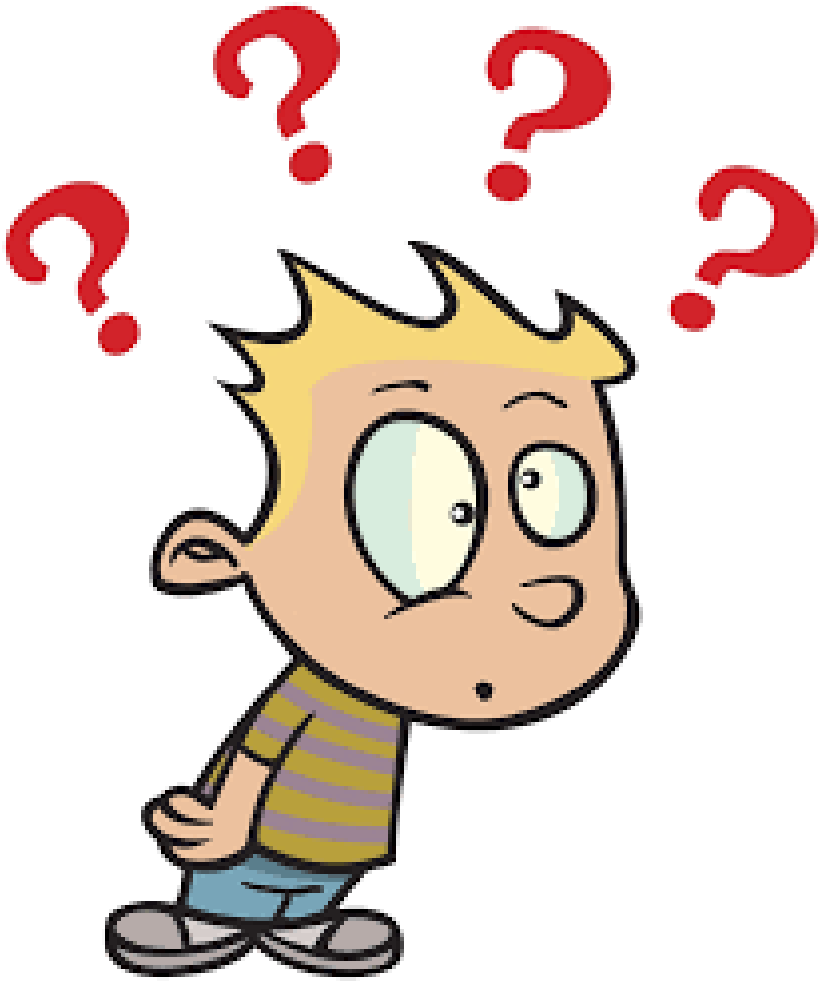
Introductory Module

Connective Tissue


Good Morning


بسم الله الرحمن الرحيم
قالوا سبحانك لا علم لنا إلا ما
علمتنا إنك أنت العليم الحكيم
صدق الله العظيم
البقرة (٣٢)

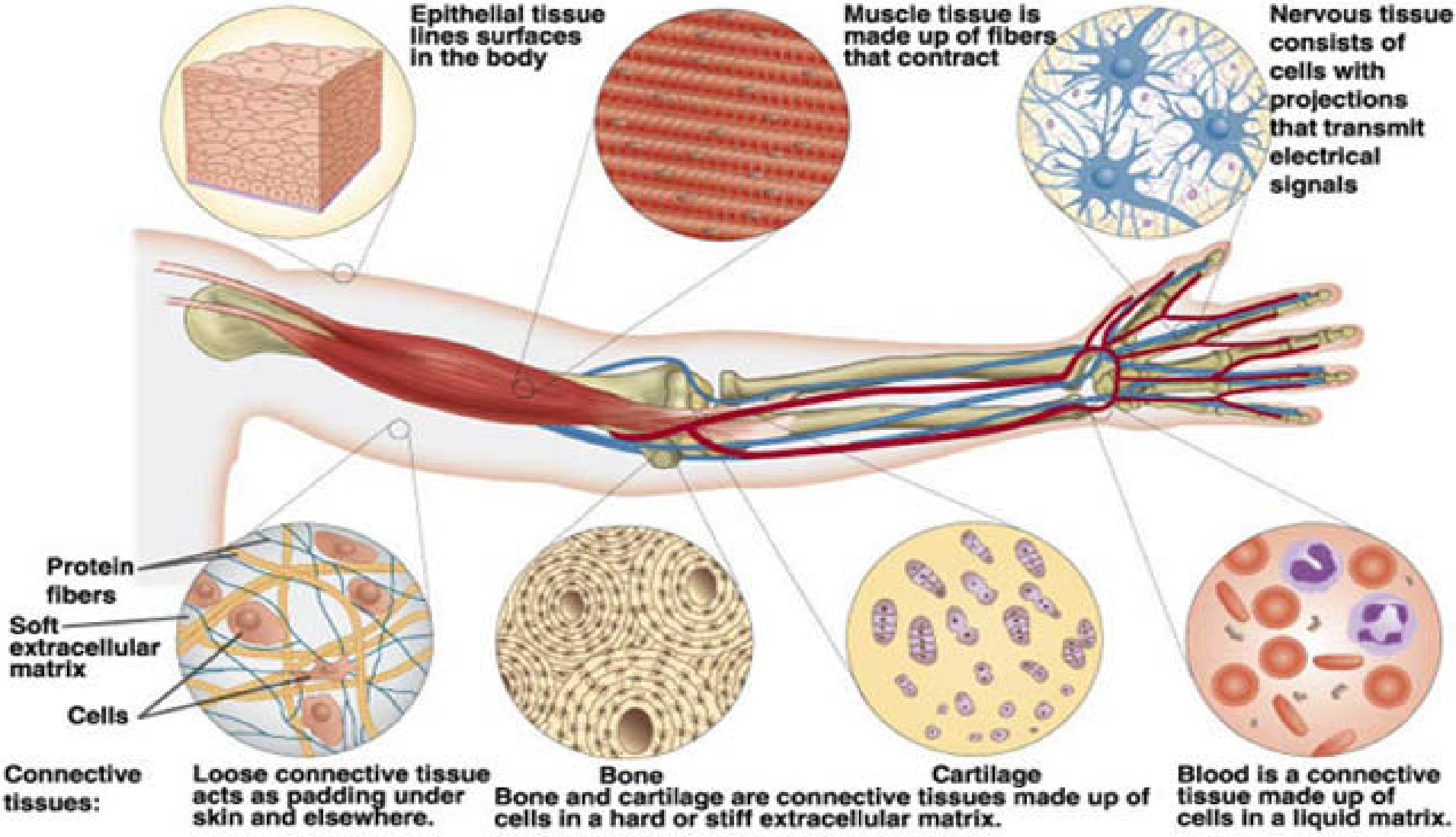


If you don’t understand…TELL ME!

