



# Connective Tissues

**Curriculum : Phase 1/Semester2/TOB /Session 6**

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**Lecturer : Dr. Rajaa Ali Al- Tae**

**Msc. PhD. Histology      G.mail: [dr.rajaaali@gmail.com](mailto:dr.rajaaali@gmail.com)**

**Hammurabi Medical Collage / Babylon University**

# Connective Tissues

## **Obectives:**

Having revised this lecture you should be able to:

- ✓ *define the term 'connective tissue' and cite examples to explain connective tissue functions such as binding, support, protection, etc..*
- ✓ *list the common cell types found in connective tissue (fibroblasts, macrophages and mast cells) describing their function.*

## Connective Tissues

- ✓ *describe, and discuss the function of, extracellular matrix (e.g. the constituents of ground substance and the collagen, reticular and elastic fibres which may lie within it).*
- ✓ *explain the differences between loose and dense connective tissues, in terms of their cellular and extracellular components, relating these differences to tissue function. And their clinical relevance & application.*
- ✓ *classify different types of loose and dense connective tissue.*

# Connective Tissues

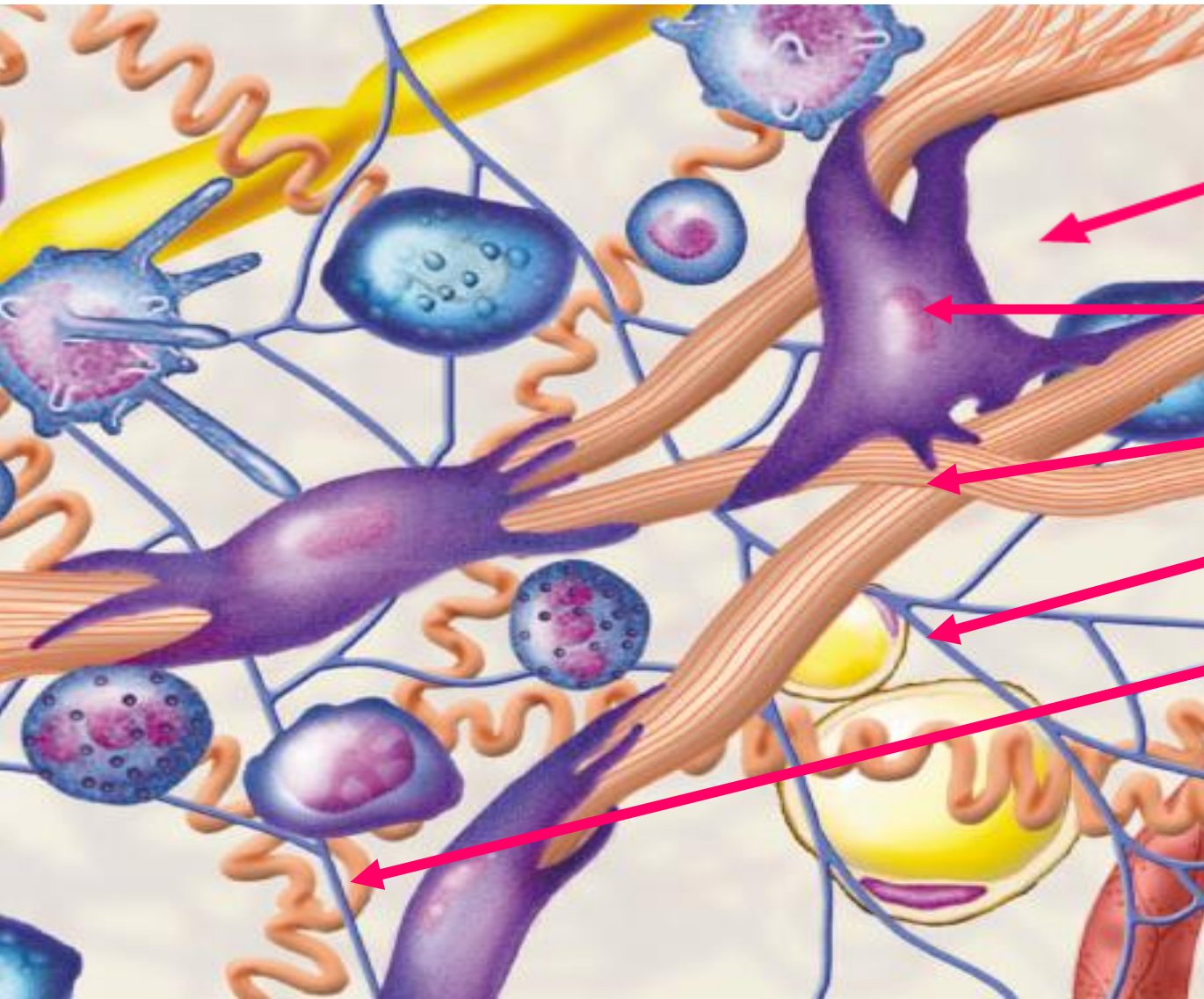
## ***References:***

- Histology Textbooks 'Basic Histology', Junqueira, 13 th Edition
- Colour Atlas of Histology' Gartner and Hiatt 5 th Edition
- <http://www.histologyguide.com/>
- Atlas of Histology with Functional & Clinical Correlation, Dongmei Cui, 1<sup>st</sup> Edition, 2011

## Connective Tissues

***Connective tissue:*** is one of the basic tissues which gives structural and metabolic support to other tissues and organs of the body. It connects other tissues.

