

Lecture 3 :

CONNECTIVE TISSUE (C.T)



King saud university
Histology team med438



- **Colour index :**
Red : important
Grey : doctors notes

Objectives:

- Enumerate the general characteristics of C.T.
- Classify C.T into C.T. proper and special types of C.T.
- Classify C.T. proper (C.T.P.)
- Describe the structure (components) and distribution of different types of C.T.P.

❑ Definition Of Connective Tissue (C.T)

- It is one of 4 basic tissues.
- *4 basic tissues are connective , epithelial, muscular and nervous.
- it is **mesodermal** in origin.
- its supports , binds and connects other tissues and organs providing structural and metabolic support of them.

❑ General Characteristics :

- 1- C.T is formed of widely separated. (**few cells with abundant extracellular matrix**).
- 2- Most C.T. are vascular.

❑ Components Of C.T:

1- Cells:

difference types.

2- Fibers:

Collagenous , elastic , reticular.

3- Matrix:

the ***intercellular** substance, in which cells and fibers are embedded. * = Extracellular

❑ Types Of C.T (Depending On Matrix):

- Soft = C.T Proper
- Rigid (rubbery , firm) = Cartilage
- Hard (solid) = Bone
- Fluid (liquid) = Blood

Components of Connective Tissue proper :

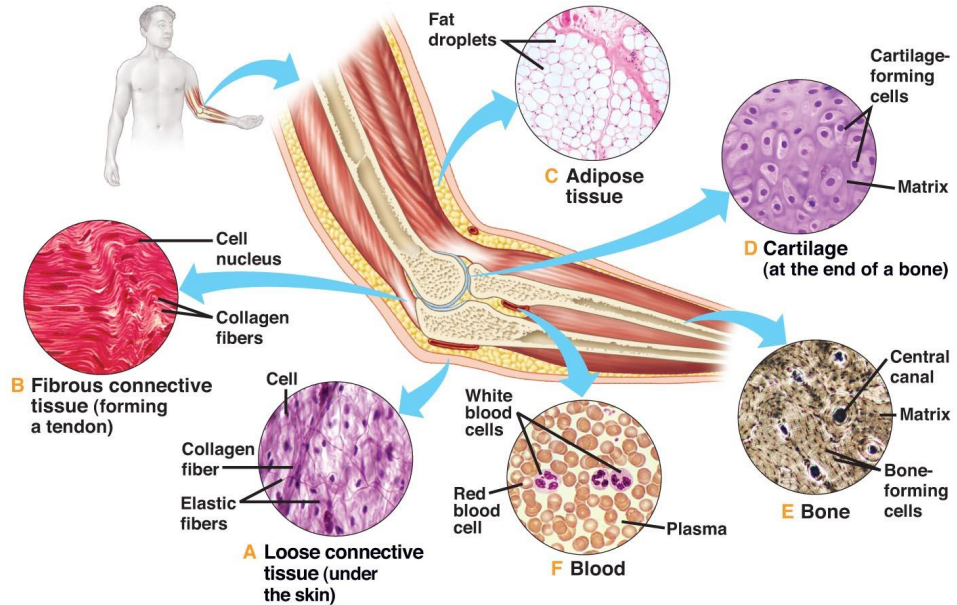
❖ Cells

1. Fibroblasts
2. Macrophages
3. Mast cells
4. Plasma cells
5. Adipose cells
6. Leucocytes

❖ Fibers

1. Collagen
2. Reticular
3. Elastic

❖ Matrix



□ Cells

Fibroblast

Most common cell, found nearly in all types of C.T. proper.

L/M: Flat branched cells (spindle-shaped) with basophilic cytoplasm.

- They can divide.
- Old fibroblasts are called **fibrocytes**. *fibrocytes are mainly inactive.

Function:

1. Formation of proteins of C.T. fibers. *the cytoplasm of these cells are rich in ribosomes which on the outer surface of Rough ER.
2. **Formation of C.T. matrix.**
3. Healing of wounds.
- 4- *Responsible for formation of 3 types of fibers (collagen, elastic, reticular).



Macrophages

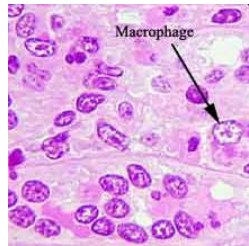
L/M: Basophilic cytoplasm, rich in lysosomes

- Irregular outlines (**cell membrane**)

*pseudopodia (الأقدام الكاذبة) of macrophages is the cause of its irregular outlines.

- They can divide.
- They originate from blood monocytes.

Function: Phagocytosis.

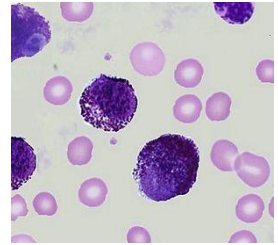


Mast Cells

L/M: Cytoplasm contains numerous basophilic cytoplasmic granules.