Connective tissues

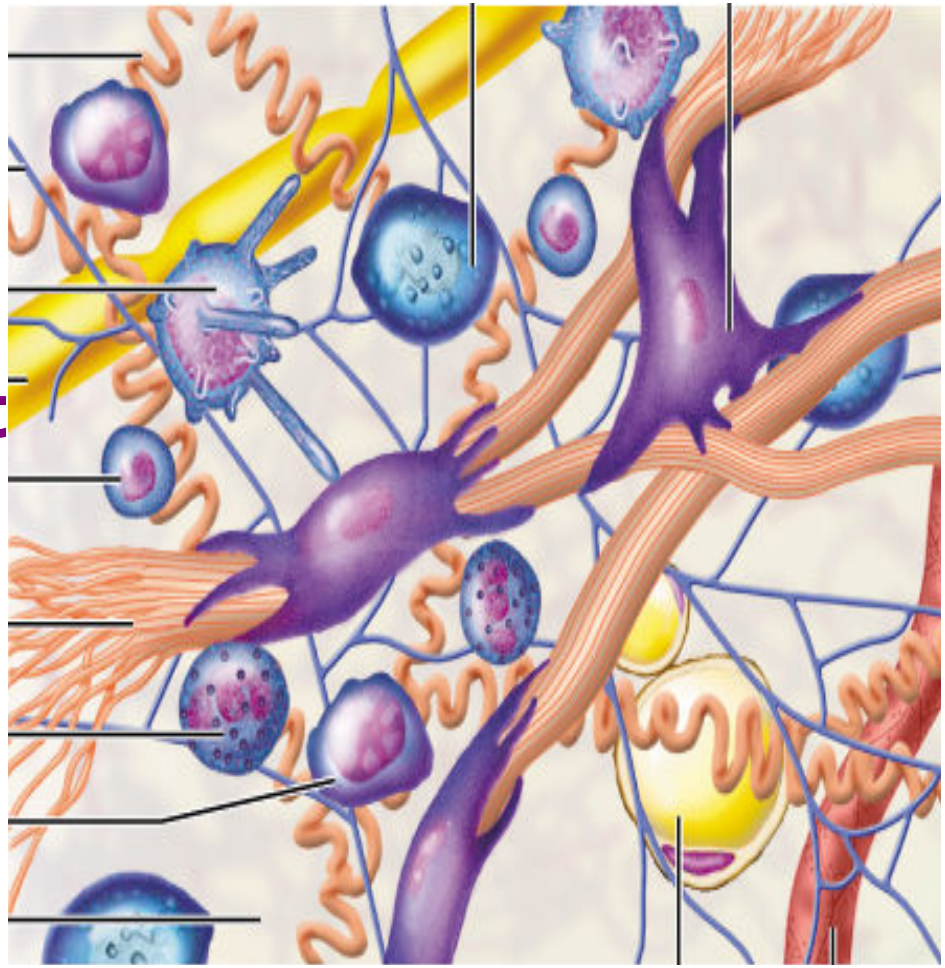
- د. سمراء حسين عبد القوى
- مدرس الهستولوجيا
- كلية الطب البشرى
- جامعة بنى‌سويف
- samraahussein@yahoo.com

Types Of Tissues



- **Characteristics:**

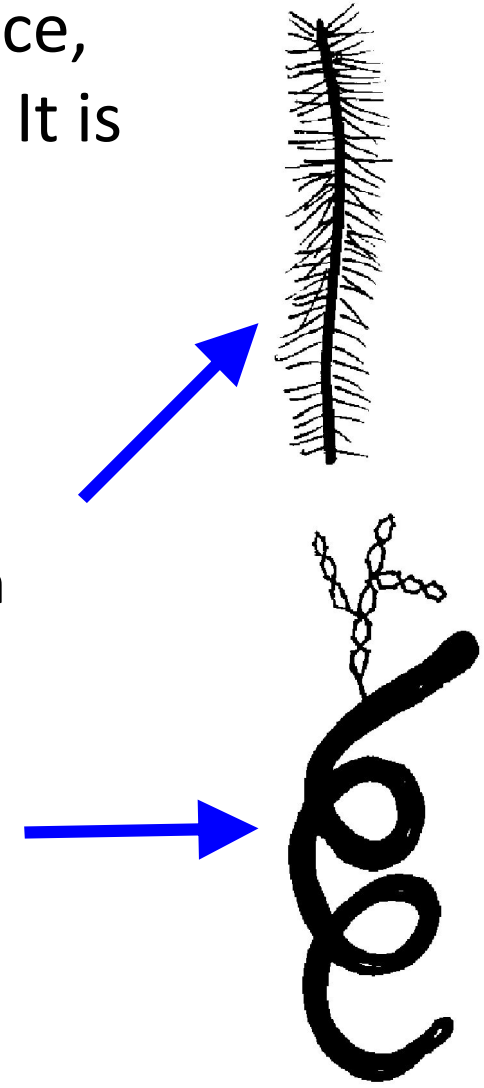
1. **Origin: mesoderm.**
2. **Widely separated cells + large amount of matrix.**
3. **Penetrated by Blood vessels, nerves and lymphatic vessels.**



4. **Function: Connects, supports and protects other tissues .**

GROUND SUBSTANCE

- **Definition:** It is the intercellular substance, in which cells and fibres are embedded. It is amorphous, jelly-like & translucent.
- **Structure:** a viscid mixture of:
  1. **Proteoglycans (glycosaminoglycans):** (90% polysaccharide + 10% protein core):
     A. Sulfated: chondroitin sulfate, heparan sulfate.
     B. Non-sulfated: hyaluronic acid.
  2. **Glycoproteins:** (90% protein + 10% monosaccharide): fibronectin, laminin & integrins.
  3. **Tissue fluid:** similar to plasma.

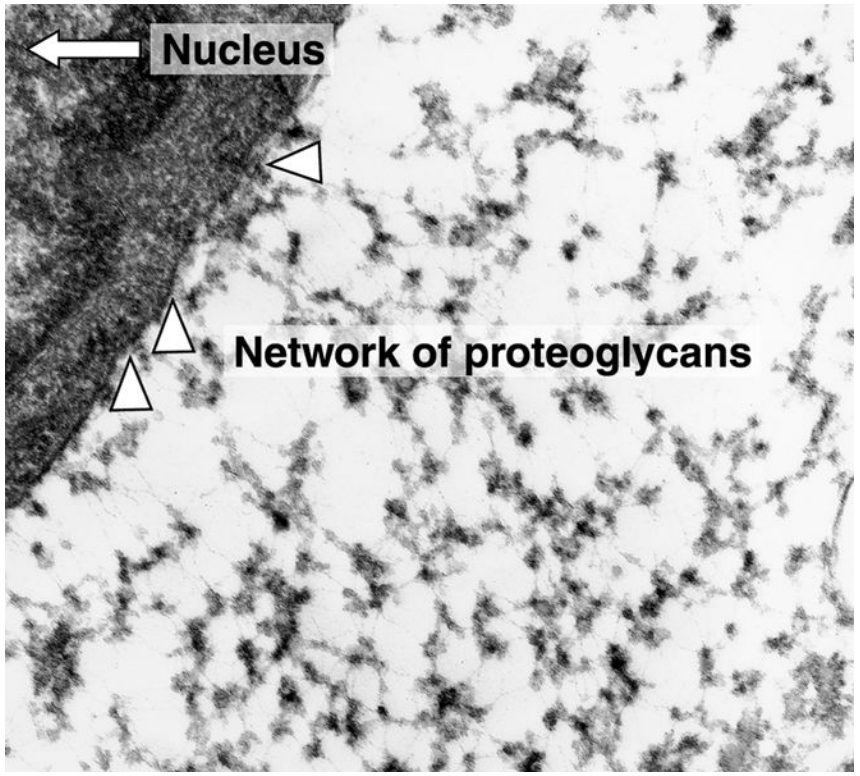


GROUND SUBSTANCE

- **Staining:**
  - Toluidine blue → ***purple*** (metachromatic).
  - PAS → ***red.***
  - Silver → ***brown.***
- **Functions:**
  - Medium for passage of nutrients, gasses & wastes between blood and cells.
  - Bond cells & fibers together.
  - Physical barrier preventing spread of microbes.

