

Connective Tissue

Part 1

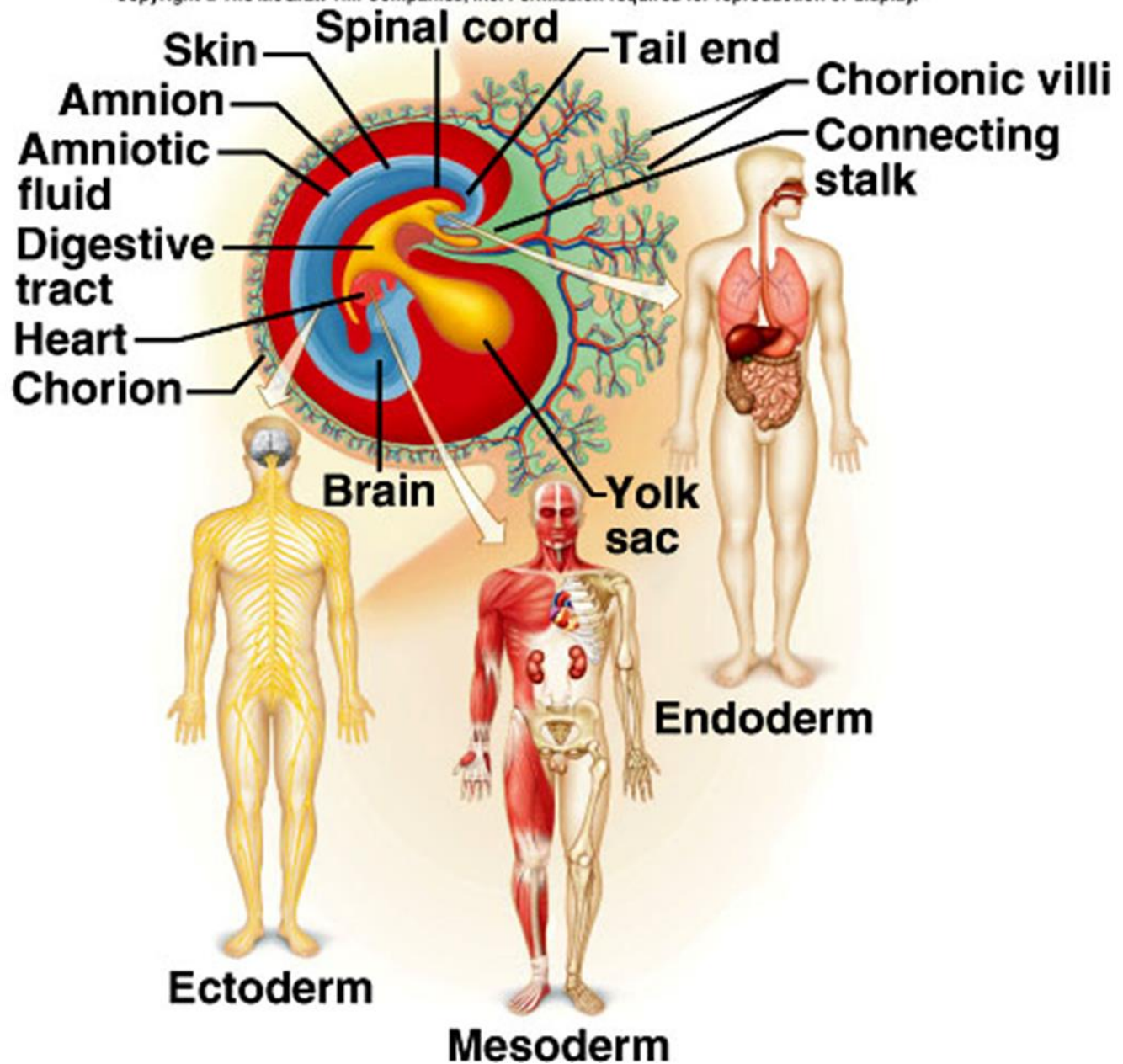
Descriptive Histology 272

29/09/2019

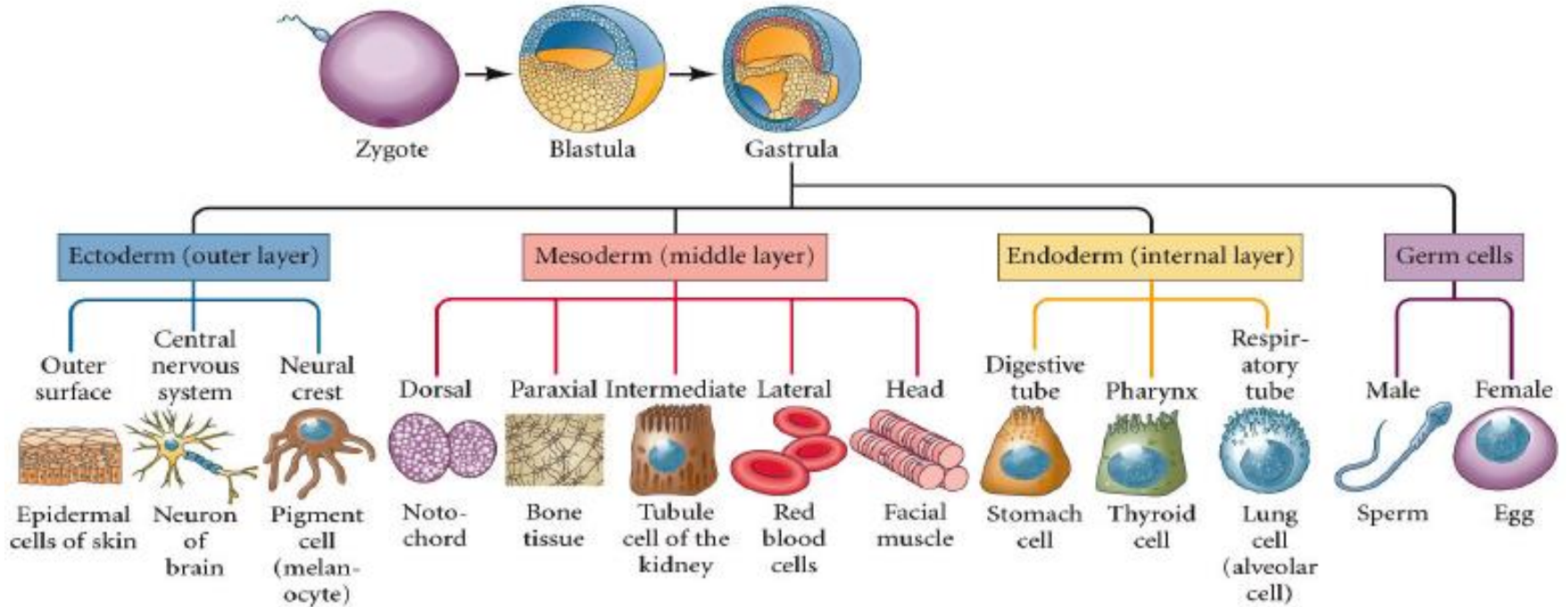
Gastrulation Process

Gastrulation (gas"troola'shun) is the process by which the epiblast and hypoblast layers of the bilaminar embryonic disc are transformed into the trilaminar embryonic disc, consisting of the three germ layers (ectoderm, mesoderm and endoderm).