# Connective Tissues



*Extracellular matrix*

*Fibroblasts*

*Collagen Fibers*

*Reticular Fibers*



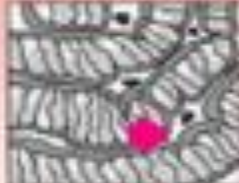

*Elastic Fibers*

- Most abundant & widely distributed tissue throughout the body (bones, blood, fat, etc.)
- No contact with the outside
- Term used to include a variety of tissues
- Derived from embryonic mesenchyme

- Mesenchymal cells” – types of immature or precursor cells awaiting a specific stimulus to differentiate
- Cells capable of differentiating during development or adult life by regeneration or both
- Assume distinctive gross & microscopic



# Cell Lines From Mesenchymal Cells

Common embryonic origin:	Mesenchyme			
Cellular descendants:	<p>Fibroblast</p> <p>Fibrocyte</p> 	<p>Chondroblast</p> <p>Chondrocyte</p> 	<p>Osteoblast</p> <p>Osteocyte</p> 	<p>Hematopoietic stem cell</p> <p>Blood cells* (and macrophages)</p> 
Class of connective tissue resulting:	Connective tissue proper	Cartilage	Osseous (bone)	Blood
Subclasses:	<p>1. Loose connective tissue</p> <p>Types: Areolar Adipose Reticular</p> <p>2. Dense connective tissue</p> <p>Types: Regular Irregular Elastic</p>	<p>1. Hyaline cartilage</p> <p>2. Fibrocartilage</p> <p>3. Elastic cartilage</p>	<p>1. Compact bone</p> <p>2. Spongy (cancellous) bone</p>	<p>* Blood cell formation and differentiation are quite complex. Details are provided in Chapter 17.</p>



## *An Example of Clinical Relevance*

### ➤ Regenerative Capacity :

Tissue destruction after inflammation or traumatic injury –spaces left (in tissues that do not divide) filled by CT ( scar tissue).

### ➤ Surgical incisions – Tissue healing :

depends upon the regenerative capacity of CT ( repair by fibroblasts ) wound closure

# Constituents of Connective Tissue

1. **Cells** : mostly fibroblasts, chondrocytes, macrophages, melanocytes, adipocytes, lymphocytes, etc.)

2. **Extracellular fibres:**

**A-Collagenous** : Regular : (tendons, ligament)

Irregular : (dermis of skin)

**B-Reticular** : around capillary, lymph nodes

**C-Elastic** : large artery

3. **Ground substance**: (tissue fluid; gel-like; solid)

← **Matrix**

## ***Connective Tissue :*** ***Ground Substance***

***Composition & consistency varies considerably:***

- Thin gel : in loose connective tissue
- Firm gel : in cartilage
- Hard : (impregnated with inorganic salts) in bone

