



Histology
Foundation Block



3 Connective Tissue




[Editing File](#)

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- Main text
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Objectives:

In this lecture you are expected to learn :

1. Enumerate the general characteristics of C.T
2. Classify C.T into C.T proper (C.T.P) and special types of C.T
3. Describe components of C.T.P
4. Classify C.T.P and know the distribution and function of each type
5. Describe the structure, distribution, and function of different types of C.T.P.
6. Enumerate the functions of C.T.
7. Understand the following clinical applications: (Edema , Tumors of adipose tissue.)

CONNECTIVE TISSUE (C.T.)

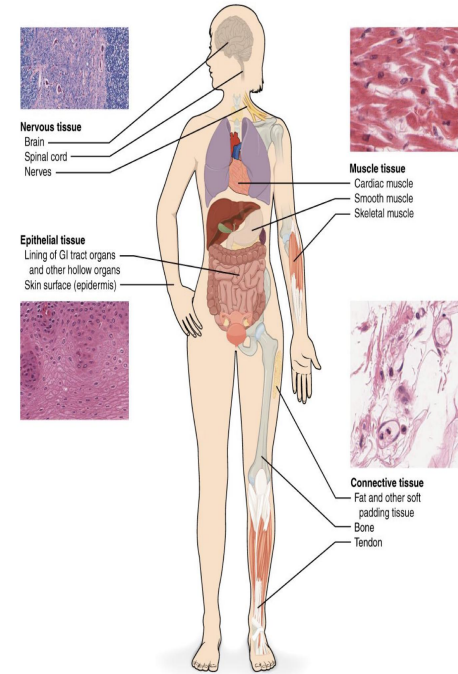
Definition :

- It is one of the 4 basic tissues.
- It is **mesodermal** in origin. (remember the trilaminar embryonic disc, Embryology)
- Functions:
 - It supports, binds, and connects other tissues and organs
 - provides structural and metabolic support for them.

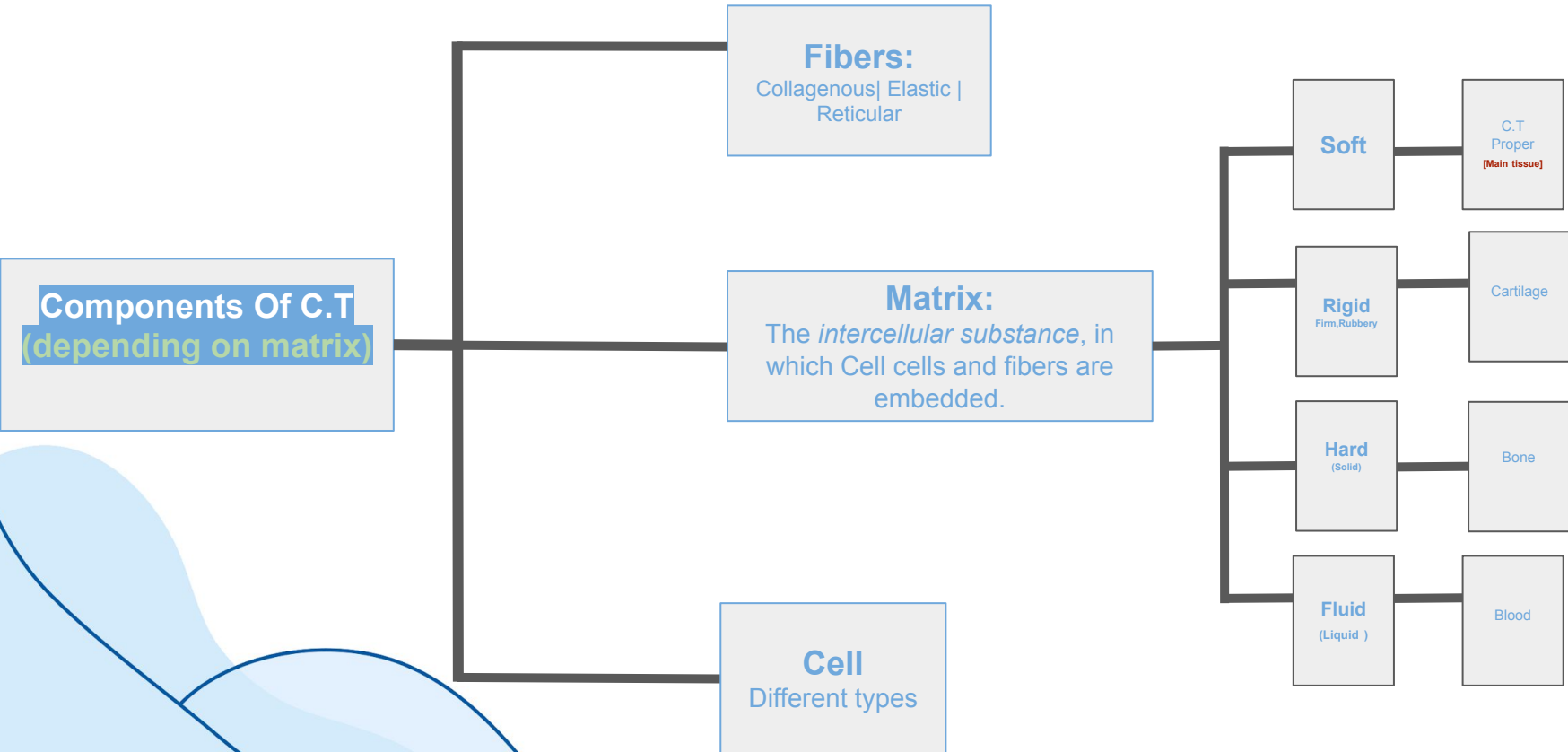
General characteristics of C.T:

