Lecture 9

Connective tissue

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introduction

- The connective tissue is one of the four basic types of animal tissue, arise from the mesoderm only .
- Their main function is to connect other tissues or organ together or support them ,transport and protection.
- The connective tissue, have a large amount of intercellular substance or matrix among their cells, blood supply . They are never to be found on surface, and they do not rest on a basement membrane.

Composition of connective tissue

- Connective tissue is composed of cells, fibers and ground substances (matrix).
- **Cells of the connective Tissues:**
- 1. Fibroblast (Formation of proteins of C.T. fibers) .
- 2. Macrophage (phagocytosis).
- 3. plasma cell (secretion of antibodies)
- 4. Mast cell (secretion heparin and histamine) .
- 5. Fat cell (storage of fat).
- 6. Leucocytes(white blood cell).
- 7. osteocyte (osteoblast) bone
- 8. chondrocyte (chondroblast) cartilage

.Fibers of connective tissue

1- Collagenous fibers: are tough, flexible and they resist stretching , they are called white fibers and waved un branched they often occur in bundles with the fibers parallel to one another.

2- Elastic fibers: are thinner than collagenous fibers and they are highly elastic , branched and join to form a network , they are called yellow fiber.

3- Reticular fibers: They are made of collagen but are thinner as compared to collagen fibers , and they appear as net of branched fibers not in parallel.

• Ground substance (matrix):

- Ground substance : is component between the cell and fibers of connective tissues. Consists of proteoglycans and glycoprotein.
- Ground substance may be viscous as in blood , semi solid as in cartilage and solid as in bone

Classification of connective tissue

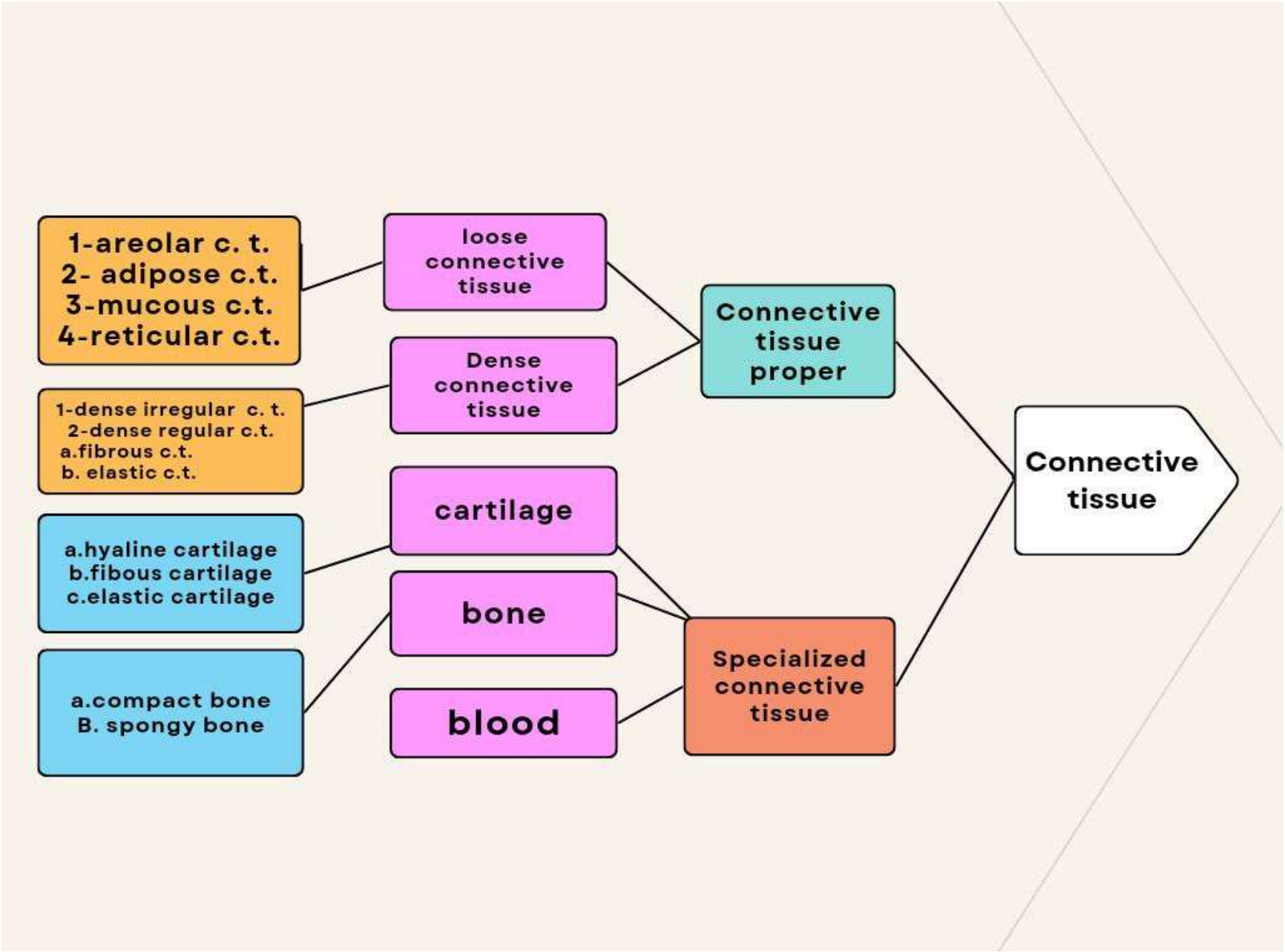
- Connective tissue classify to:

1- connective tissue proper

is subdivided according to cells, fibers, and ground substance into two types **loose** and **dense** connective tissue.

2- specialized connective tissue

includes cartilage , bone and blood.