# *Classification of Connective Tissues*

## *A: Proper C.T*

### *I. Loose Connective Tissue (support, cushioning)*

1. Areolar - cushions organs
2. Reticular - liver, spleen
3. Adipose – fat
4. Mesenchymal \_ umbilical cord

## ***Types of Cells in Loose CT -***

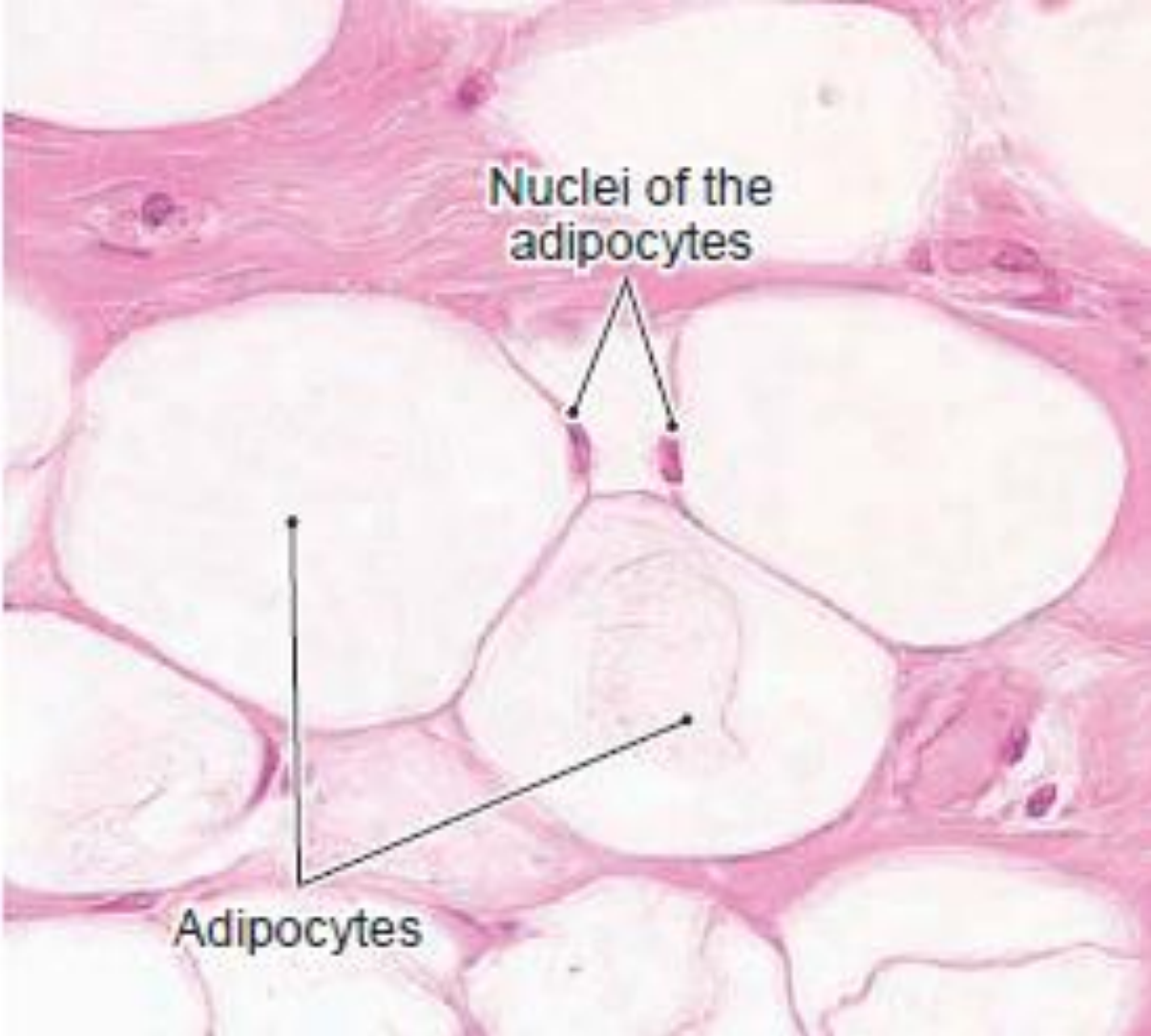