- C.T. is formed of **widely separated**, **few** cells with **abundant** extracellular matrix
- Most C.T. are vascular. (have blood vessel)


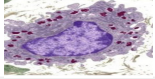
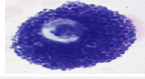
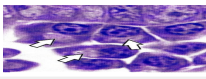

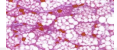
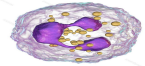
(remember : Epithelial tissue is avascular)



COMPONENTS & TYPES OF CONNECTIVE TISSUE



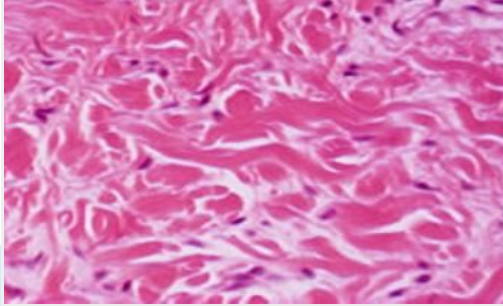
[Cells]

| | Fibroblasts  | Macrophages  | Mast cells  | Plasma cells  | Unilocular Adipose cells  | Multilocular Adipose cells  | Leucocyte (White blood cells)  |
|-----------------|--|---|---|---|---|---|---|
| L/M | <p>- Most common cell, found nearly in all types of C.T. proper.</p> <p>-Flat branched cells (spindle-shaped) with basophilic cytoplasm. (rich in ribosomes)</p> <p>-They can divide.</p> <p>- old fibroblasts are called fibrocytes</p> <p>(they can comeback as fibroblast if needed) e.g injury happen</p> <p>(-blast)->Active stage (-cyte)->Inactive stage</p> | <p>(الخلية الأكلة)</p> <ul style="list-style-type: none"> • Basophilic cytoplasm , rich in lysosomes. • Irregular outline. (because of the pseudopodia coming out from it) <u>الأقدام الكاذبة</u> • They can divide. • They originate from blood monocytes. Monocytes: a type of white blood cells. Monocytes->Macrophages | <p>Cytoplasm contains numerous basophilic cytoplasmic granules.</p> <p>Mast cells are originated from bone marrow.</p> | <p>-Basophilic cytoplasm with negative golgi image (the pale area) .</p> <p>-Nucleus: spherical, eccentric with a clock-face appearance of chromatin.</p> <p>-Derived from B-lymphocytes.</p> | <ul style="list-style-type: none"> • Large spherical, with a single large fat droplet. (most common one & more important) • Thin rim of cytoplasm at periphery. Rim: حافة • Nucleus: flattened, blood peripheral. | <ul style="list-style-type: none"> • Small cells with multiple, small lipid droplets. • Nucleus: spherical, not flattened. | <ul style="list-style-type: none"> • Appear normally in C.T. proper. • Neutrophils: increase in acute inflammation. • Lymphocytes and monocytes: increase in chronic inflammation. • Eosinophils and basophils: increase in allergic inflammation |
| Function | <ol style="list-style-type: none"> 1. Formation of proteins of C.T. fibers. 2. Formation of C.T. matrix 3. Healing of wounds. | <p>Phagocytosis. (The ingestion of bacteria or other material)</p> | <ol style="list-style-type: none"> 1- Secrete heparin (anticoagulant). 2- Secrete Histamine (allergic reactions). (Extra secretion may cause reverse effect) | <p>Secretion of antibodies (immunoglobulins)</p> | <p>Storage of fat.</p> | <p>Production of body heat because of their large number of mitochondria.</p> | |