Function:

1. Secrete **heparin** (anticoagulant).
2. Secrete **histamine** (allergic reactions).



□ Cells

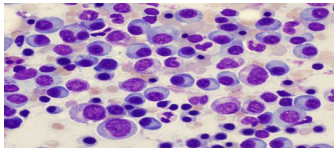
Plasma Cells *Active

L/M: Basophilic cytoplasm with a **negative Golgi image**.

*negative Golgi image : lack of ribosomes around Golgi apparatus.

- Nucleus: spherical , eccentric with a clock-face appearance of chromatin.
- **Derived from B-lymphocytes.** *Inactive

Function: Secretion of antibodies (immunoglobulins).

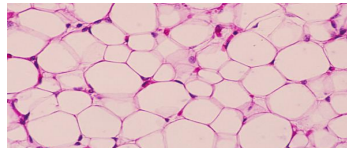


Adipose Cells (Adipocytes , Fat Cells)

L/M of Unilocular Adipose Cells:

- Large spherical , with a single large fat droplet.
 - Thin rim of cytoplasm at the periphery.
 - Nucleus: flattened , peripheral.
- *the large fat droplet squeeze the cytoplasm and nucleus to give them their shape.

Function: Storage of fat.



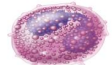
Leukocytes (White Blood Cells)

- 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.

Leukocytes



Basophil



Eosinophil



Monocyte

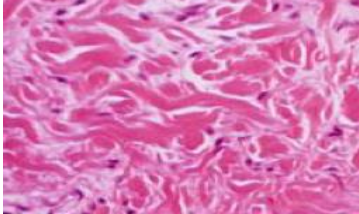
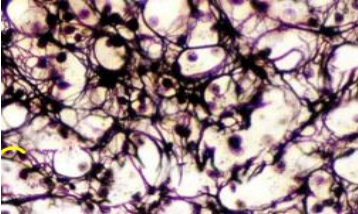
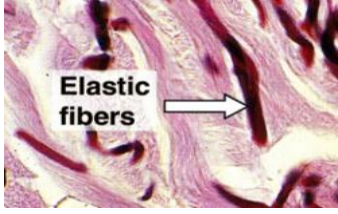


Neutrophil



Lymphocyte

□ Fibers

1) Collagen Fibers	2) Reticular Fibers	3) Elastic Fibers
<ul style="list-style-type: none">• Made of collagen type I	<ul style="list-style-type: none">• Made of collagen type III	<ul style="list-style-type: none">• Made of elastin
<ul style="list-style-type: none">• Non-branched fiber , arranged in bundles <p>*bundles form the branch.</p>	<ul style="list-style-type: none">• Branch and form a network	<ul style="list-style-type: none">• Branched
<ul style="list-style-type: none">• Acidophilic	<ul style="list-style-type: none">• Stained black with silver	<ul style="list-style-type: none">• Stained brown with orcein
		

➤ **Other important types of collagen include:**

1- type II (in cartilage). 2- type IV (in basement membranes)

Types Of Connective Tissue (Proper)