Three Primary Germ Layers



References

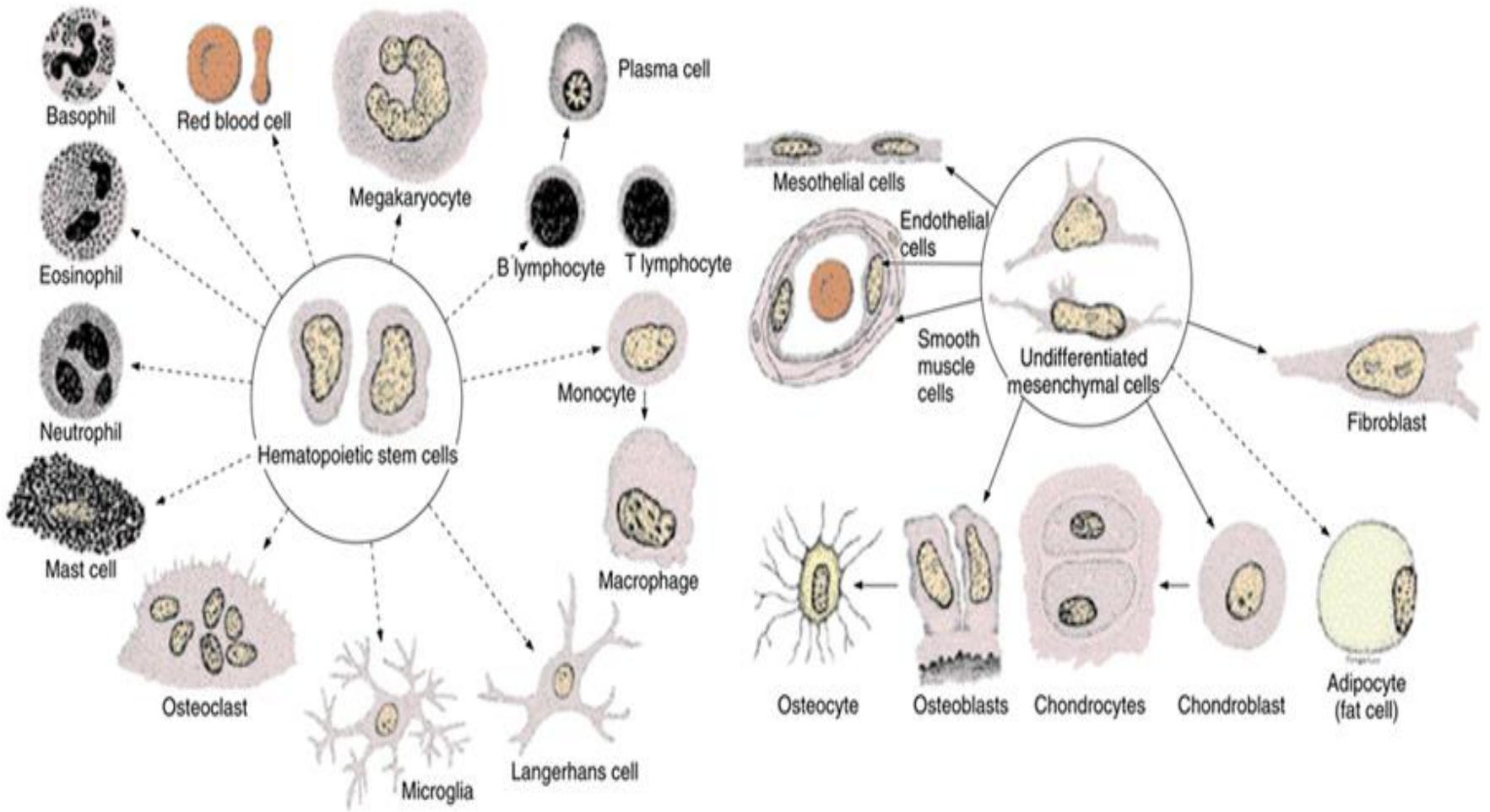
<https://www.youtube.com/watch?v=3AOoikTEfeo>

<https://www.youtube.com/watch?v=w9tJ7UiLrQs>

<https://www.khanacademy.org/test-prep/mcat/cells/embryology/a/human-embryogenesis>

[https://embryology.med.unsw.edu.au/embryology/images/3/3e/
/Human_development_001.mp4](https://embryology.med.unsw.edu.au/embryology/images/3/3e/Human_development_001.mp4)



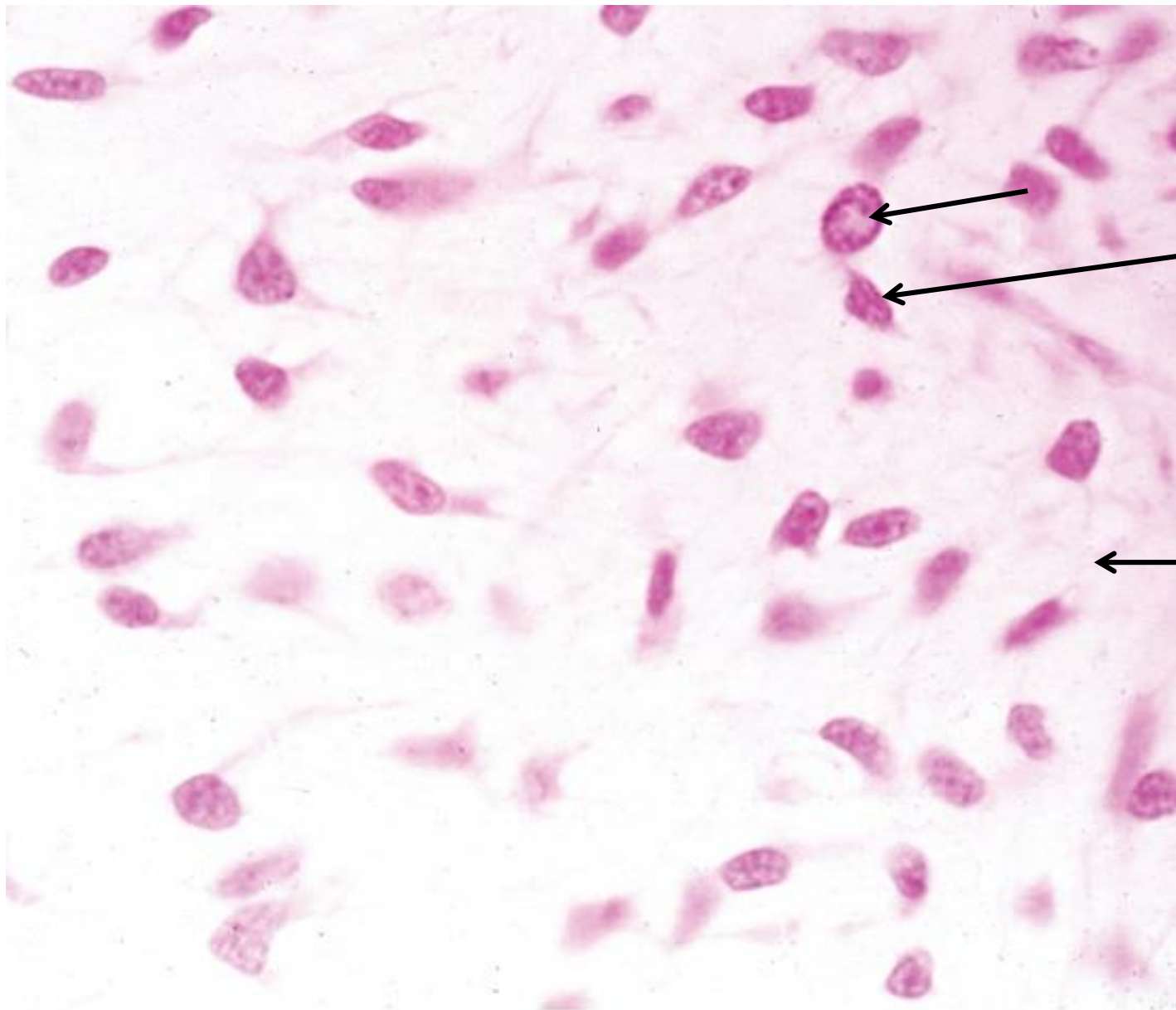


Connective tissue

Connective tissues provide a matrix that supports and physically connects other tissues and cells together in organs.