### ***Resident:***

1. Fibroblasts
2. Macrophages
3. Mesenchymal
4. Cells

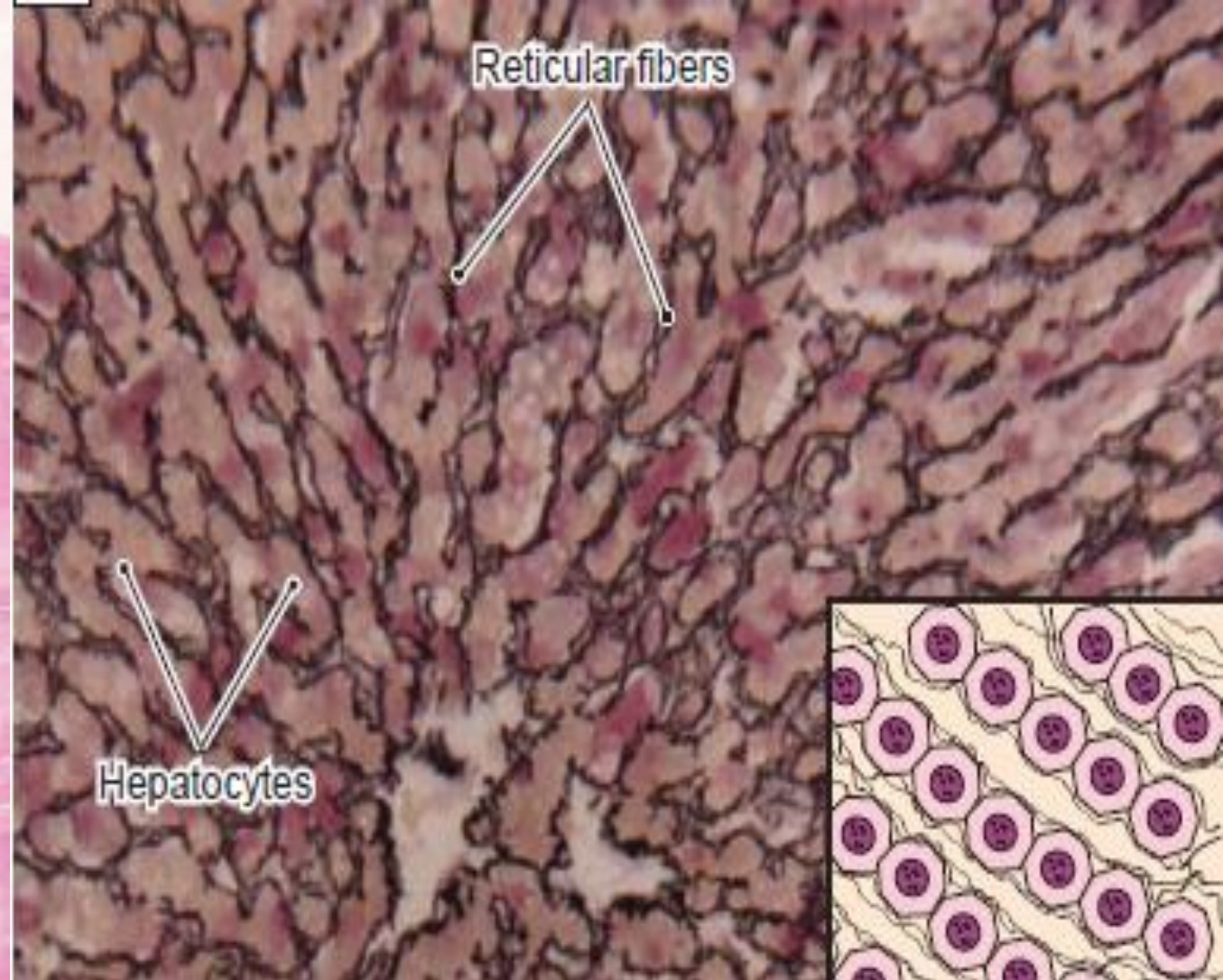
### ***Visitant:***

1. *Plasma cells*
2. *Mast cells*
3. *Leucocytes*
4. *Fat cells*
5. *Pigment cells*
6. *Reticular cells*