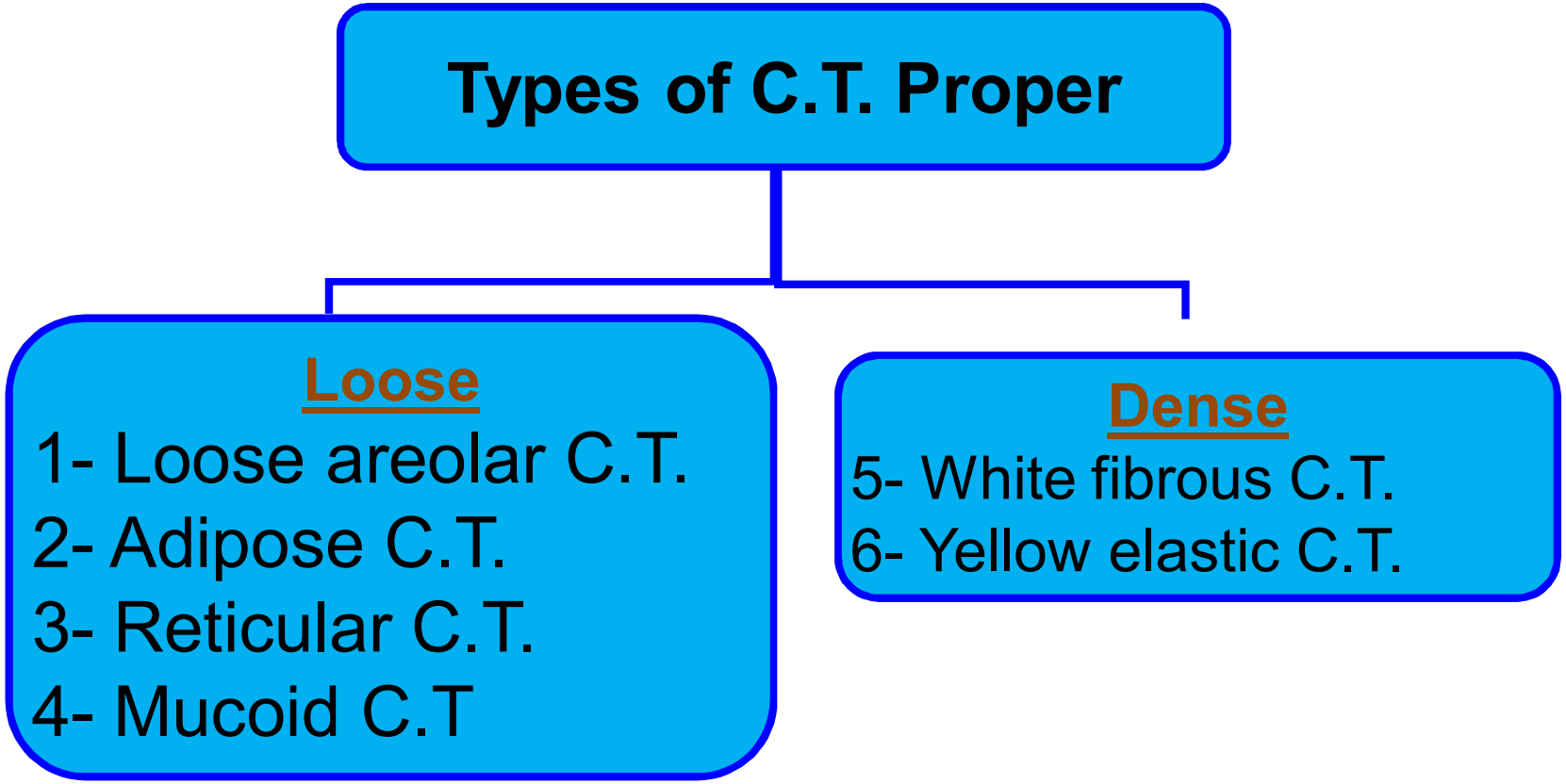
Staining of matrix

- **Toluidine blue----- *purple.***
- **PAS------*red.***
- **Ag-------*brown.***



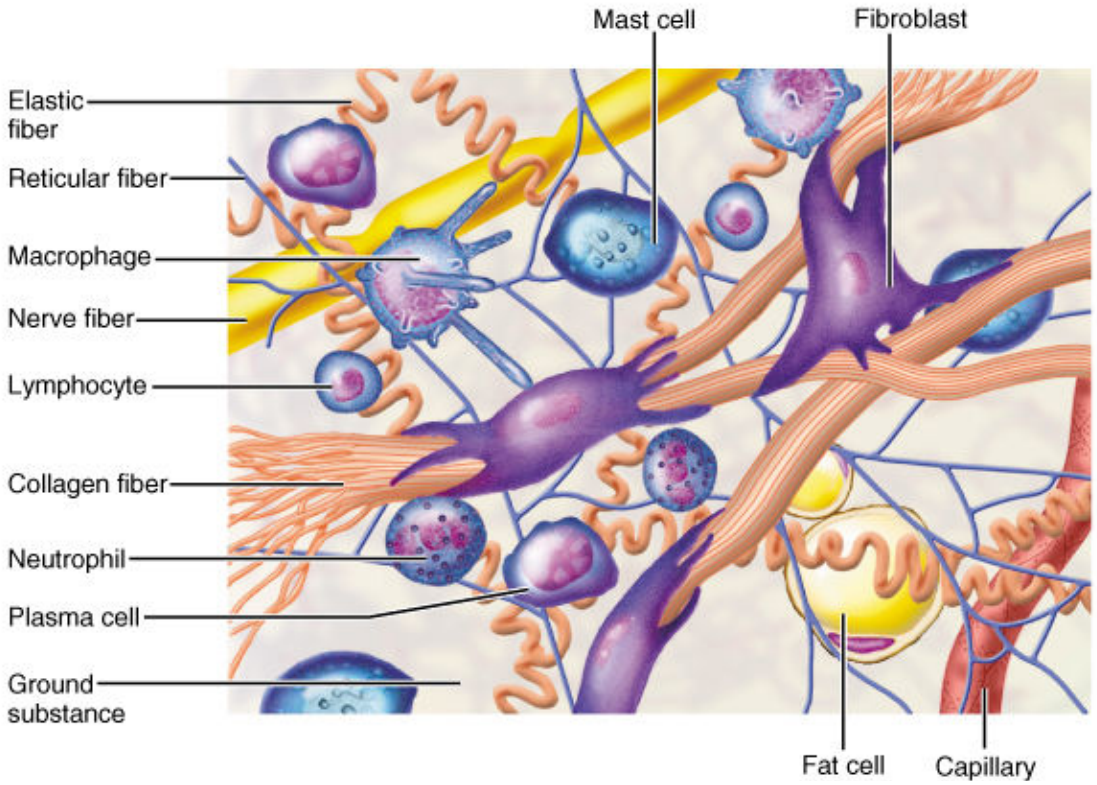
TYPES OF C.T. PROPER

- Classified according to the relative abundance of the basic components.