1-areolar c. t.
2- adipose c.t.
3-mucous c.t.
4-reticular c.t.
1-dense irregular c. t.
2-dense regular c.t.
a.fibrous c.t.
b. elastic c.t.
a.hyaline cartilage
b.fibous cartilage
c.elastic cartilage
a.compact bone
B. spongy bone
loose connective tissue
Dense connective tissue
cartilage
bone
blood
Connective tissue proper
Specialized connective tissue
Connective tissue

Classification of connective tissue

1- connective tissue proper

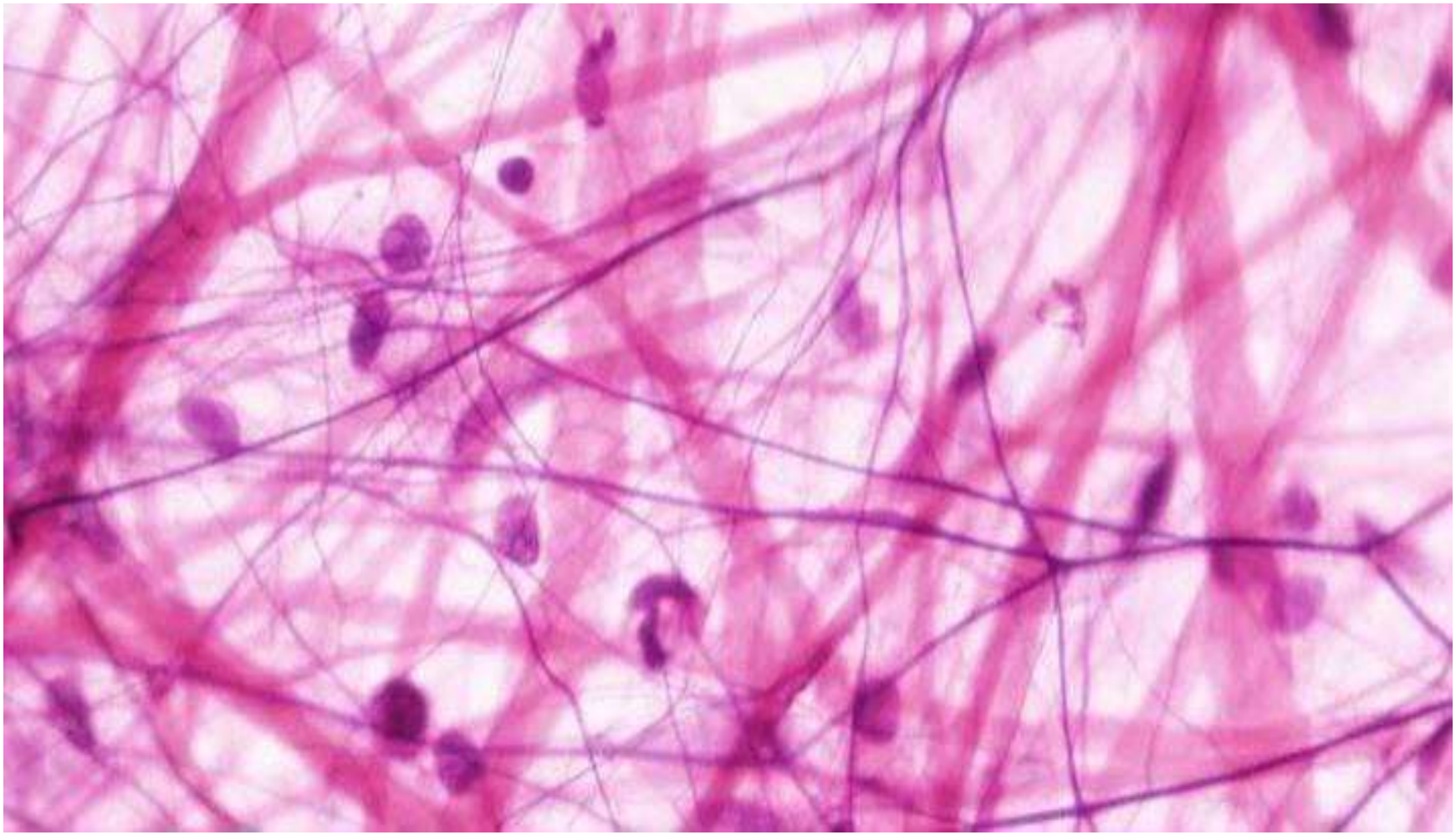
The connective tissue proper divided to:

A. Loose connective tissue: Is characterized by loosely arranged fibers and an abundance of cells

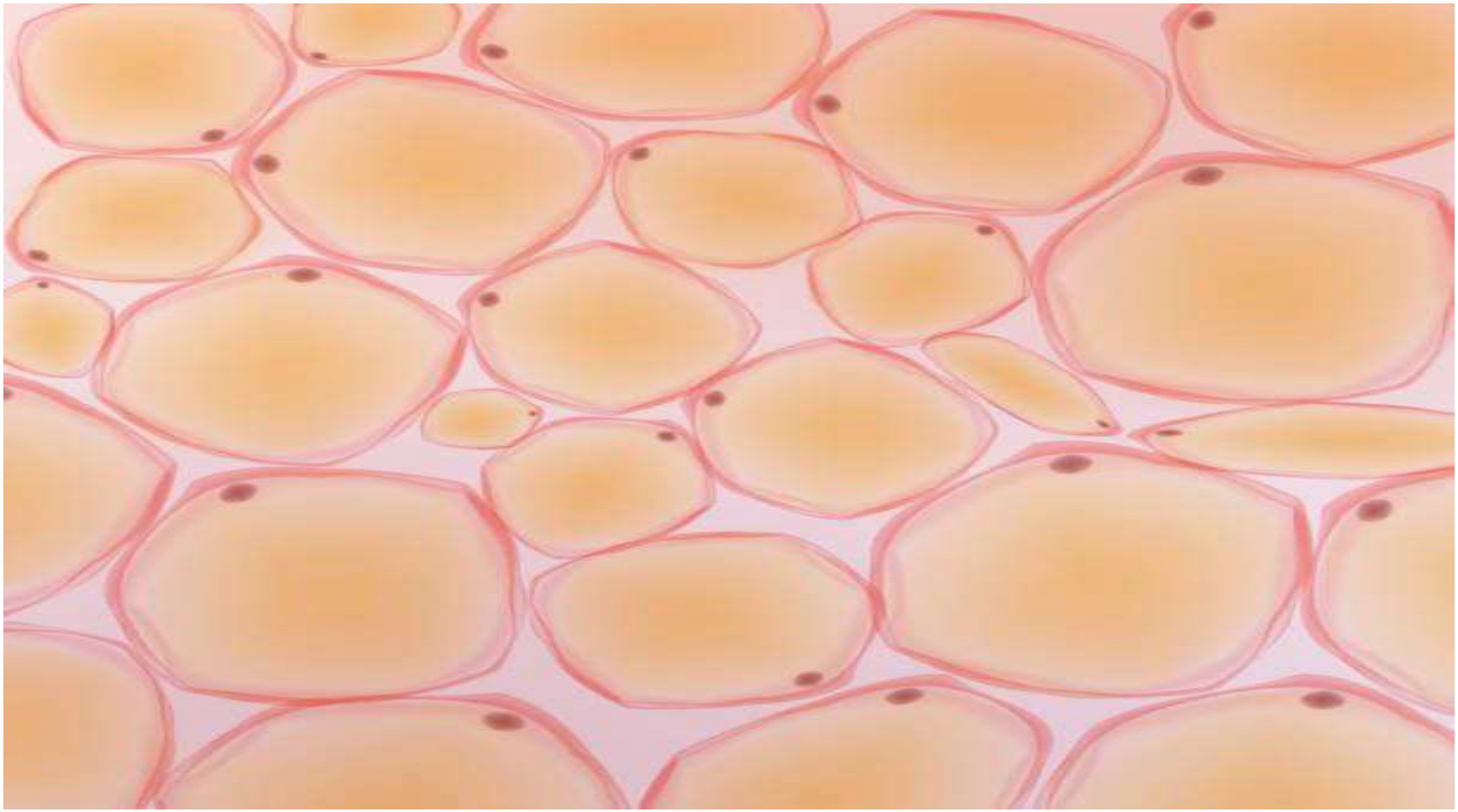
There are four types of loose connective tissue :