Fibers

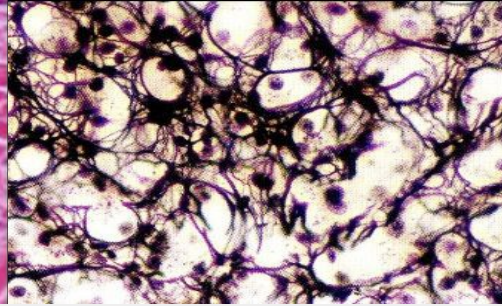
Collagen Fibers
(Made of **collagen type I**)

- **Non-branched** fibers, arranged in bundles.
- **Acidophilic**.



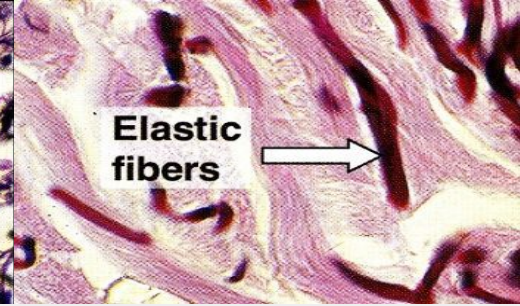
Reticular Fibers
(made of **collagen type III**)

- **Branched** and form a network.
- Stained **black** with silver.



Elastic Fibers
(Made of **Elastin**)

- **Branched**.
- Stained **brown** with orcein.

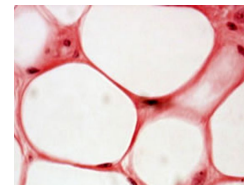
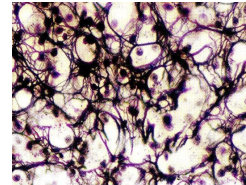
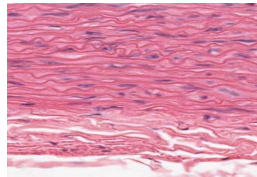
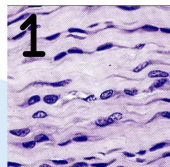
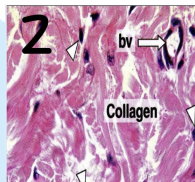
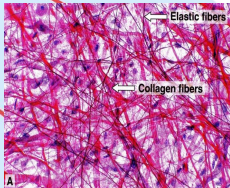


Other important types of Collagen include:

- type II (in **cartilage**)
- type IV (in **basement membrane**)