The interstitial fluid of connective tissue gives metabolic support to cells as the medium for diffusion of nutrients and waste products.





Cells

matrix

Source: Mescher AL: *Junqueira's Basic Histology: Text and Atlas, 12th Edition*: <http://www.accessmedicine.com>

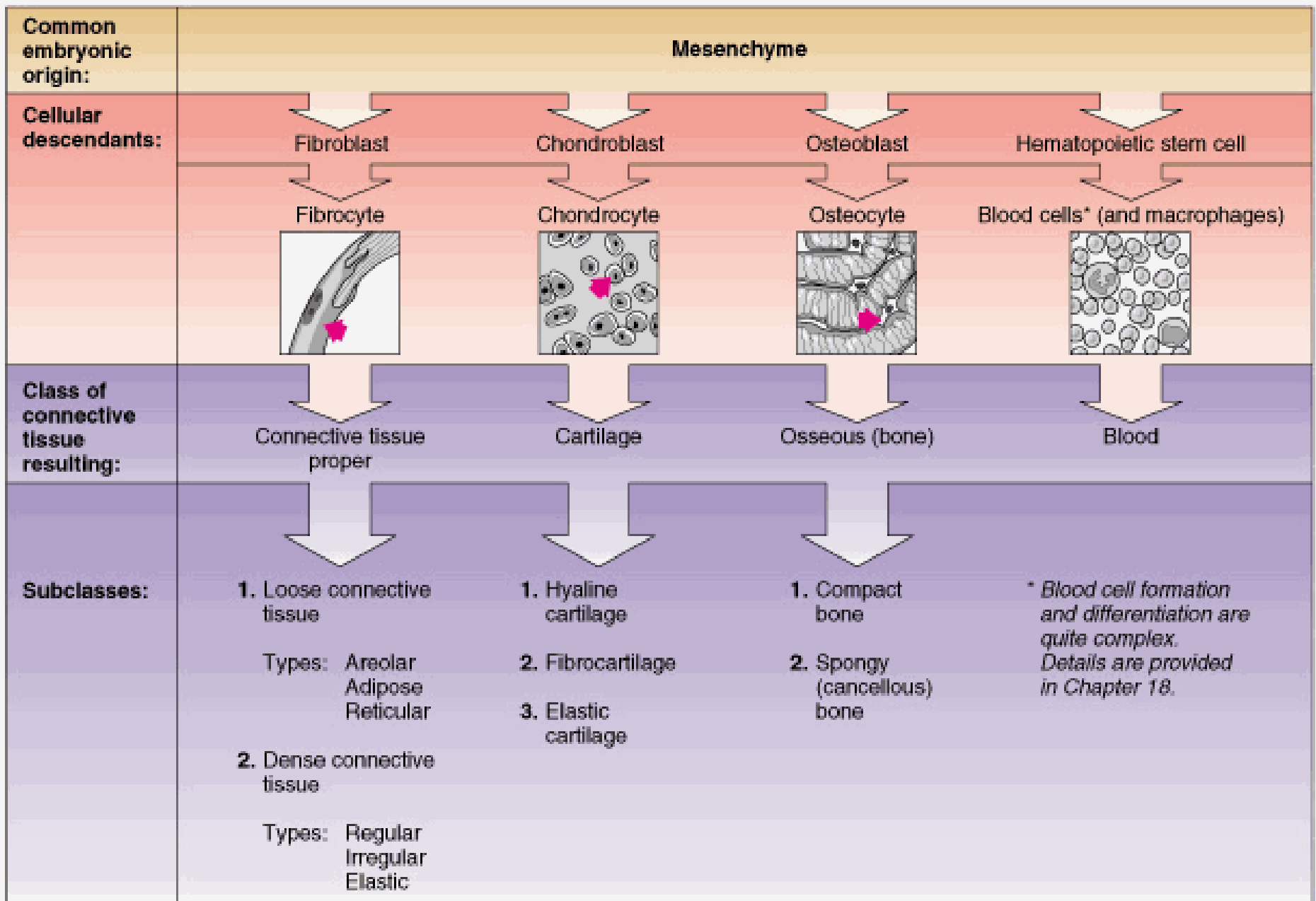
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Extra Cellular Matrix (ECM)

Extra Cellular Matrix composed of different combinations of **protein fibers** (collagen, and elastic fibers) and **ground substance** which is a complex of anionic, hydrophilic, macromolecules include the following

- Glycosaminoglycans (or GAGs),
- Proteoglycans, and
- Multiadhesive glycoproteins.





Proper Connective Tissue

Loose

Dense - Regular
& Irregular

Connective tissue with special properties

Adipose tissue

Elastic tissue

Hematopoietic

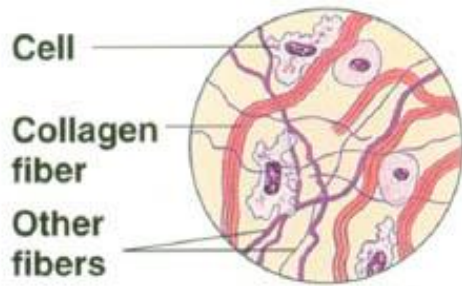
Mucous tissue

Supporting Connective Tissue

Cartilage

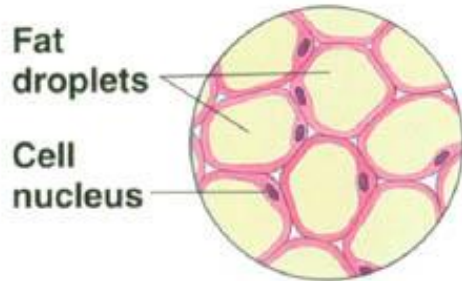
Bone





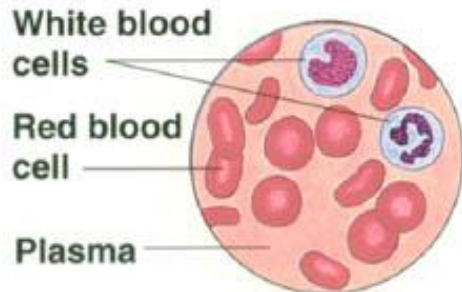
Cell
Collagen fiber
Other fibers

A. Loose connective tissue (under the skin)



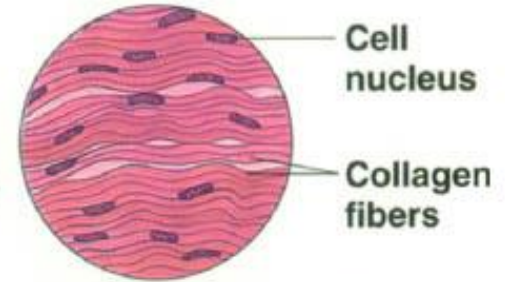
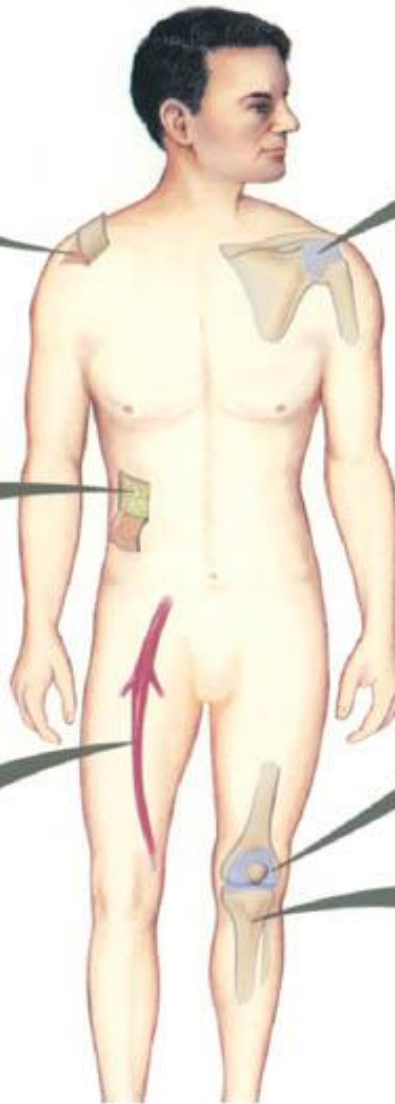
Fat droplets
Cell nucleus