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graph TD; A[Types Of Connective Tissue (Proper)] --- B[1) Loose (Areolar) C.T.]; A --- C[2) Dense Collagenous C.T.]; A --- D[3) Elastic Tissue]; A --- E[4) Reticular Tissue]; A --- F[5) Adipose Tissue];
```

1) Loose (Areolar)
C.T

2) Dense
Collagenous C.T

3) Elastic Tissue

4) Reticular Tissue

5) Adipose Tissue

1- Loose (areolar) C.T.

The most common type of C.T. proper.

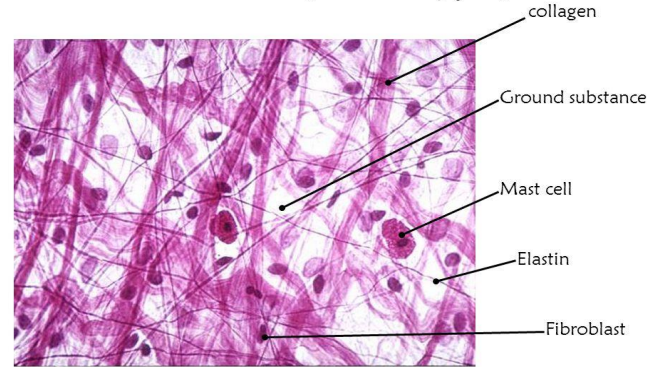
L/M:

- ❖ 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.

Sites:

e.g. Subcutaneous tissue.

Areolar (Prototype)



2- Dense collagenous C.T.

L/M:

Predominance of collagen fibers + fibroblasts.

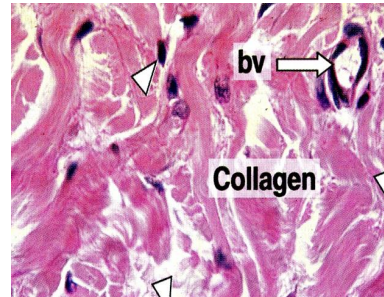
Sites:

1- Dense irregular: e.g. dermis of the skin, capsules.

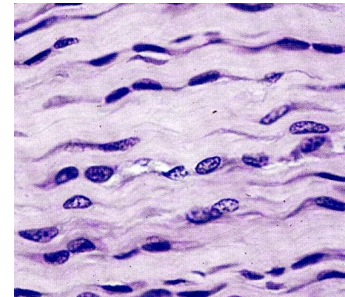
2- Dense regular: e.g. tendons, ligaments.

Function: tough tissue : resistant to stretch.

1



2



3- Elastic tissue

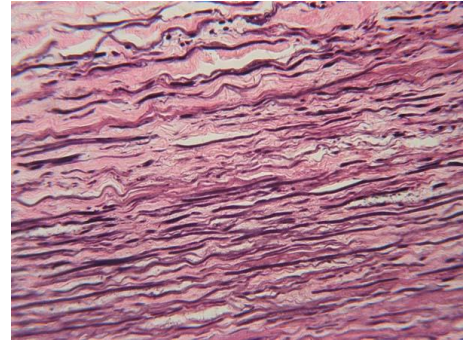
L/M:

Predominance of elastic fibers (sheets or membranes)
+ fibroblasts.

Sites:

Large arteries , e.g. Aorta

Function: elastic tissue : stretchable.



4- Reticular tissue

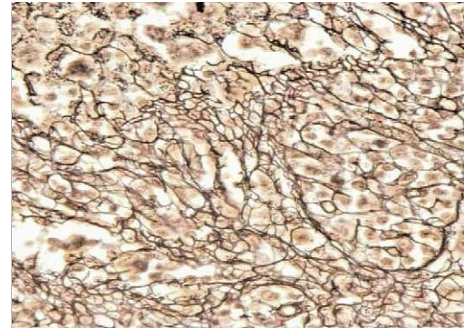
L/M:

Predominance of reticular fibers +
reticular cells (specialized fibroblasts).

Sites:

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

Function: structural support.



*Stroma means : structural elements.

5- Unilocular adipose tissue (white adipose tissue)

L/M:

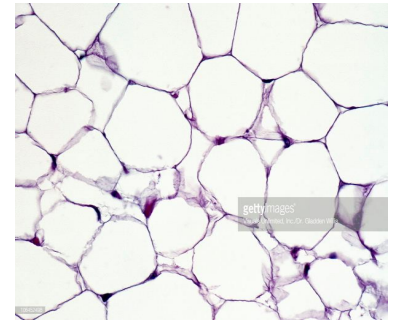
Predominance of **unilocular fat cells**.

Sites:

- **Subcutaneous tissue** , especially in:
 1. Buttocks.
 2. Abdominal wall.
 3. Female breast.
- **Around the kidney.**

Function:

1. **Synthesis** , storage and release of fat.
2. **Supports organs** , e.g. kidney.
3. **Heat insulation.**



Functions of connective tissue proper:

1) **Supports** , **binds** , and **connects** other tissues and organs.

2) **Nourishes** the surrounding structures , through its blood vessels.

3) Its Cells provide healing of injured tissues , produce heparin , histamine , antibodies , store fat , preserve body temperature and protect against microorganisms.

4) Its fibers provide rigidity or elasticity.

MCQs:

1- Elastic connective tissue is found in?

- A. Tendons
- B. Ligaments
- C. Wall of aorta
- D. Liver

2- A cell which produces collagen?

- A. Fibroblast
- B. Mast cell
- C. Plasma cells
- D. Macrophage

3- Which type of cells is extensively involved in allergic reactions?

- A. Plasma cell
- B. Mast cell
- C. Macrophage
- D. Fibroblast

4- Which of the following is one of connective tissue proper?

- A. cartilage
- B. Lymph
- C. adipose tissue
- D. blood

5- The most common type of C.T. proper is?

- A. Loose (Areolar)
- B. Dense Collagenous
- C. Elastic Tissue
- D. Adipose Tissue

6- Tissue which binds and supports other tissues is called?

- A. connective tissue
- B. Linkage tissue
- C. muscle tissue
- D. nervous tissue

A	A	C	B	A	C
6	5	4	3	2	1

Team members :

- **Abdullah alassaf**
- **Abdullah altuwaijri**
- **Talal jamal aldeen**
- **Faisal alqifari**

- **Alhanouf alhaluli**
- **Rawan alzayed**
- **Renad alkanaan**
- **Nouf albrikan**
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Team leaders :

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