- 1. areolar connective tissue (hypodermis).
- 2. Adipose connective tissue (subcutaneous tissue).
- 3. Mucous connective tissue(umbilical cord).
- 4. Reticular connective tissue(lymph node).

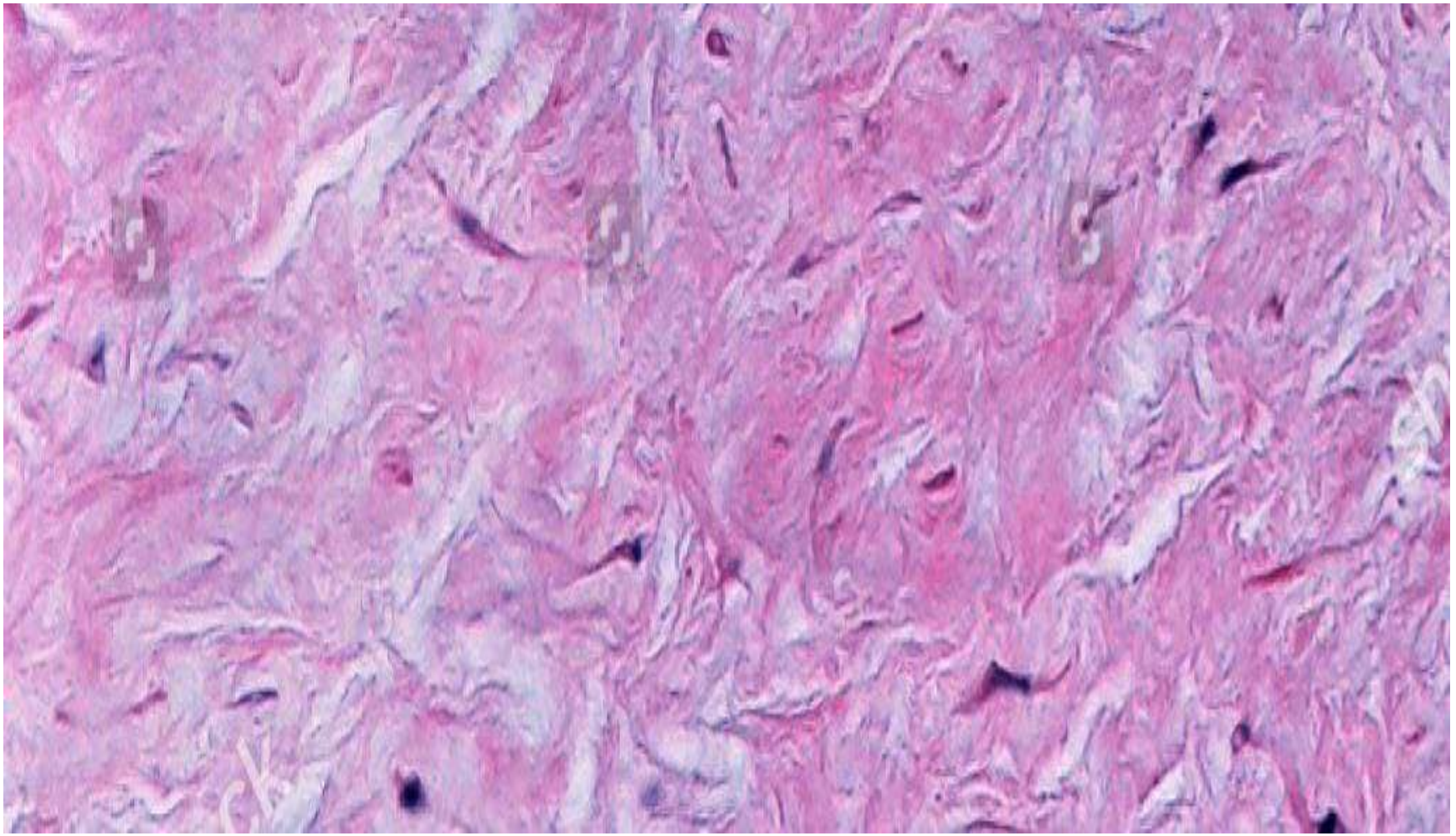
areolar connective tissue (hypodermis)



