c) Increase in number
 - d) Decrease in number
5. Which type of tissue contains all C.T.P. components?
 - a) Loose (areolar)
 - b) Dense
 - c) Elastic
 - d) Reticular