Connective Tissue Proper

| | | | | | |
|----------|--|--|---|--|---|
| Type | <p>1- Loose (areolar) C.T. The most common type of C.T. proper.</p> | <p>2- Dense collagenous C.T.</p> | <p>3- Elastic C.T.</p> | <p>4- Reticular C.T.</p> | <p>5- Unilocular adipose tissue. (white adipose cells)</p> |
| L/M | <p>-Contains all the main components of C.T.P: all types of C.T. cells & fibers + abundant matrix. -No predominant element in loose C.T.</p> | <p>-Predominance of collagen fibers + fibroblasts.</p> | <p>-Predominance of elastic fibers (sheets or membrane) + fibroblasts</p> | <p>-Predominance of reticular fibers + reticular cells (specialized fibroblasts)</p> | <p>-Predominance of unilocular fat cells.</p> |
| Site | <p>E.g. Subcutaneous tissue</p> | <p>1- Dense regular: e.g. tendons, ligaments (Avascular) 2- Dense irregular: e.g . dermis of the skin, capsules (to cover organs for protection)</p> | <p>Large arteries: e.g. aorta.</p> | <p>Stroma of organs: e.g. liver, lymph node, spleen. (More on it in L4)</p> | <p>Subcutaneous tissue, especially in: -buttocks, abdominal wall, female breast, around the kidney.</p> |
| Function | | <p>Tough tissue; resistance to stretch.</p> | <p>Elastic tissue; stretchable</p> | <p>Structural support.</p> | <p>1) synthesis, storage, release of fat. 2) support organs Eg.kidney 3) heat insulation</p> |

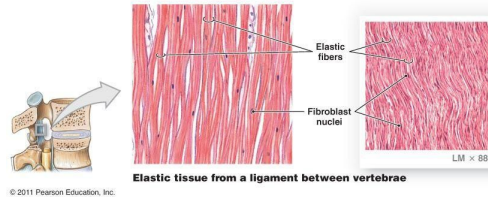
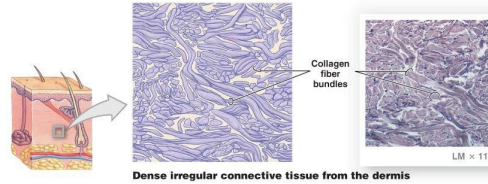
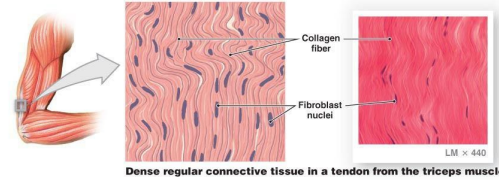


Functions of Connective Tissue Proper:

Supports, binds and connects other tissues and organs.

Nourishes the surrounding structures, through its blood vessels

The three types of dense connective tissues



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Its cells provides Healing of injured tissues, Produce heparin, histamin & antibodies, Store fat & Preserve body temperature and Protect against microorganisms.

Its Fibers provide Rigidity or Elasticity.