*Adipose tissue*



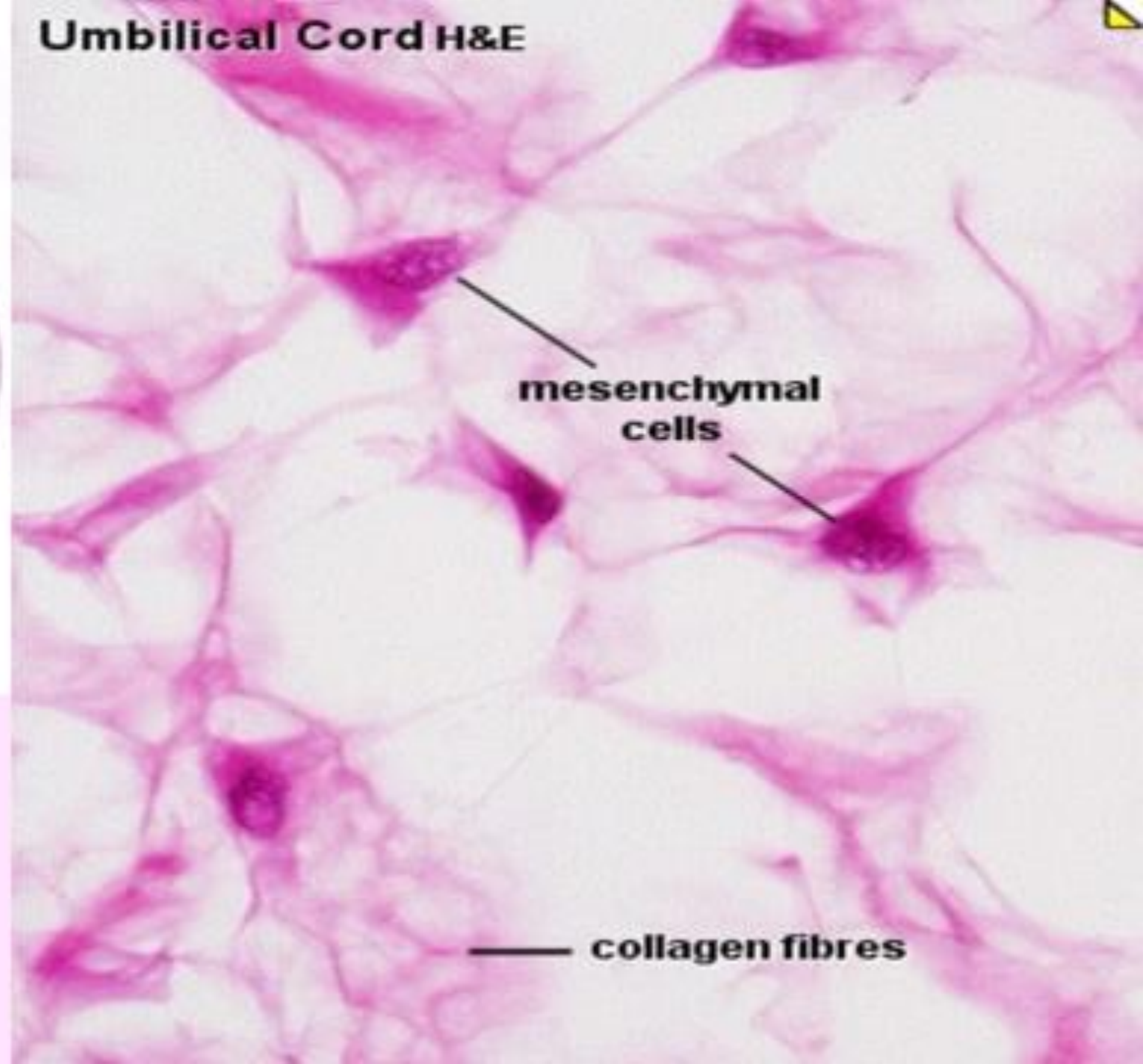
*Reticular tissue*

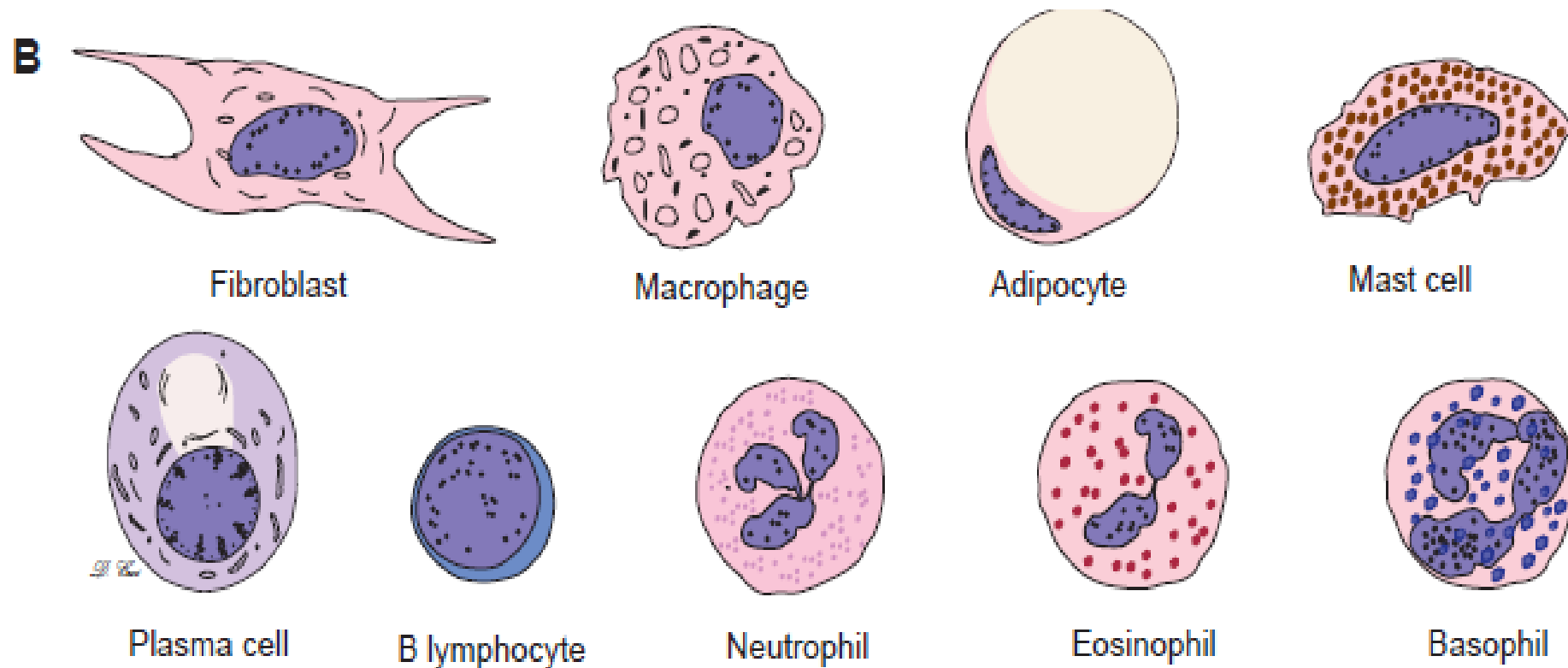




*Transfer section through  
umbilical cord*

## Umbilical Cord H&E





**Figure 4-1B.** A representation of the main types of connective tissue cells in connective tissue proper.

The nuclei of these connective tissue cells are indicated in *purple*. *Note:* Mast cells, eosinophils, basophils, and neutrophils all contain granules in their cytoplasm. The *light yellow circle* in the adipocyte (fat cell) represents its lipid droplet. These cells are not drawn to scale; the adipocyte is much larger than the others.