B. Adipose tissue



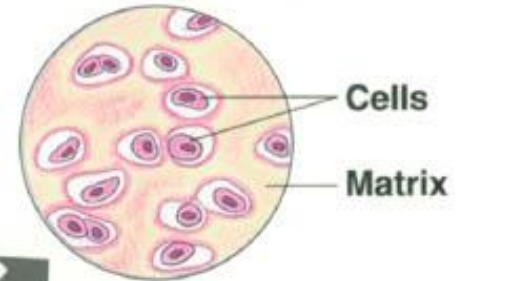
White blood cells
Red blood cell
Plasma

C. Blood



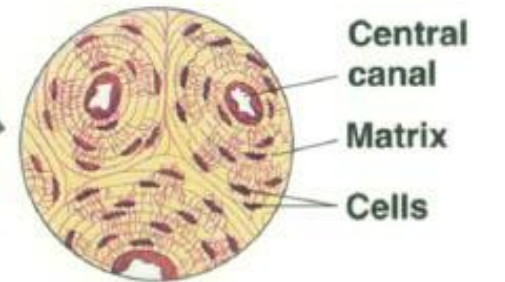
Cell nucleus
Collagen fibers

D. Fibrous connective tissue (forming a ligament)



Cells
Matrix

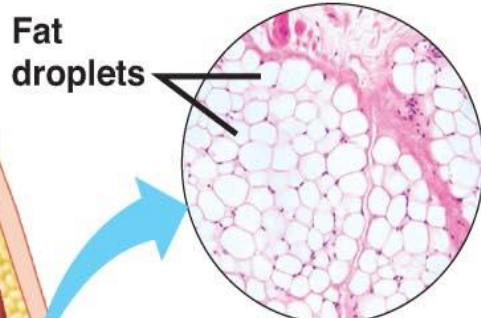
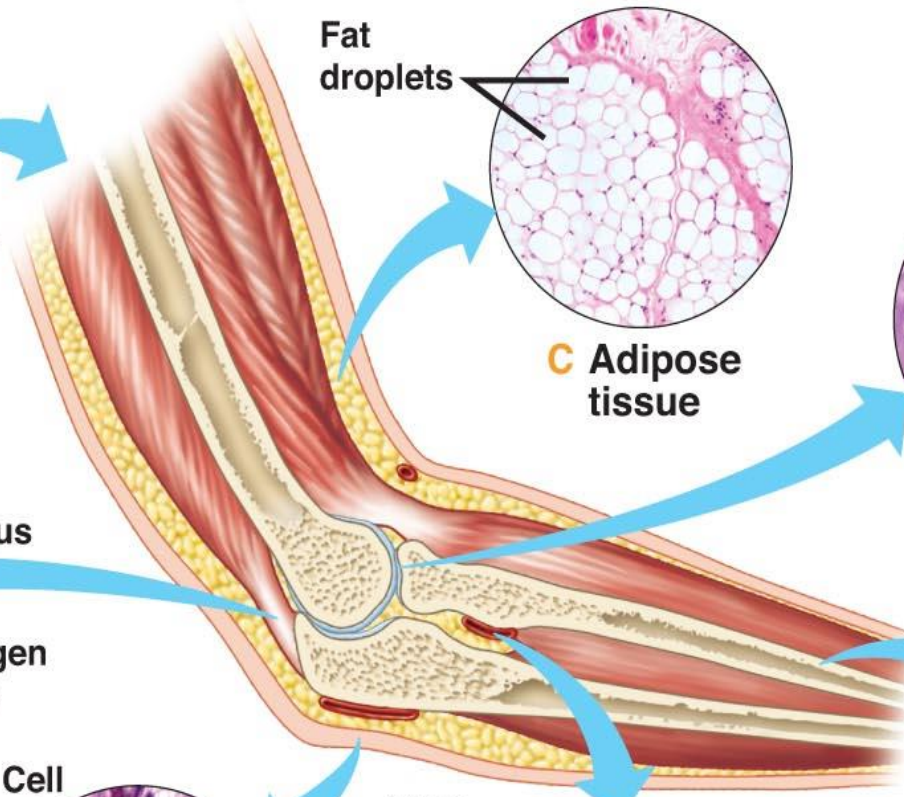
E. Cartilage (at the end of a bone)



Central canal
Matrix
Cells

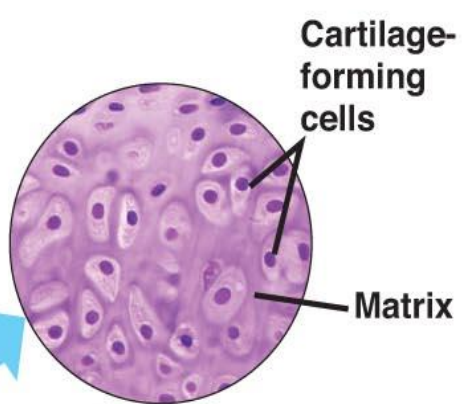
F. Bone





Fat droplets

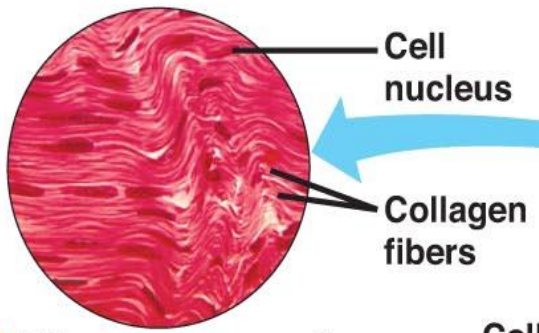
C Adipose tissue



Cartilage-forming cells

Matrix

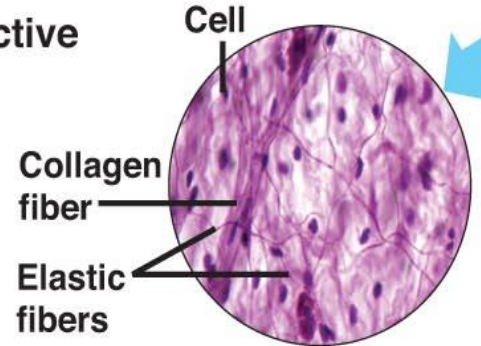
D Cartilage (at the end of a bone)



Cell nucleus

Collagen fibers

B Fibrous connective tissue (forming a tendon)

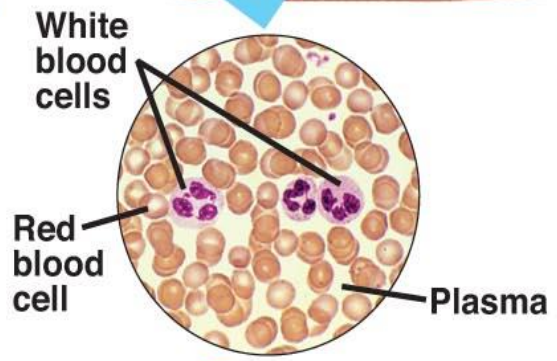


Cell

Collagen fiber

Elastic fibers

A Loose connective tissue (under the skin)