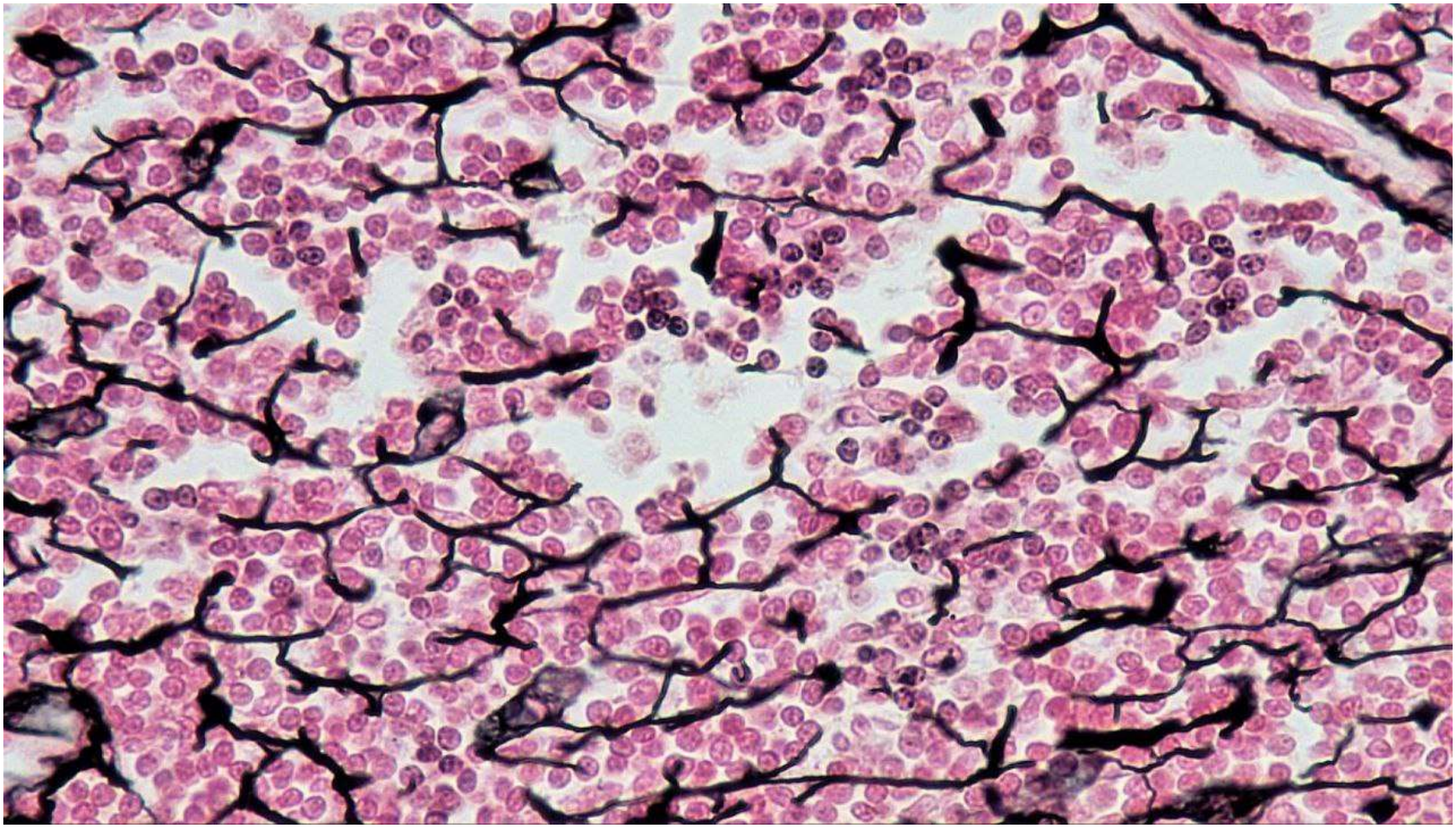
Adipose connective tissue (subcutaneous tissue)



Mucous connective tissue(umbilical cord)



Reticular connective tissue(lymph node)



B- Dense connective tissue

Dense connective tissue have two types :