**See:**

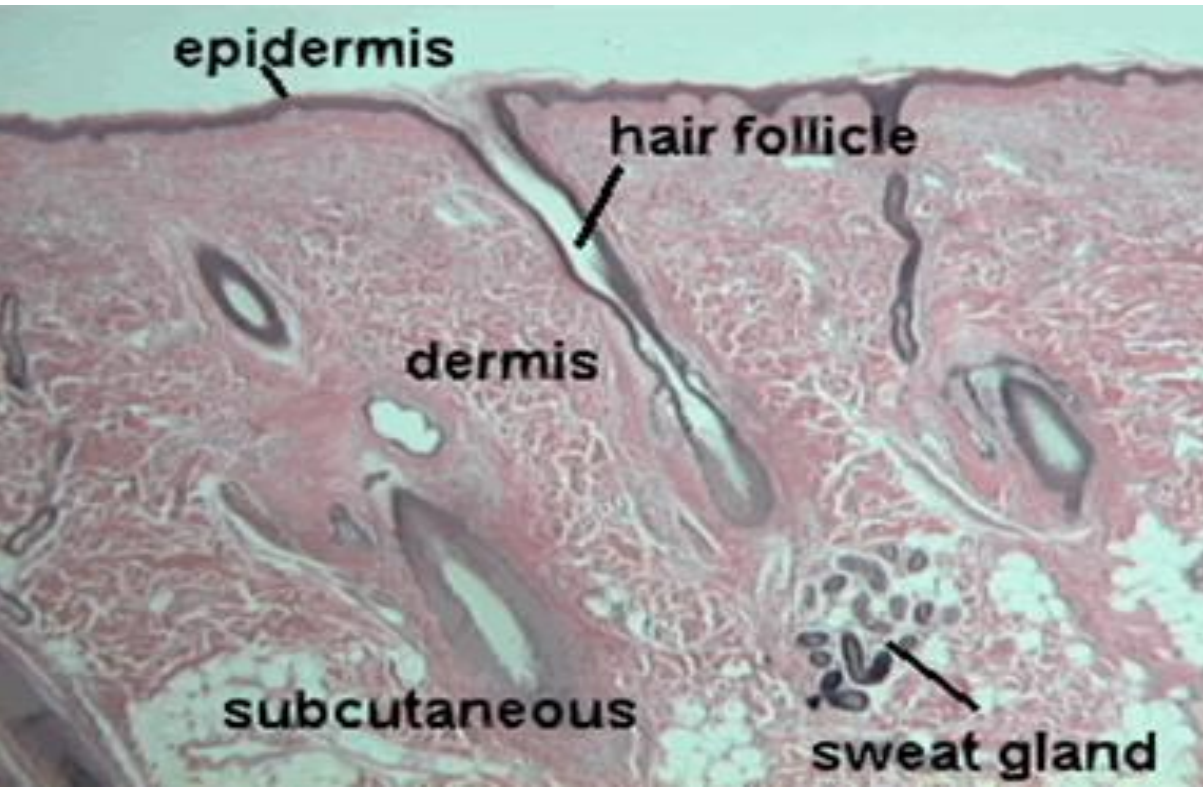
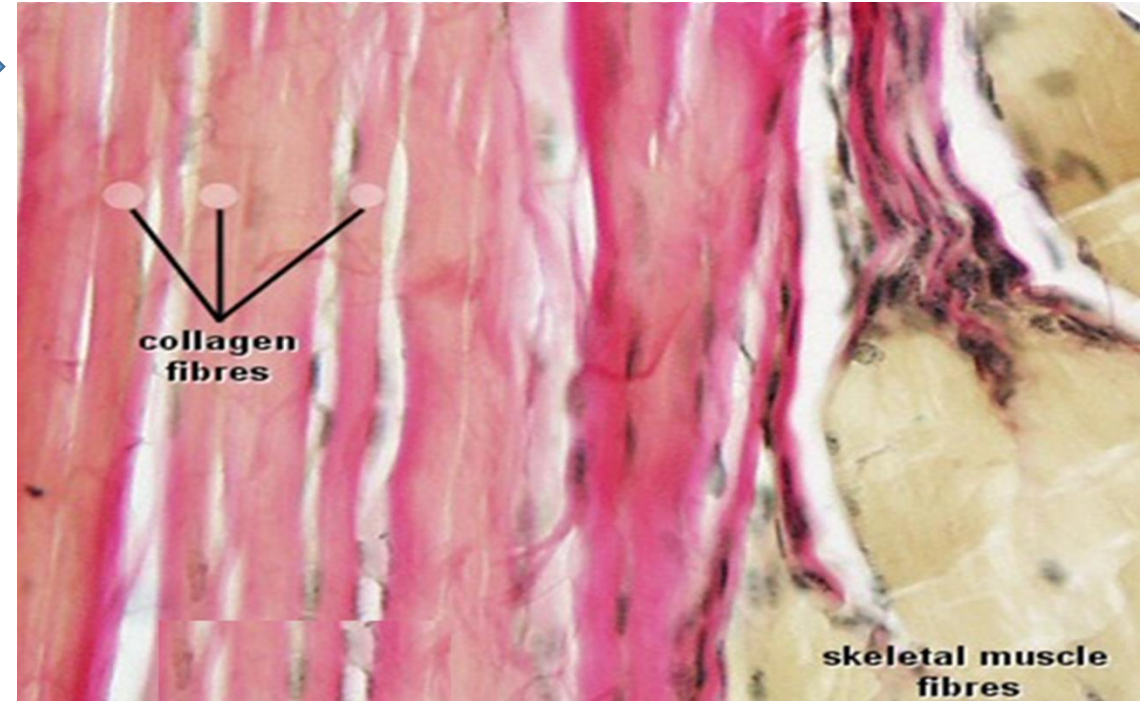
***Cells of connective tissue (**list only**) /Jonquiere Pp.98-105***