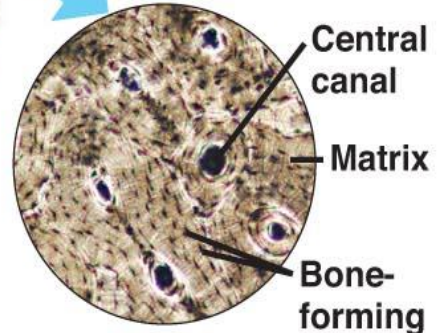


White blood cells

Red blood cell

Plasma

F Blood



Central canal

Matrix

Bone-forming cells

E Bone

Loose Connective tissue consists of

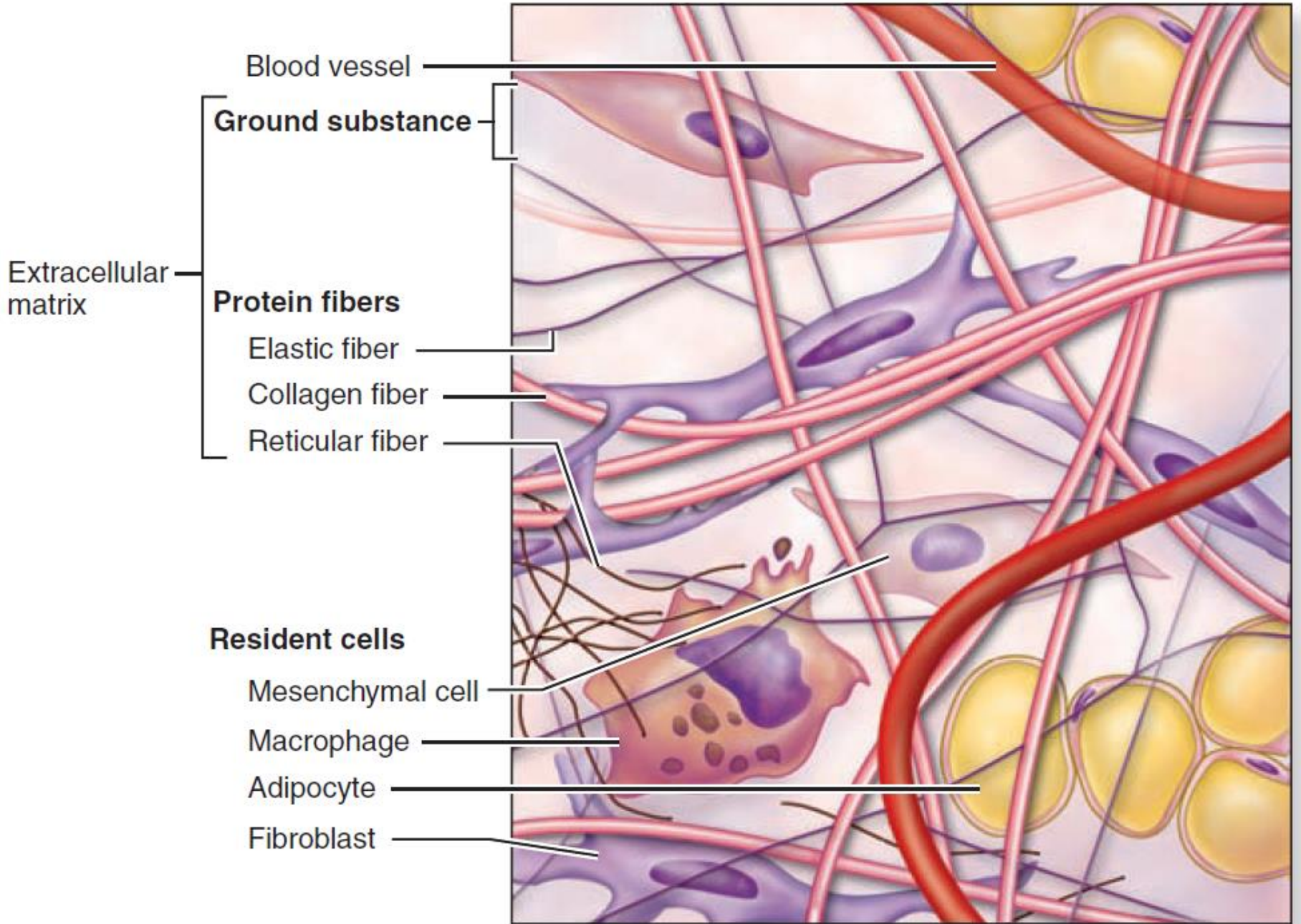