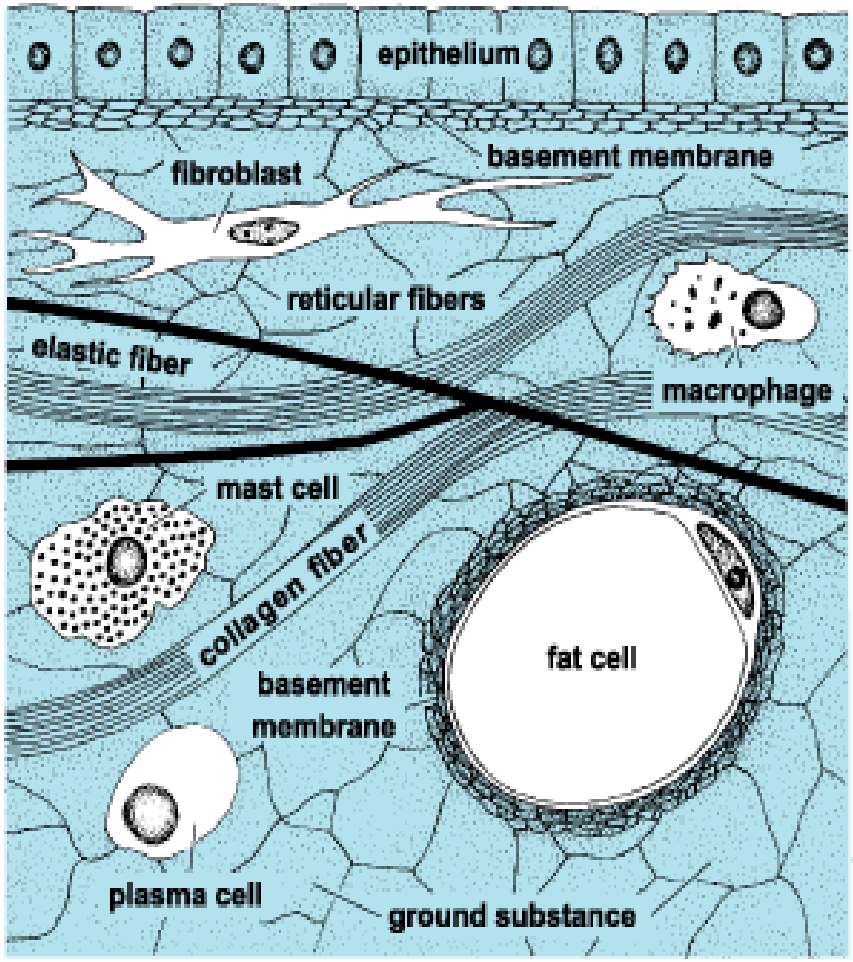
1- Areolar Connective Tissue

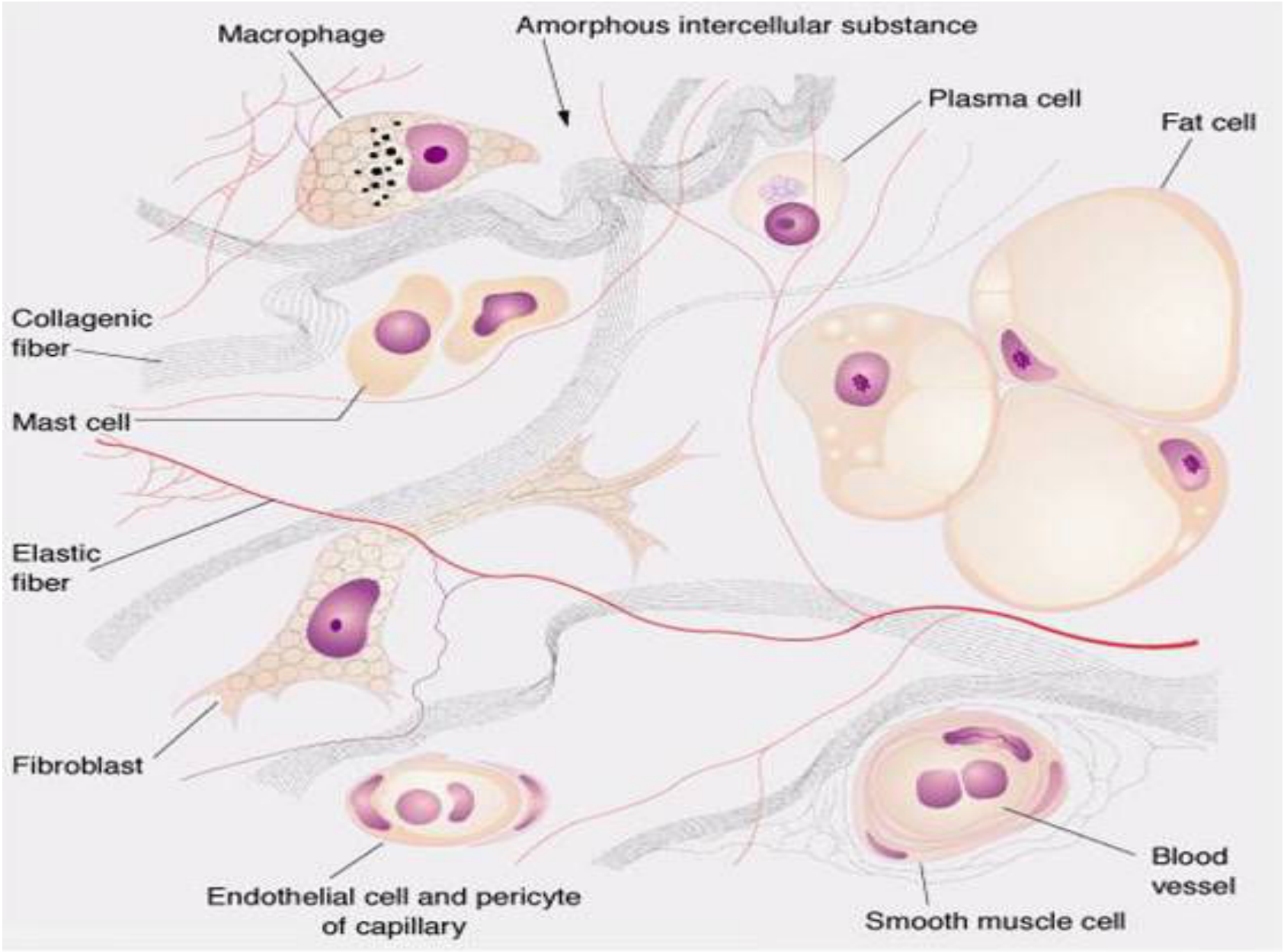
- ***Most common*** type.
- Contains potential spaces (areolae).
- Contains ***all types*** of C.T. cells & fibres + abundant matrix.
- **Sites*: everywhere*** (except CNS), e.g.
  - dermis of skin
  - adventitia of BVs
  - submucosa of GIT
  - serous membranes.



Functions:

1- Nourishes surrounding structures.
2- Binds structures together.
3- Limits spread of infection.