1. Irregular dense connective tissue (dermis).

characterized by an abundance of fibers and few cells

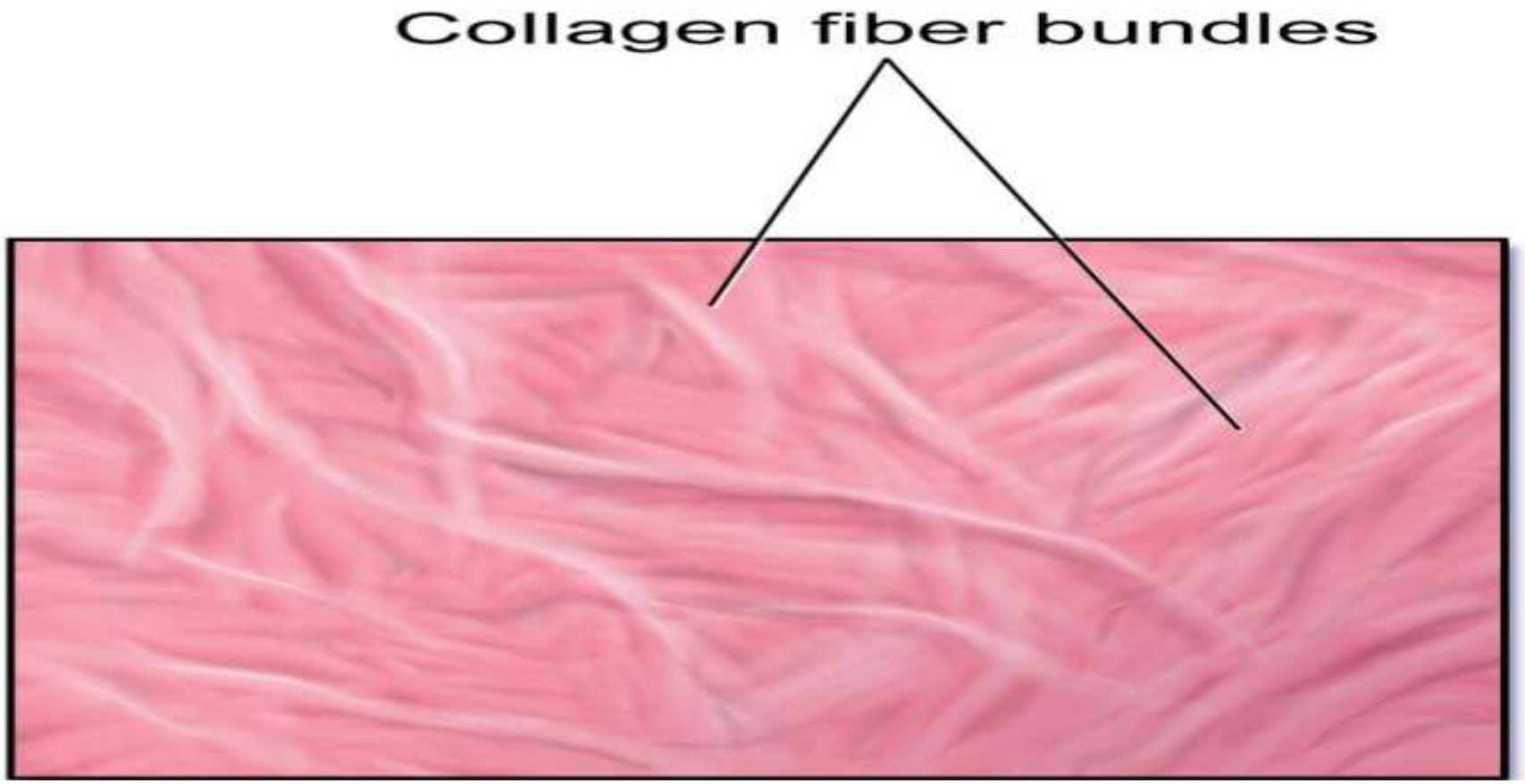
2. Regular dense connective tissue

which characterized by ordered and densely packed in parallel arrays of fibers .This can subdivided into:

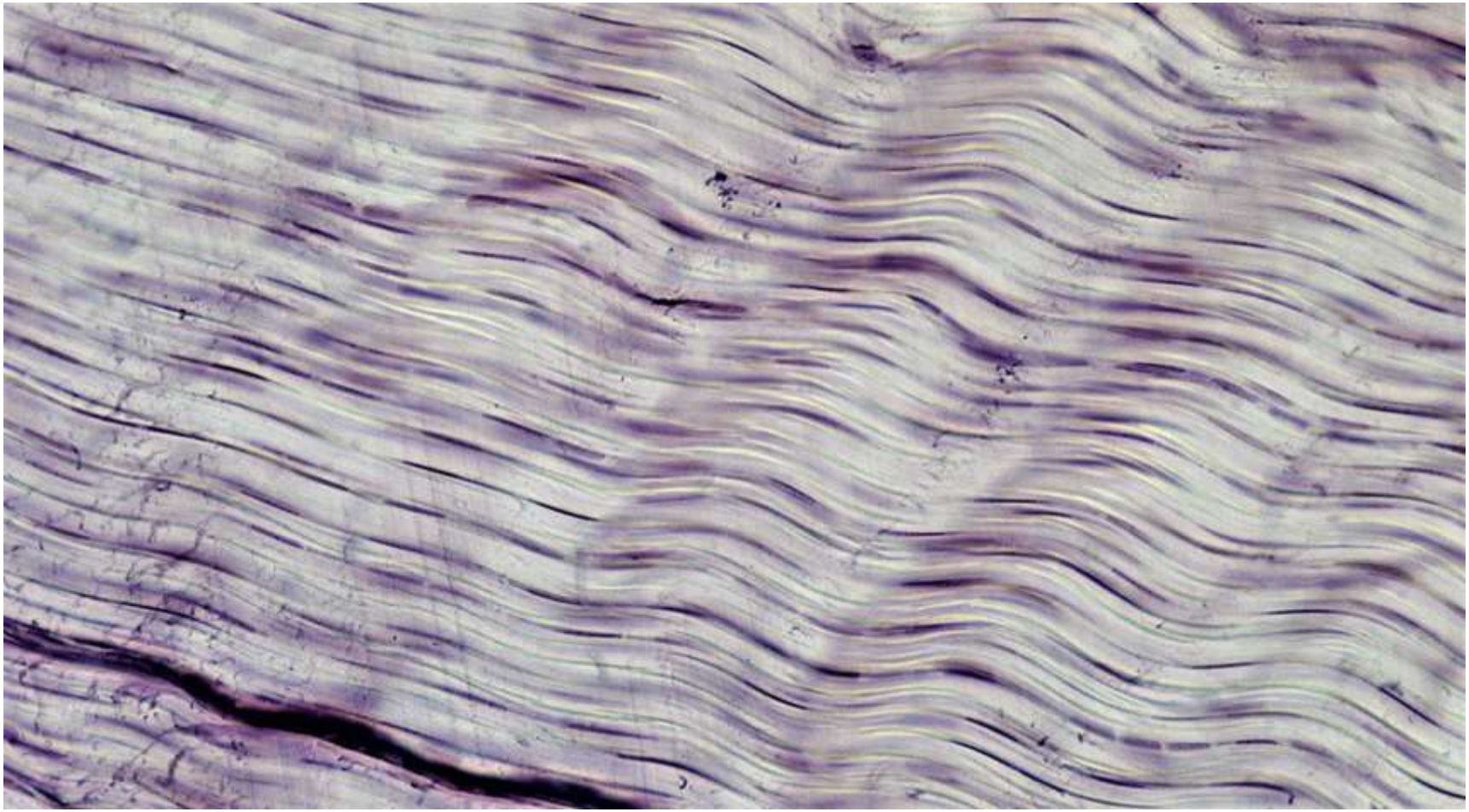
I. Fibrous connective tissue (tendon) bundles of white fiber