1. Fibers

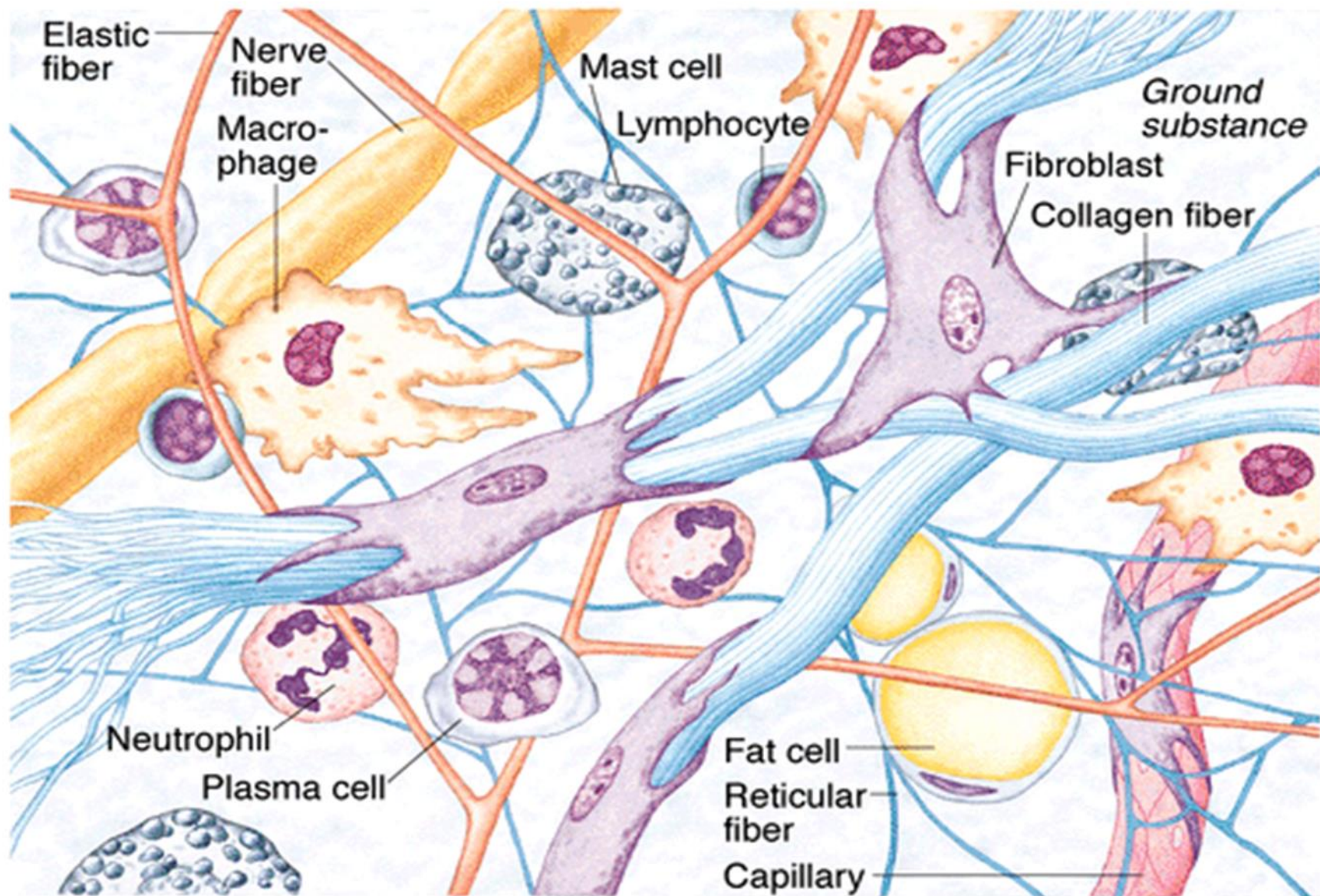
- ▶ Collagen
- ▶ Elastin
- ▶ Reticular

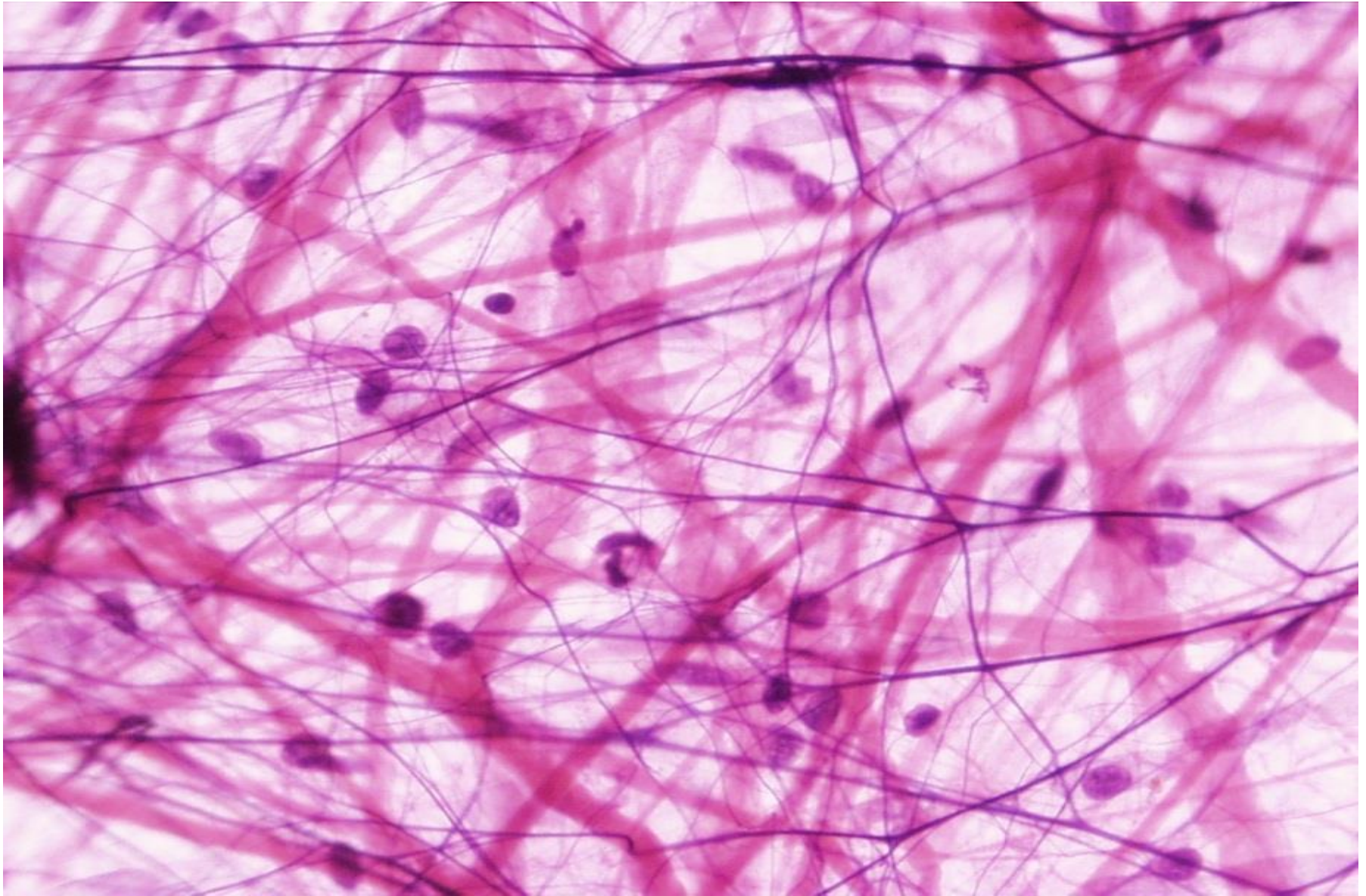
2. Cells

- ▶ Fibroblasts
 - ▶ Plasma Cells
 - ▶ Adipocytes
 - ▶ Mast Cells, and
 - ▶ Macrophages
-