***Functions of cells in connective tissue proper/Jonquiere Pp.100***

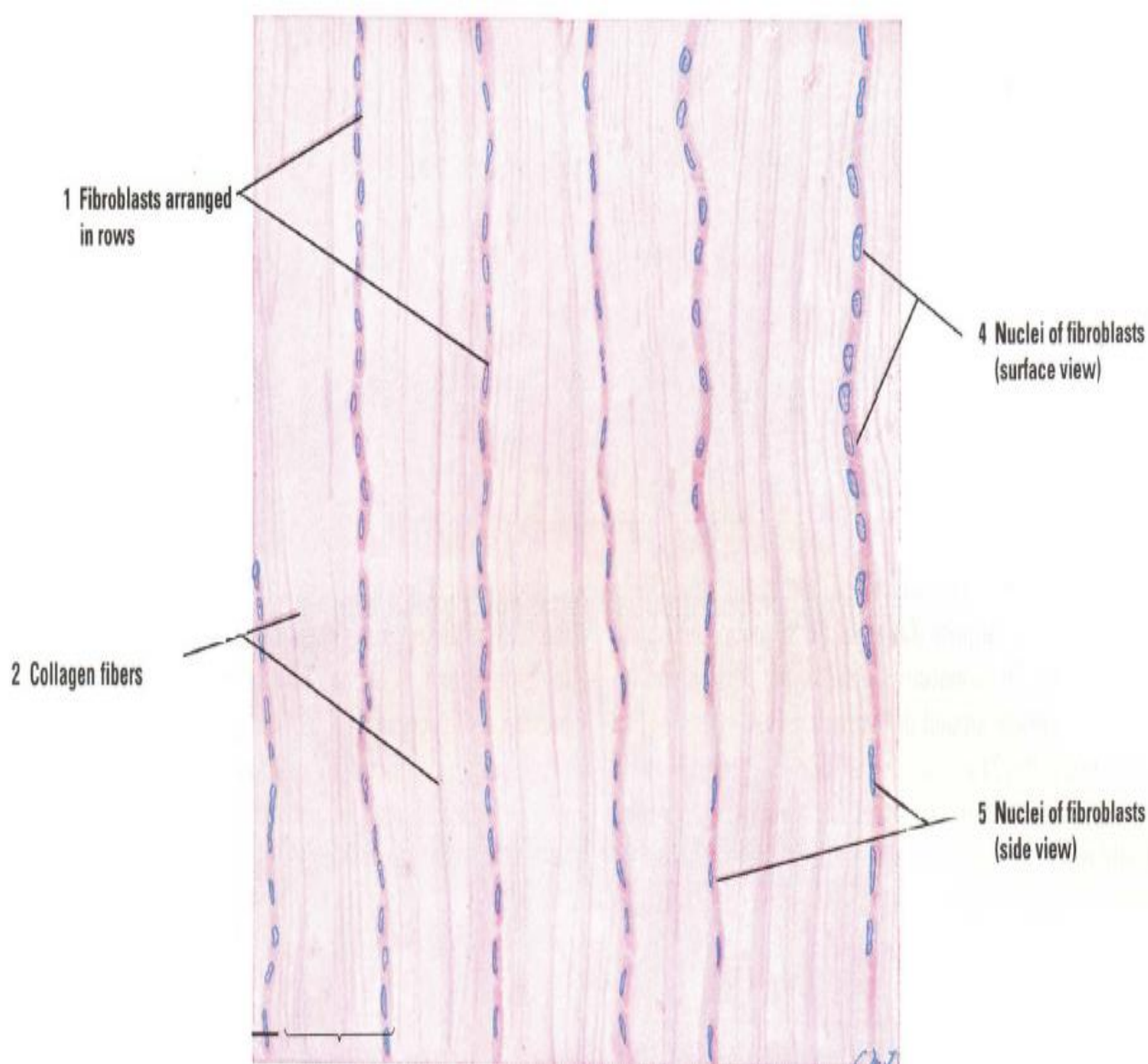


## II. Dense Connective Tissue (fibrous)

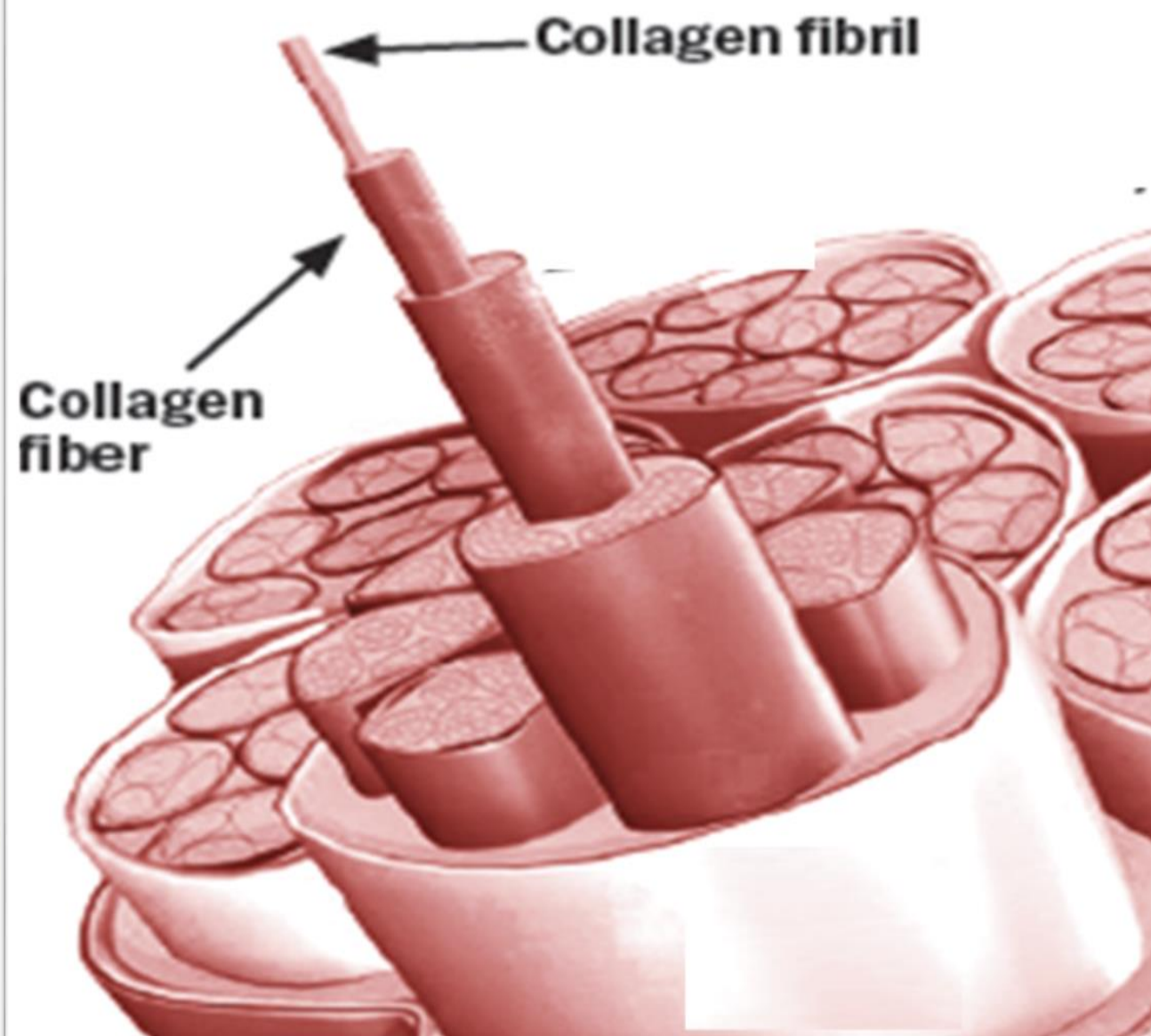
### 1. Dense regular :tendons →



### 2. Dense irregular :dermis of skin ←



***Regular dense connective tissue (longitudinal section):tendon***



***Schematic section of tendon***



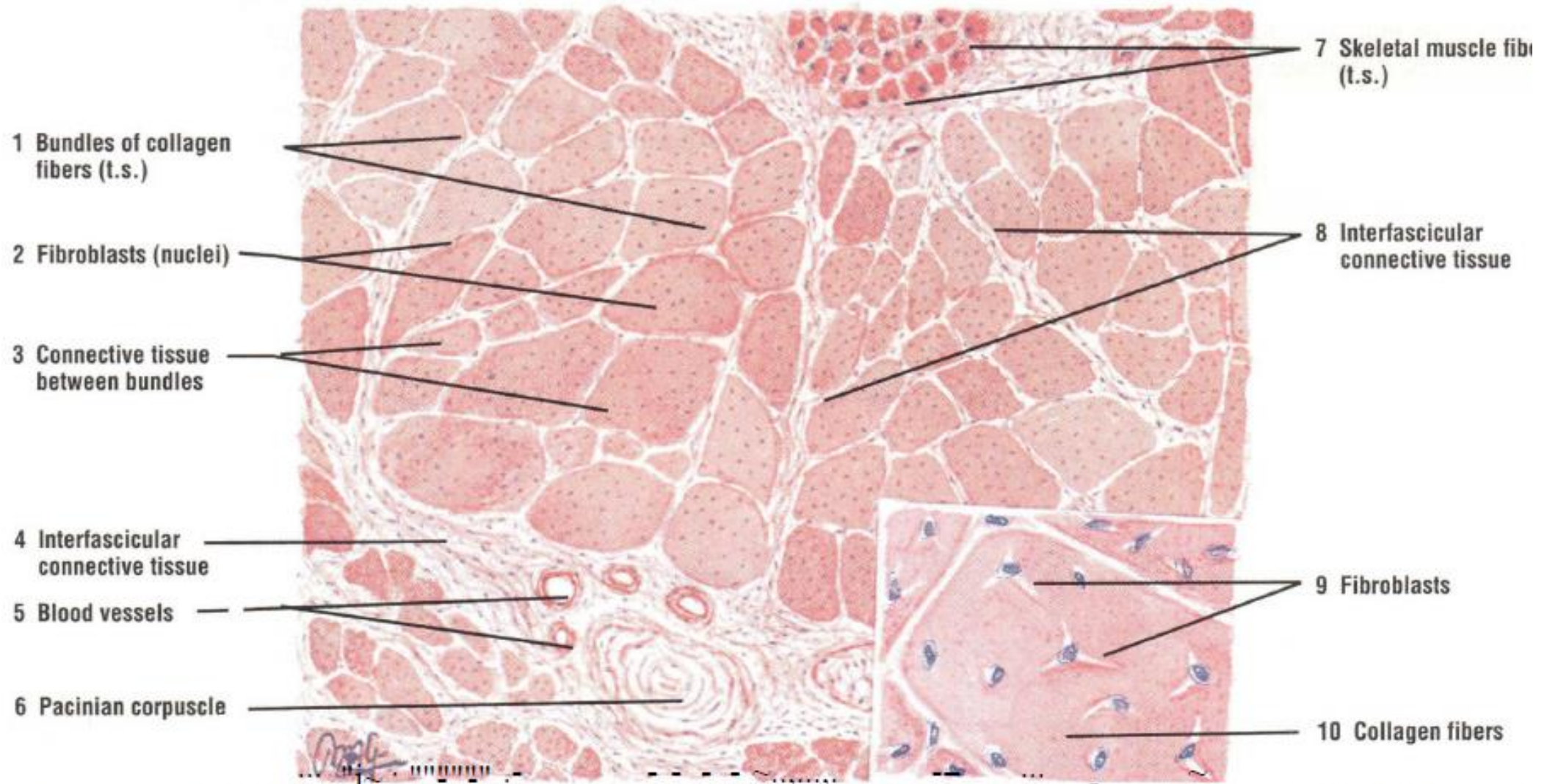


Fig. 2-6 Dense Regular Connective Tissue: Tendon (transverse section). Stain: hematoxylin-eosin. Low magnification (inset: high magnification).

## ***B. Specialized C.T***

***I. Cartilage (flexible, strong support)***

***II. Bone (structure, support)***

***III. Liquid Connective Tissue (fluid):***

1. Blood (erythrocytes – white blood cells, platelets)
2. Lymph (leukocytes)



*Thank you for listening*