II. Elastic connective tissue (ligamentum nuchae) branched of yellow fiber

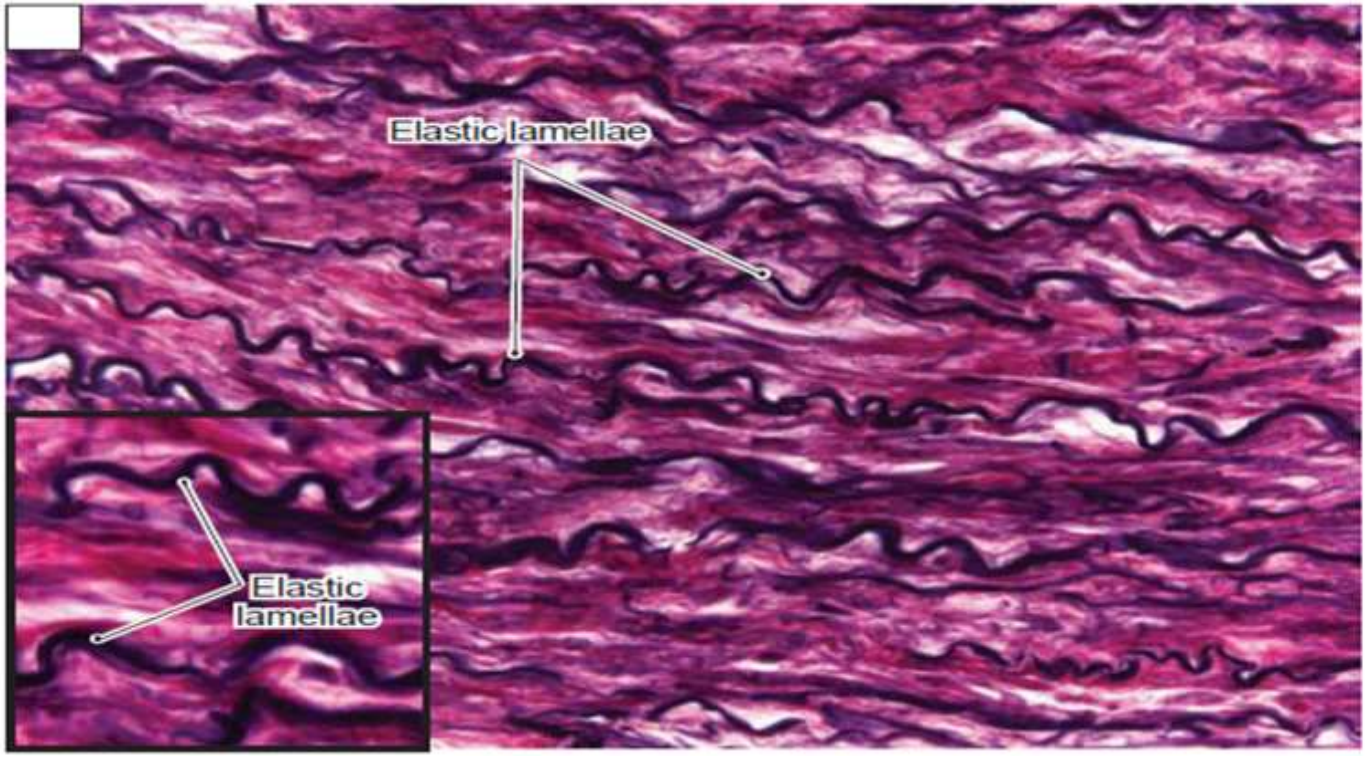
Irregular dense connective tissue (dermis)



Fibrous connective tissue (tendon)



Elastic connective tissue (ligamentum nuchae)



2-specialized connective tissue

Specialized connective tissue divided to:

a- Cartilage

b- bone

c- blood

a- Cartilage is a specialized form of connective tissue in which the extracellular matrix has a firm consistency, it is essential for the development and the growth of long bones, It consist of cells (Chondrocytes) and an extensive extracellular matrix composed of fibers and ground substance.

- The cartilage is divided to :
- Hyaline cartilage.
- Fibrocartilage.
- Elastic cartilage.

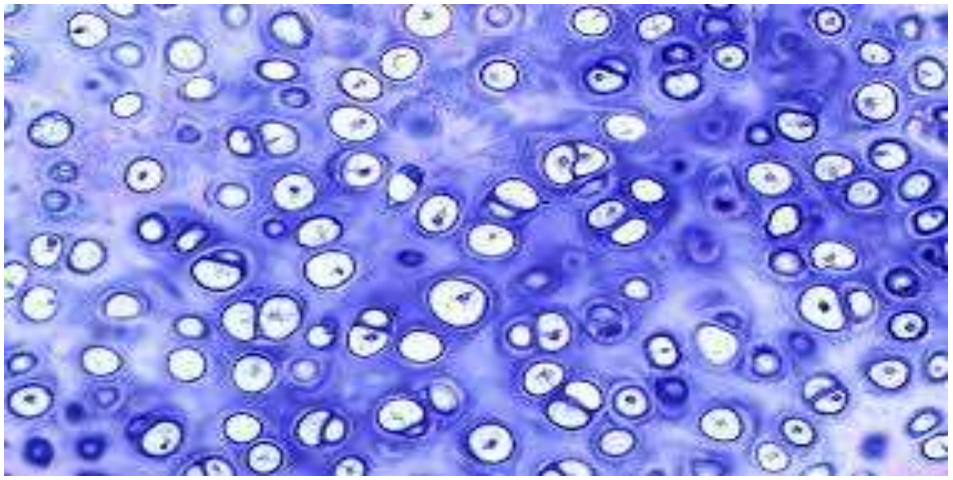
➢ Hyaline cartilage

• the matrix is clear.

• It consists chondrocytes arranged either singly or in-groups of twos, fours or rarely eight

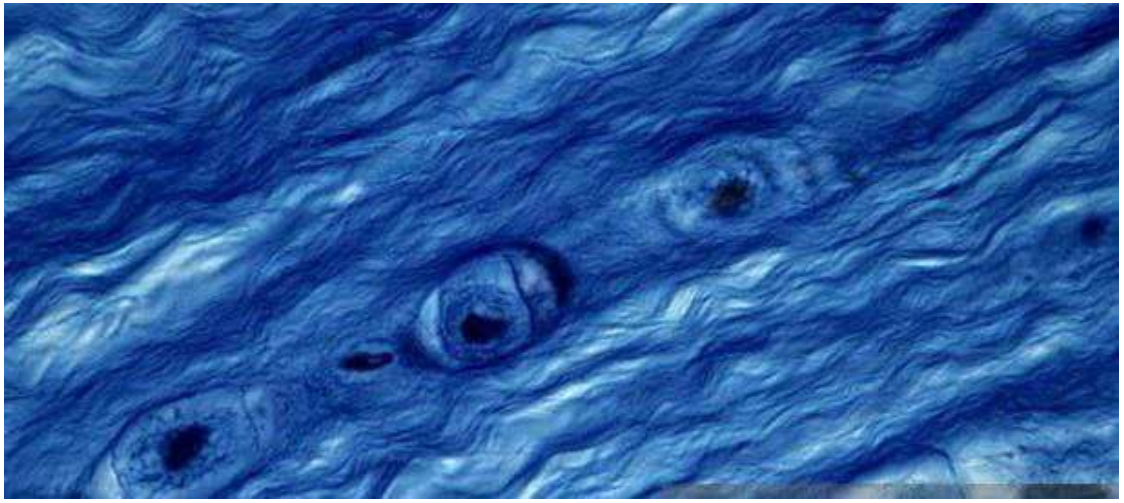
• presence the perichondrium.