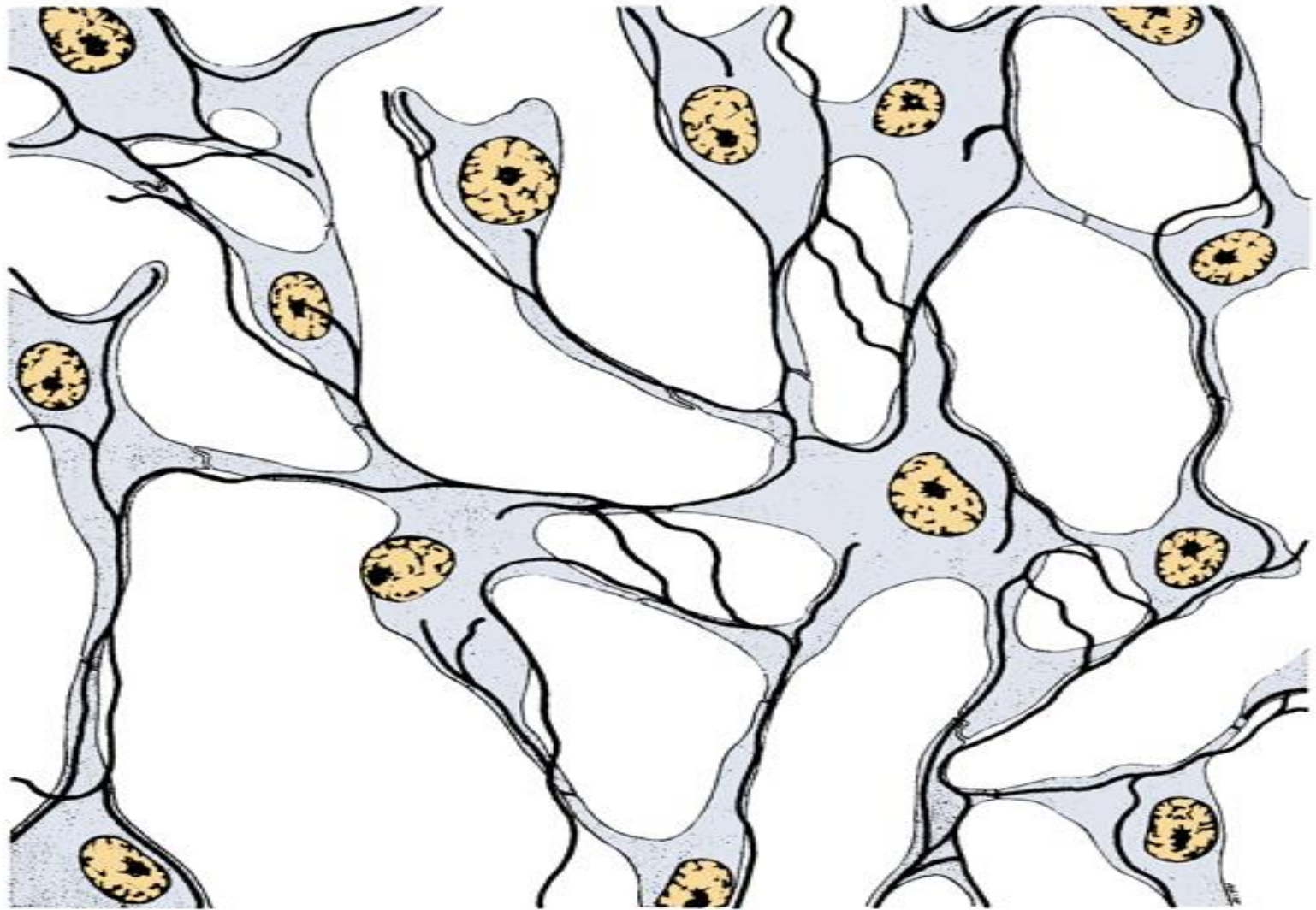






Loose Connective Tissue





Reticular connective tissue



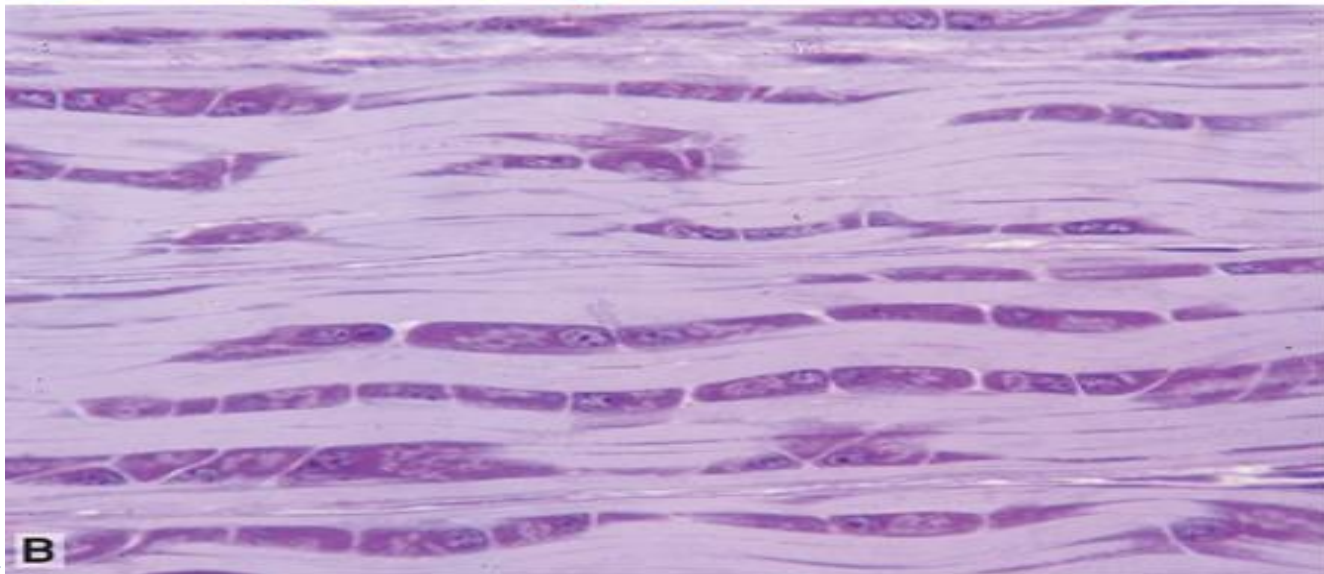
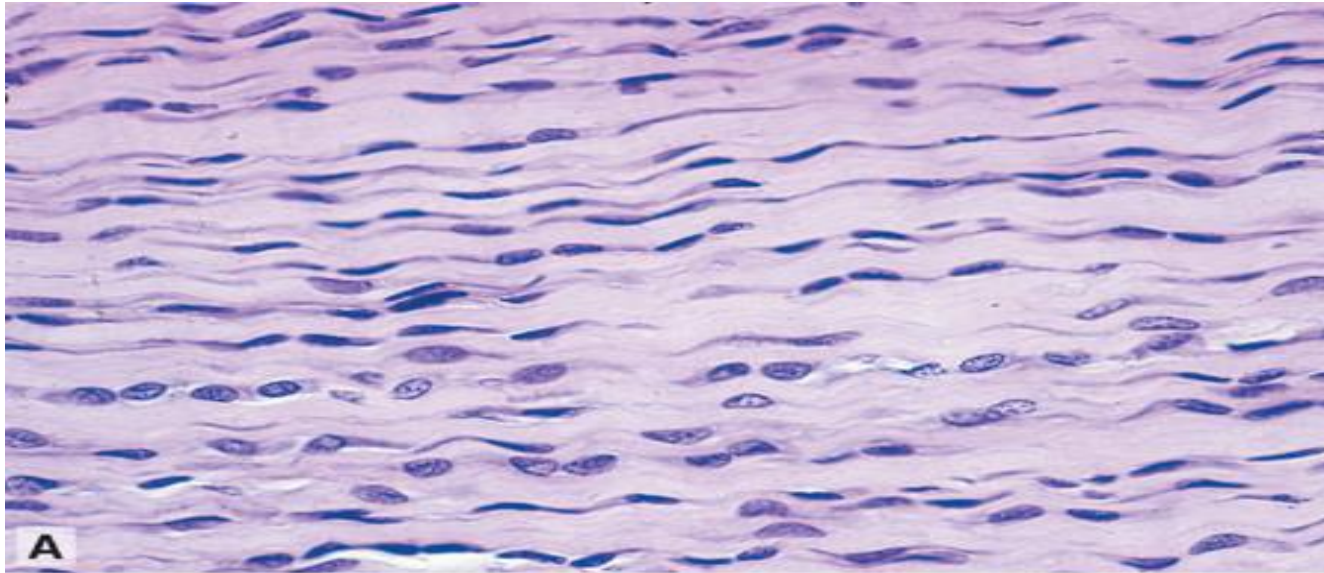
Dense Connective Tissue

Dense Connective Tissue:

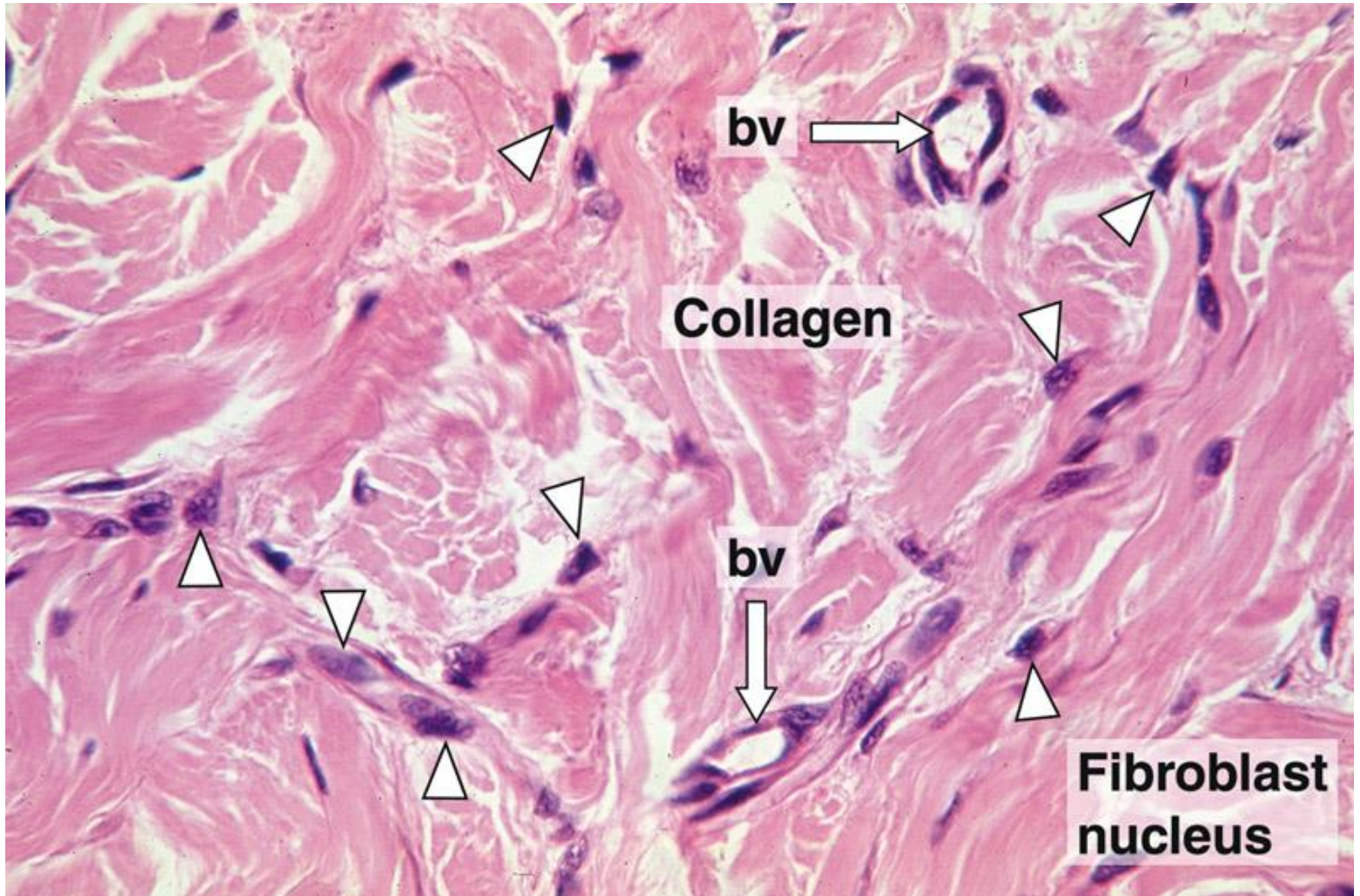
- ▶ **Dense regular connective tissue**
Tendons and ligaments
- ▶ **Dense irregular connective tissue**
Dermis of skin, submucosa of digestive tract



Dense regular Connective Tissue




Dense Irregular Connective Tissue



Adipose Tissue

Adipose Tissue is a loose fibrous connective tissue that is packed with many fat cells (called "**adipocytes**").

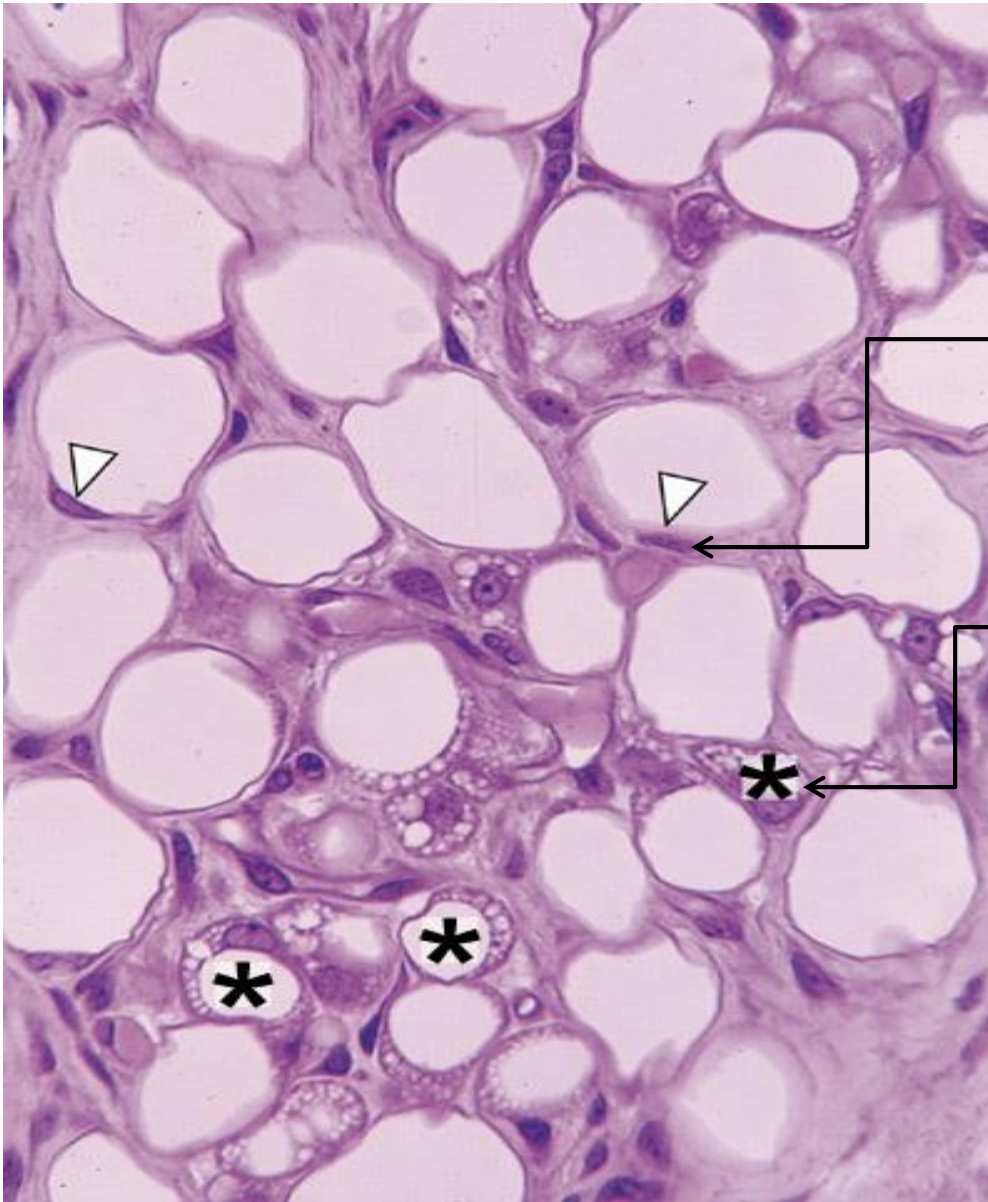
Locations of adipose tissue include:

- Subcutaneous layer deep to skin;
 - Around the heart;
 - Around the kidneys;
 - Yellow marrow of the long bones
 - Padding around the joints
 - Inside the eye-socket, posterior to the eyeball.
-
- 

The Functions of adipose tissue

- ▶ Adipose tissue acts as an insulating layer, helping to reduce heat loss through the skin.
- ▶ It also has a protective function, providing mechanical protection ("padding") and support around some of the major organs, e.g. kidneys.
- ▶ Adipose tissue is also a means of energy storage.
Food that is excess to requirements is converted into fat and stored within adipose tissue in the body.





nuclei of adipocytes

**Adipocytes in
growing stage**



Functions of Connective Tissue

Most connective tissue is serving several vital functions simultaneously, including –

- transport of nutrients and metabolites,
- immunological defense,
- mechanical support.

After injury, connective tissue is instrumental in tissue repair, specifically in scar formation.

Additional functions found in specialized sites include

- reserve energy storage (as fat),
 - heat generation (brown fat),
 - hemopoiesis (blood cell formation).
-



https://www.youtube.com/watch?v=KkqEwua_pmc



Homework Essay

Explain the structure, function and differences between the fibers of connective tissue?

Key words:

- ▶ **Collagen fiber**
- ▶ **Elastin fiber**
- ▶ **Reticular fiber**