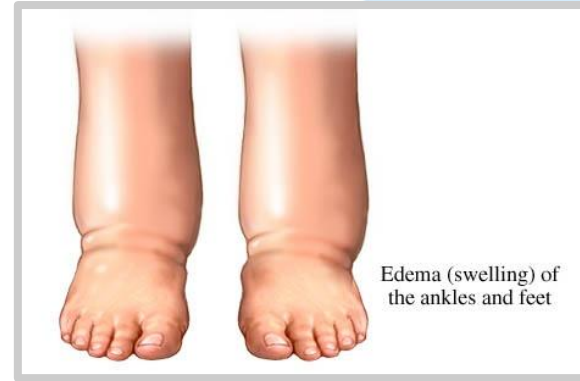
Clinical Applications

- **Edema:**

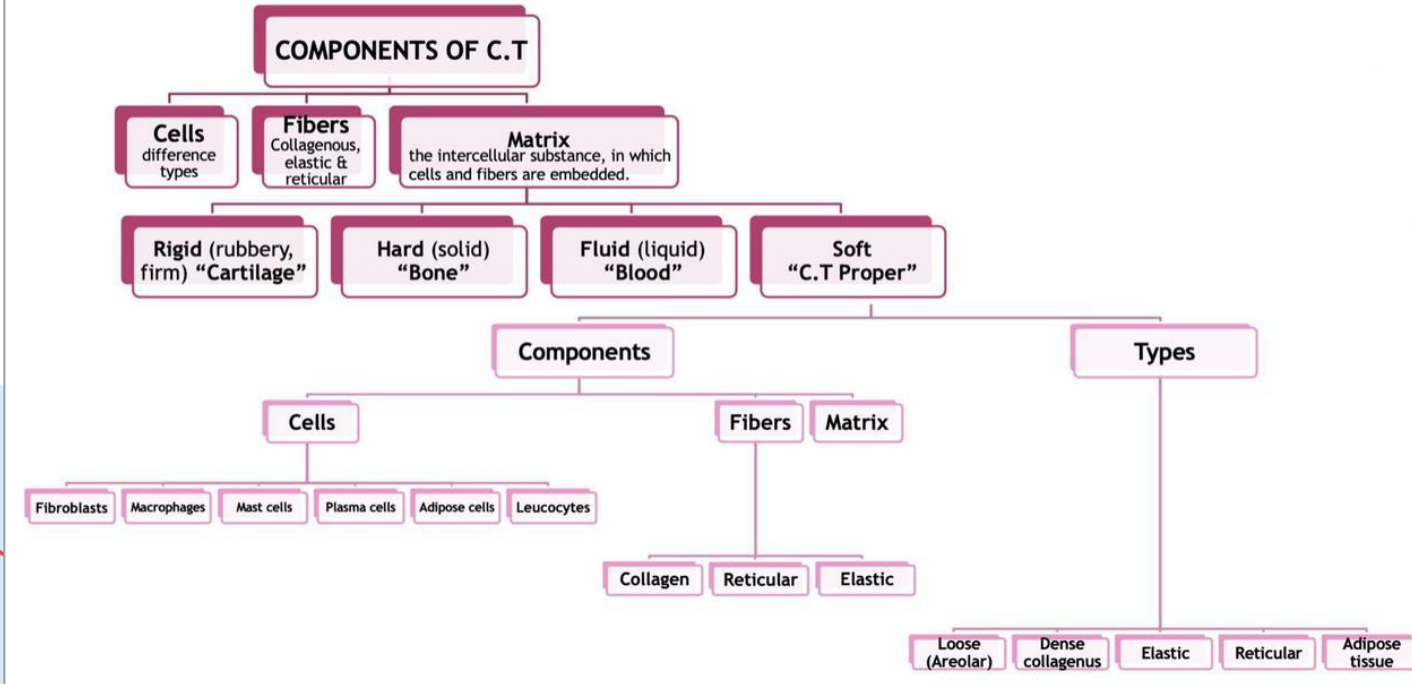
- Under normal circumstances, extracellular fluid returns to the blood capillaries or enters lymph vessels to be returned to the blood.
- **Inflammation** causes accumulation of excess tissue fluid within loose connective tissue beyond what can be returned via the capillaries and lymph vessels. This results in gross swelling, or **edema**, in the affected area.
- Edema can also result from **obstruction** of venous or lymphatic vessels.

- **Tumors of adipose tissue:**

- Tumors of adipose tissue may be benign or malignant. They may form anywhere in the body.
- **Lipomas** are common benign tumors of adipocytes.
- **Liposarcomas** are malignant tumors of adipocytes.
- The tumor cells may resemble either unilocular adipocytes or multilocular adipocytes.



Summary (From 437)



MCQs

1- Which of the following is not right about *Connective tissue (C.T)*?

A) It supports other tissues and organs.

B) Most C.T are avascular.

C) It has abundant extracellular matrix.

D) It is mesodermal in origin.

2- The cytoplasm in Cells contains numerous basophilic cytoplasmic granules.

A) Plasma

B) Unilocular Adipose

C) Macrophages

D) Mast

3- Which of the following is the main function of Unilocular Adipose cells?

A) Secretion of antibodies

B) Formation of protein

C) Storage of fat

D) Secrete Histamine

4- What is the most common type of connective tissue proper?

A) Loose (Areolar)
C.T

B) Dense collagenous
C.T

C) Elastic tissue

D) Reticular tissue

5- Which type of tissue can be found in subcutaneous?

A) Loose (Areolar)
C.T

B) Adipose tissue

C) Neither A or B

D) Both A and B

6- Which type of fibers can form a network?

A) Collagen fiber

B) Elastic fiber

C) Adipose fiber

D) Reticular fiber

Answers:

1-B

2-D

3-C

4-A

5-D

6-D

Meet The Team

Team Leaders:

عبدالرحمن القرشي

سندس الكريديس

Team Members:

تركي العتيبي

عبدالله القرني

فهد مبيريك

محمد الدوسري

أحمد باحميد

ريان العتيبي

عزام العتيبي

مازن قدري

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