• Location: trachea, form the embryonic skeleton.



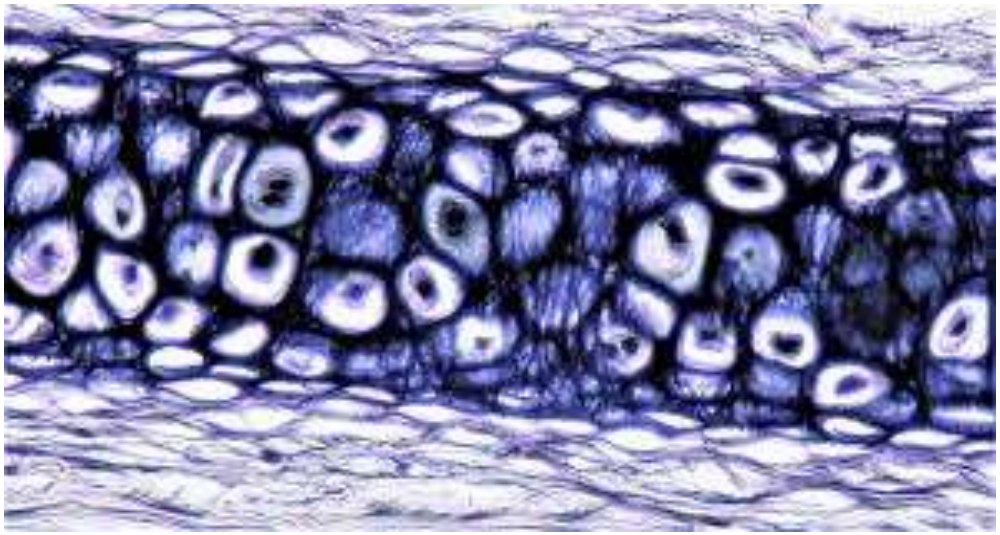
➢ •Fibrocartilage

- matrix rich in white fibers.
- no perichondrium.
- Location: It is present in intervertebral discs in mammals.



Elastic cartilage

- matrix rich in yellow fibers
- presence the perichondrium
- Location: It is present in ear pinna.



b-Bone

- Bone is a hard connective tissue that consists of living cells and a mineralized matrix.
- The matrix of bone composed organic and inorganic component.
- Organic : collagen fibers and different protein- carbohydrate molecules make about one- third of dry weight of bone.
- Inorganic : mixture of calcium and phosphorus make about two-third of dry weight of bone.
- Bone functions : supporting , protection , hemopoiesis.