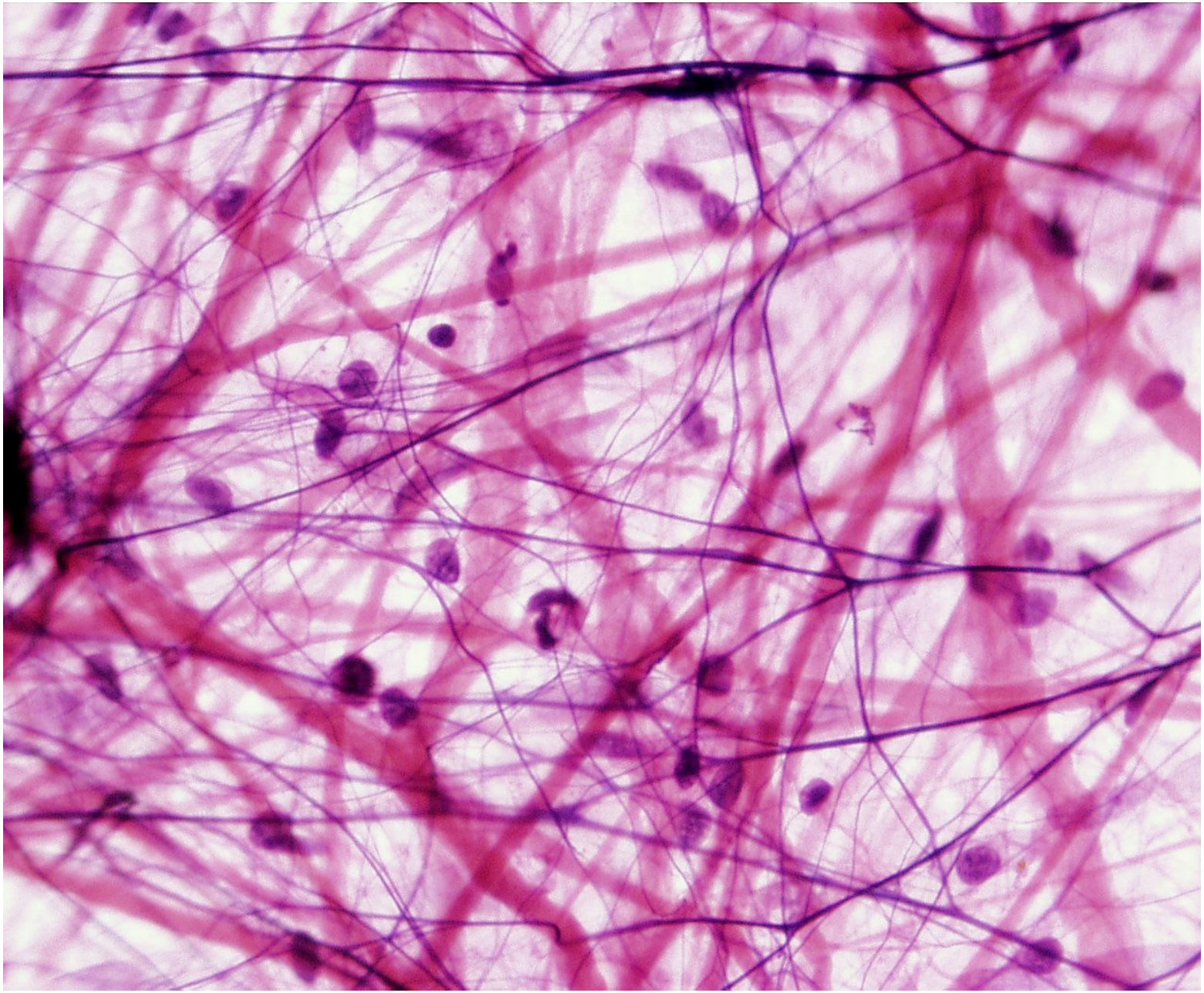

epithelium
basement membrane
fibroblast
reticular fibers
elastic fiber
macrophage
mast cell
collagen fiber
fat cell
basement membrane
plasma cell
ground substance


Macrophage
Amorphous intercellular substance
Plasma cell
Fat cell
Collagenic fiber
Mast cell
Elastic fiber
Fibroblast
Endothelial cell and pericyte of capillary
Blood vessel
Smooth muscle cell

Areolar Tissue

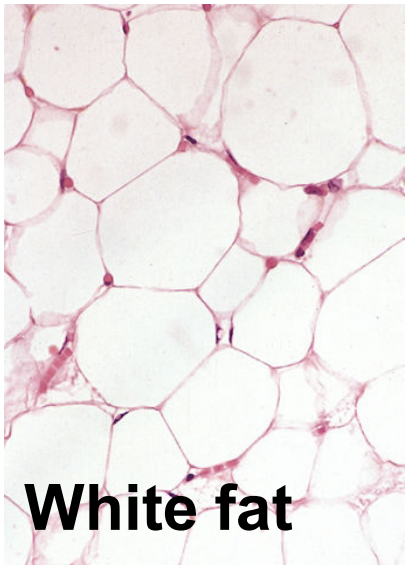
Pink = collagen

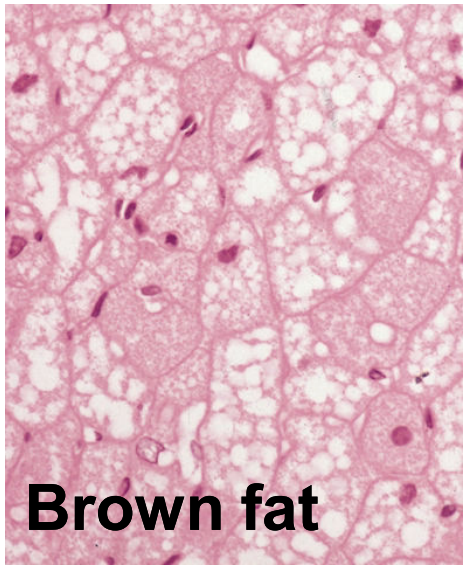
Purple = elastin

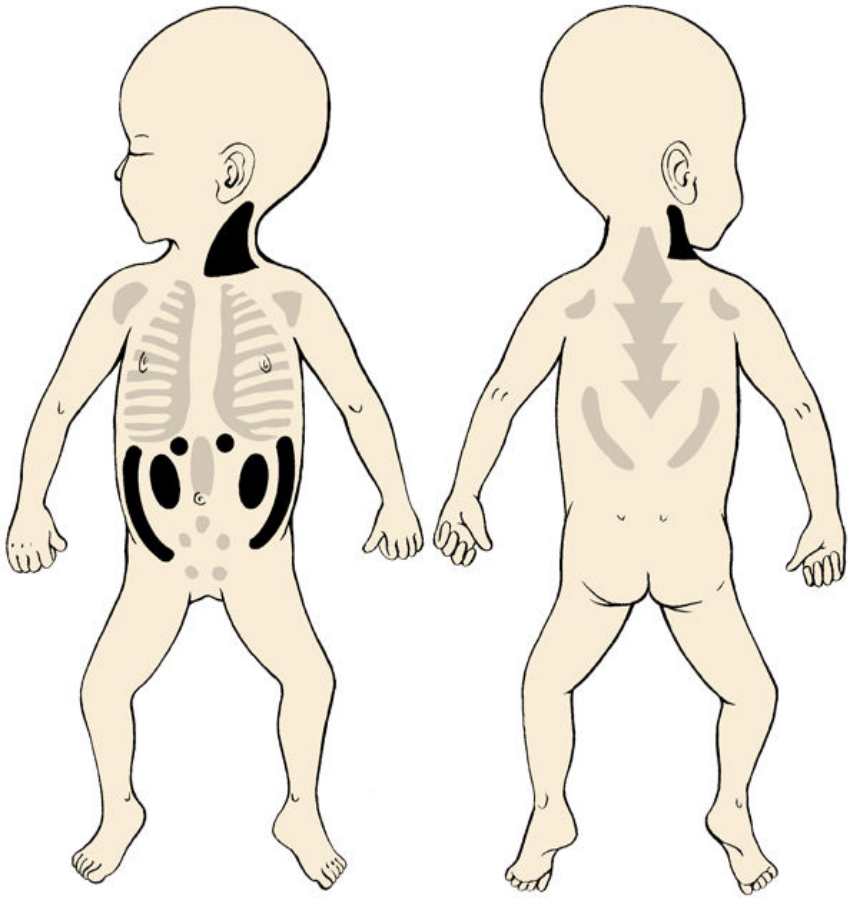


2- Adipose Connective Tissue

- Fat cells predominate.
- Consists of groups (lobules) of fat cells, separated by septa of areolar C.T.
- Fat cells stain ***orange*** by Sudan III.
- Fat cells are large, each contains one or many fat droplets.
- **2 types**: white & brown.