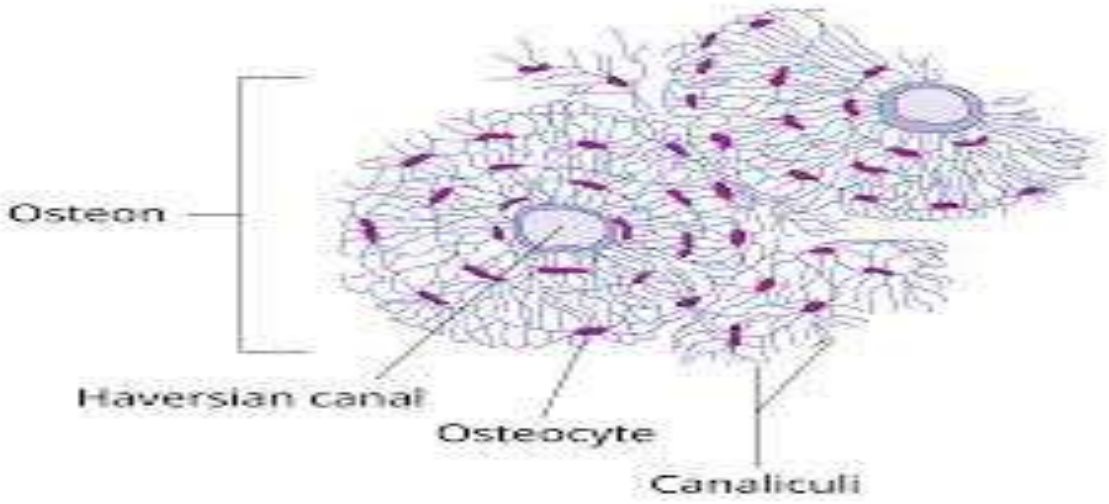
Classification of bone

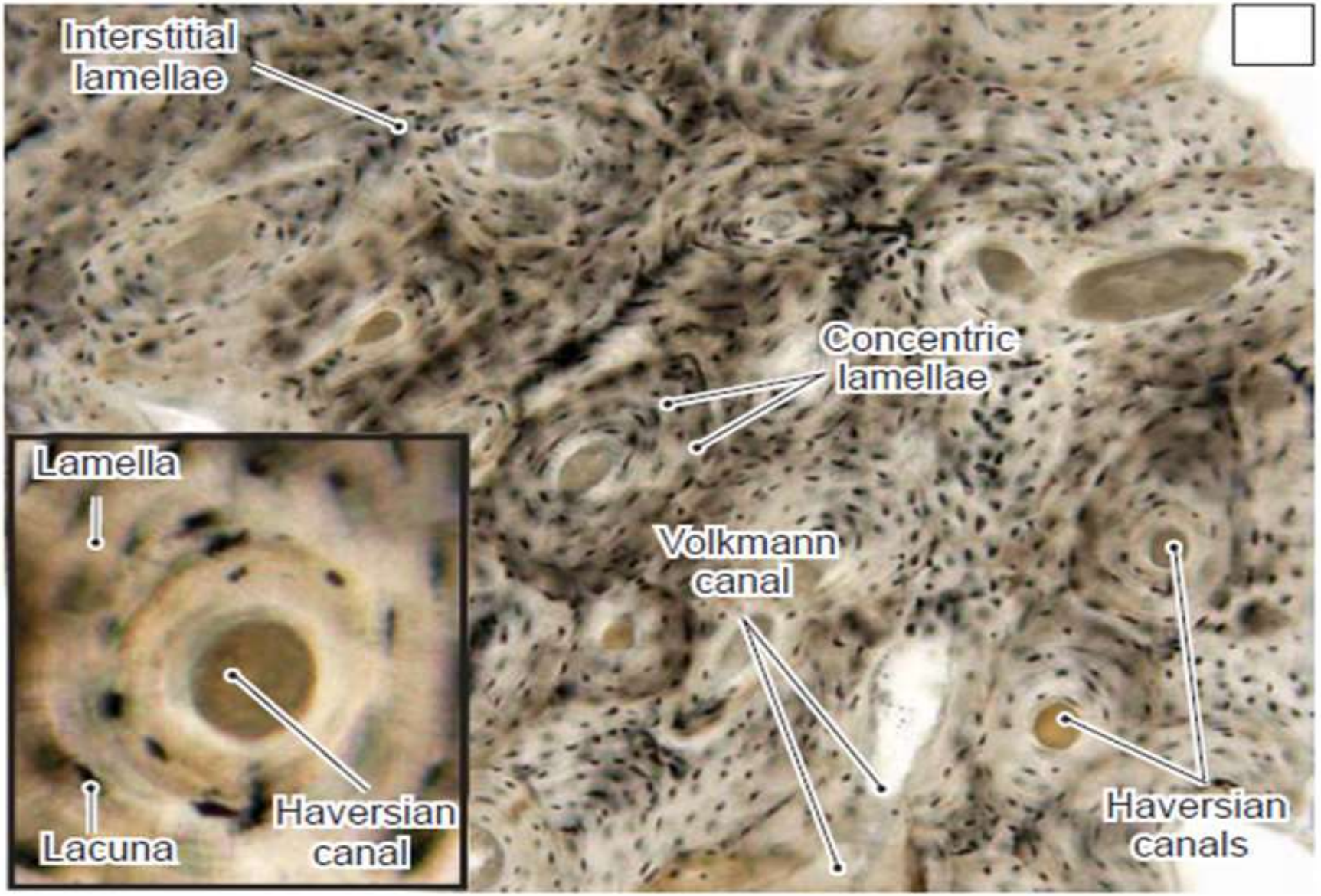
- Based on porosity the bone classify in to two types
- **1- compact bone:** makes outer hard shell of the bone and has more matrix than spaces.
- The basic unit of compact bone is an osteon (Haversian system)
- Each osteon (Haversian system) has four parts

❑ Lamella : concentric rings of extracellular matrix consist of mineral salt mostly calcium and phosphate

❑ Lacunae : small space between lamella that contain mature bone cells called osteocyte.

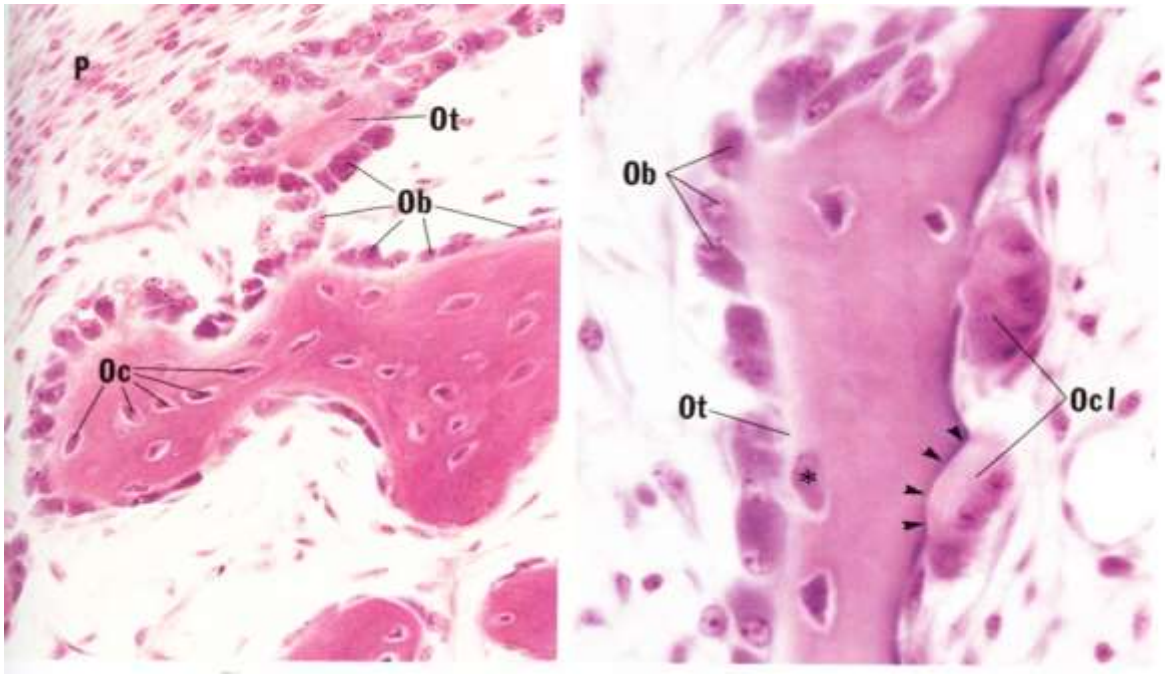
- canaliculi the lacunas are connected together by fine Canaliculi.
- Haversian canal contains blood vessels and nerves




Interstitial lamellae
Concentric lamellae
Lamella
Volkmann canal
Haversian canal
Lacuna
Haversian canal
Haversian canals

- 2- spongy bone : located in the interior of the bone , contain more space than matrix
- Spongy bone contain space and the bone connective tissue form a structure called trabeculae, the space between trabeculae are filled with red bone marrow which is site of hemopoiesis.
- Three types of cells found in spongy bone
- 1-osteocyte
- 2-osteoblast
- 3-osteoclast

Ob:osteoblast **Oc:**osteocyte **Ocl:** osteoclast



Thank you