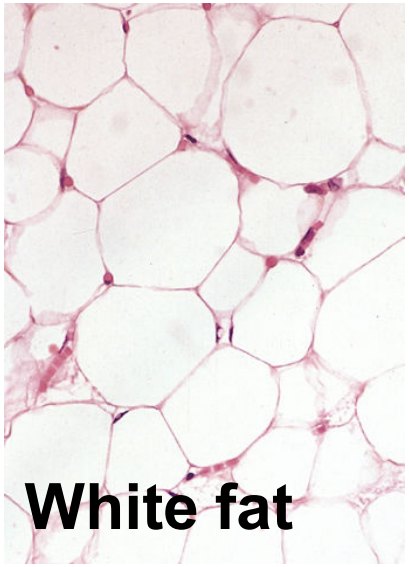


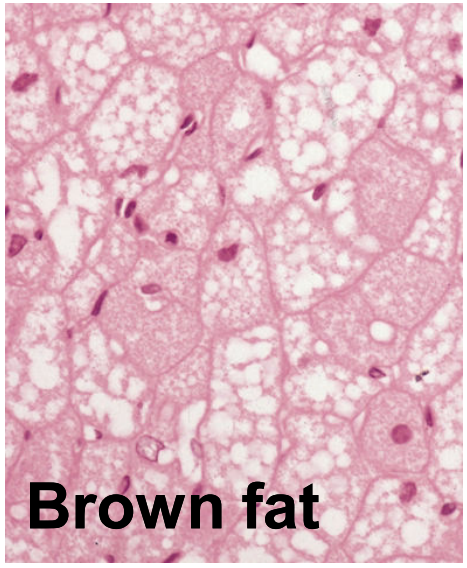




Adipose Connective Tissue

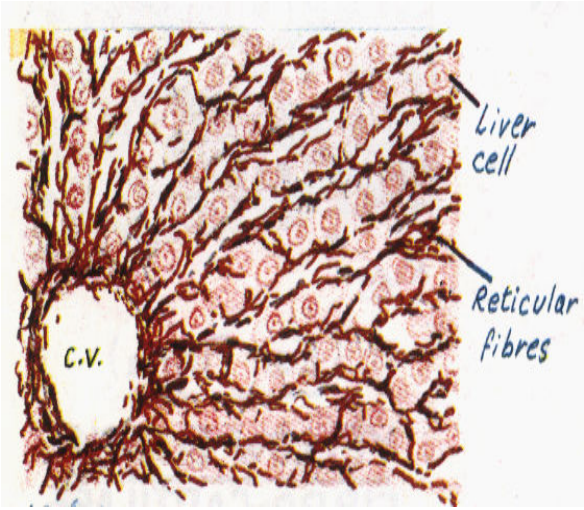
White Fat	Brown Fat
Fat cells are large. Single large fat droplet. Fat is not pigmented. Poor blood supply. Affected by diet.	Smaller fat cells. Many small fat droplets. Fat is pigmented. Rich blood supply. Not affected by diet.
Subcutaneous tissue; mammary gland, gluteal region. Renal pad of fat.	Around thoracic aorta. Between the scapulae.
Stores fat. Heat insulator. Supports soft organs. Gives body its contour.	Heat generator esp. in newly born: releases heat to warm the body.

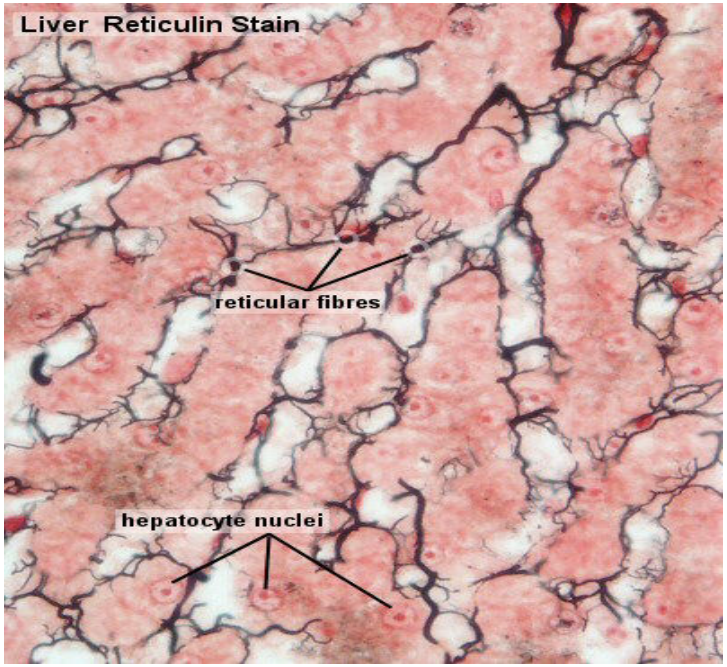

White fat


Brown fat

3- Reticular Connective Tissue

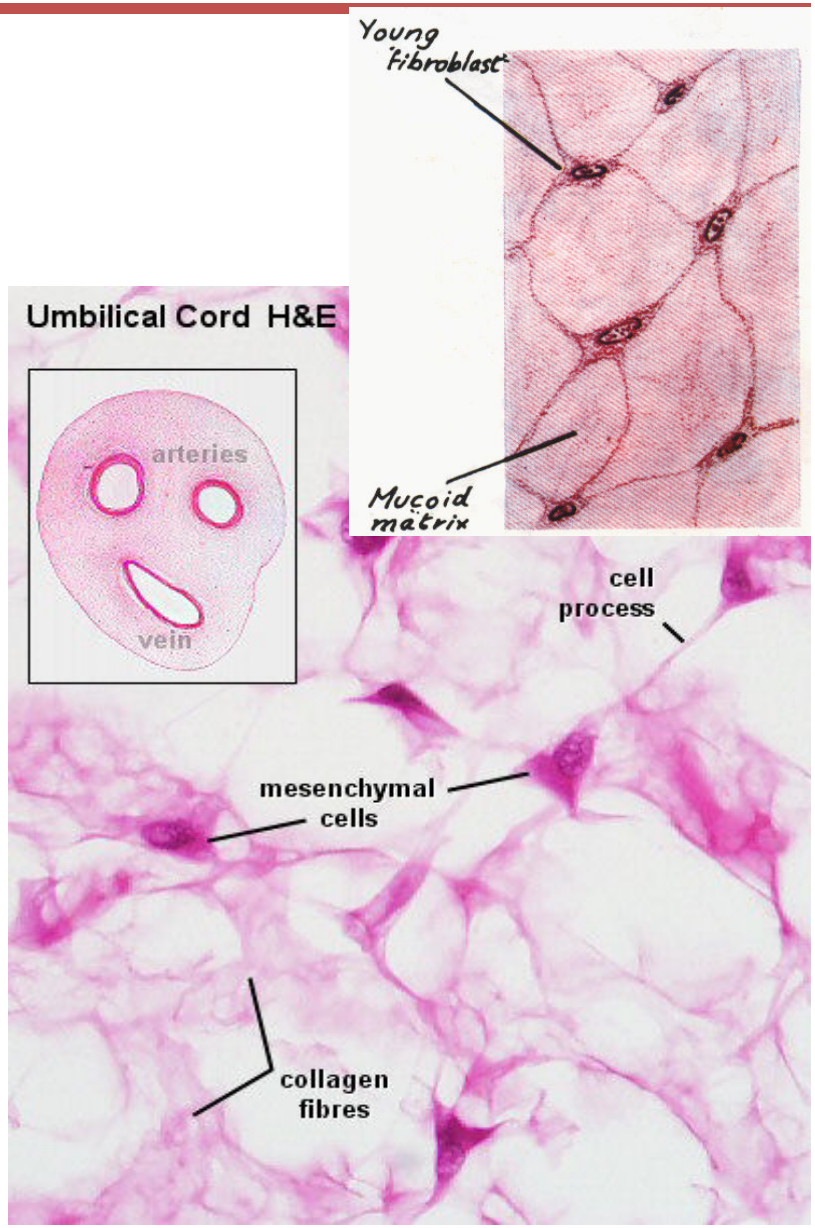
- Reticular fibres predominate.
- Consists of a network of reticular cells & reticular fibres. The fibres are argyrophilic.
- **Sites:**
  - Stroma of all organs e.g. bone marrow, spleen, liver, lymph nodes.





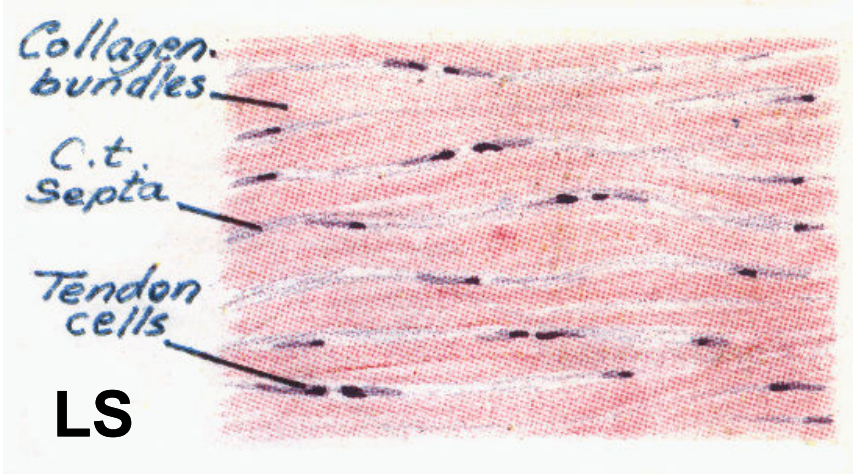
4- Mucoid Connective Tissue

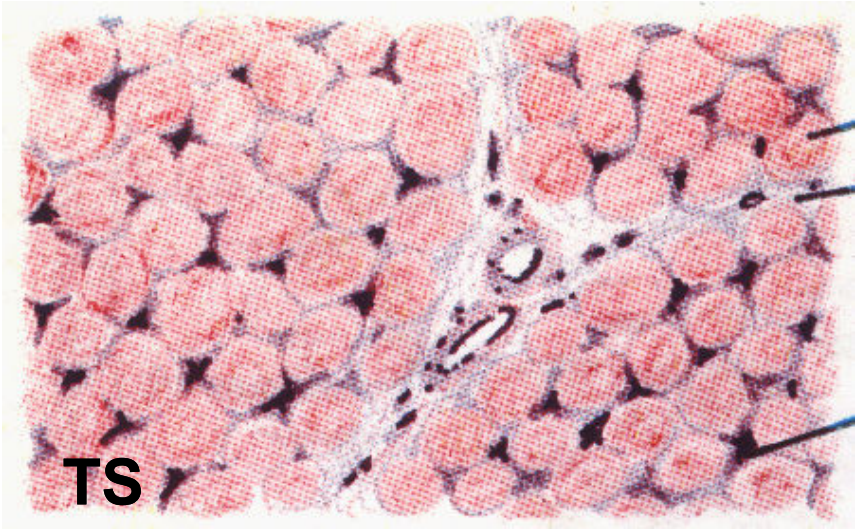
- Embryonic jelly like ,in which ground substance predominate.
- Mesenchymal cells.
- Few collagen & reticular Fibers.
- Large amount of soft ,jelly-like matrix, rich in mucus & hyaluronic acid.
- Sites: Umbilical cord (Wharton s Jelly).



White Fibrous Connective Tissue

- Collagenous fibres predominate.
- Bundles of collagen fibres + fibroblasts (tendon cells) + little matrix.
- Tough tissue; resistant to stretch.
- **Sites:** (needing toughness)
  - **Regular type:**
  - **Irregular type**:.





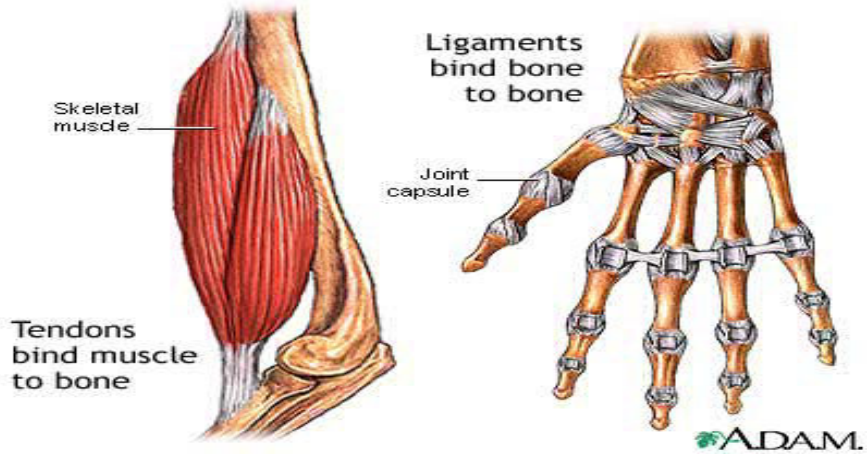
Types of white fibrous connective tissue:

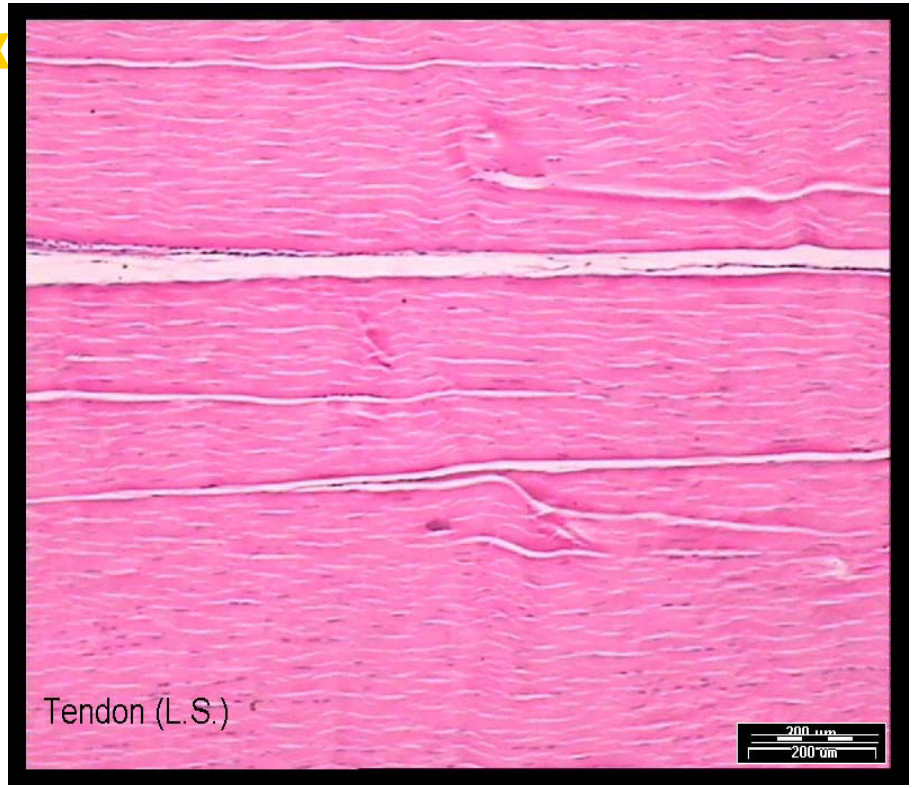
a) ***Regular type:***

Bundles of collagen arranged parallel. Fibroblasts (tendon cells) are arranged between bundles with minimal matrix

Sites: Present in the tendons of skeletal muscle and cornea.

Functions: Withstand stretch in one direction & for transparency

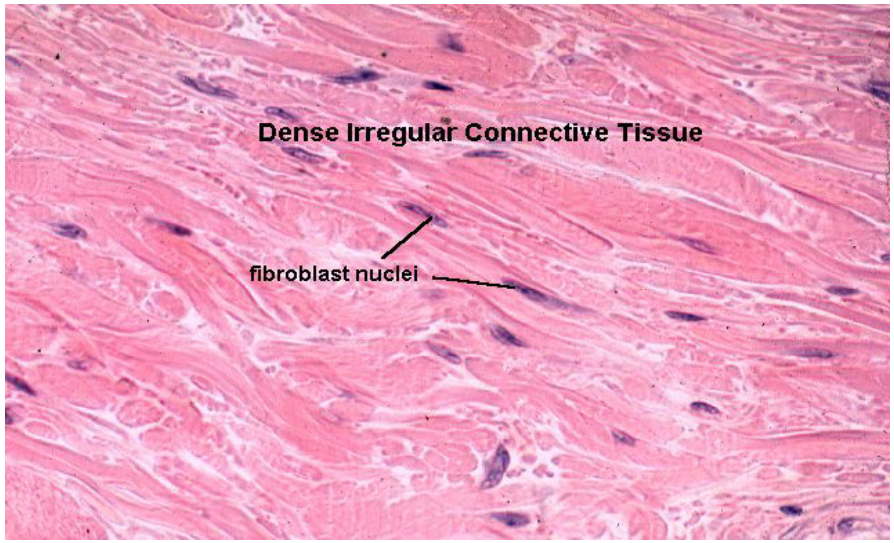




Types of white fibrous connective tissue

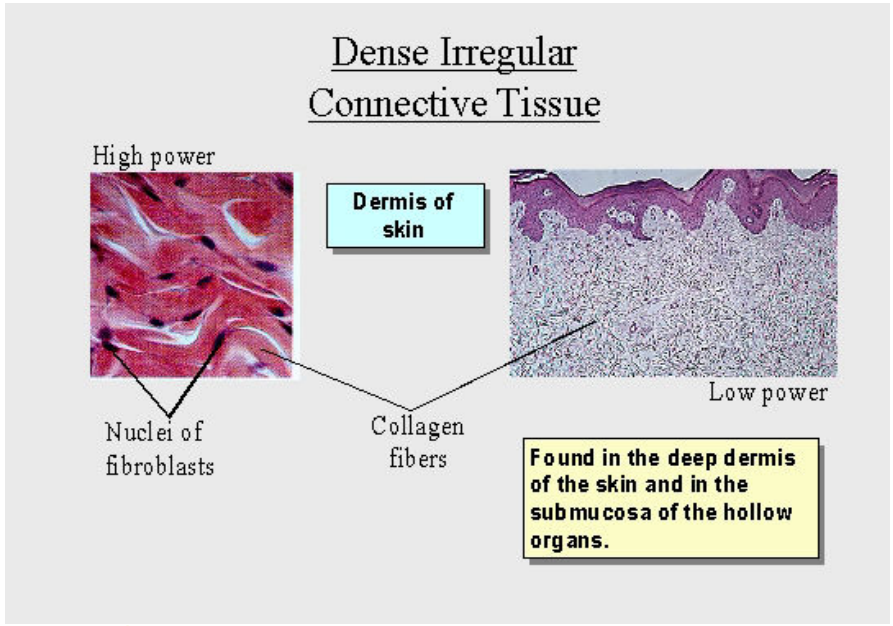
b) Irregular type:

The bundles of collagen fibers irregularly arranged.



Sites:

1. Dermis of the skin.
2. Capsule of the organs.
3. Periosteum & perichondrium.
4. Sclera of the eye.

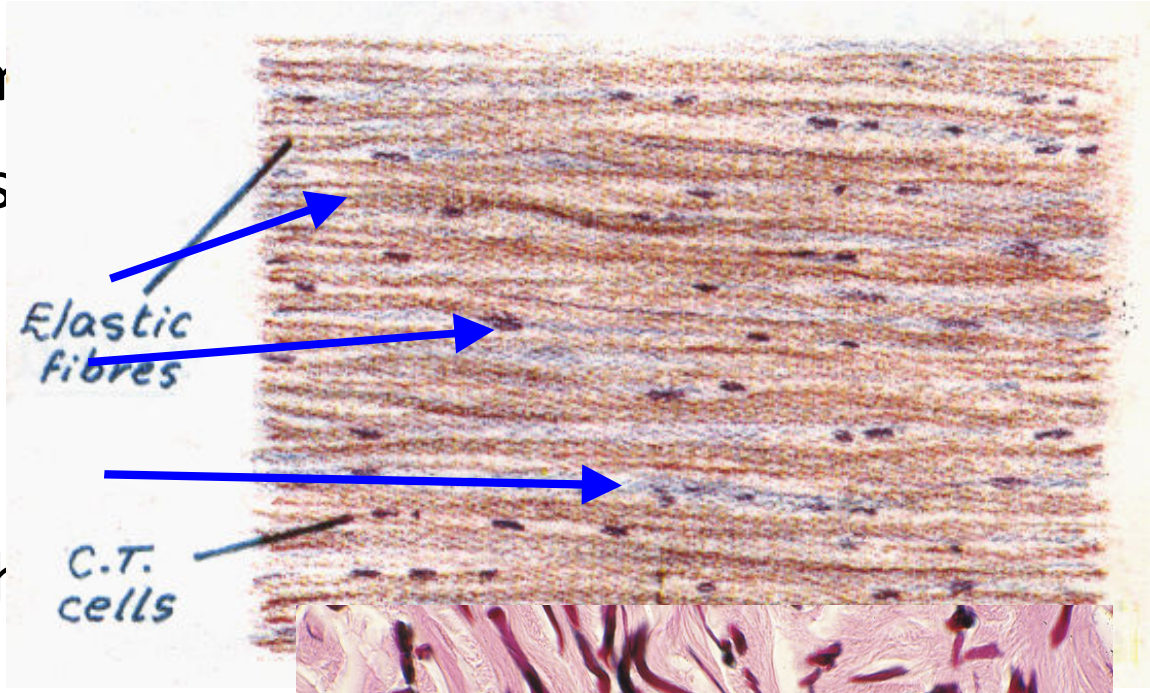


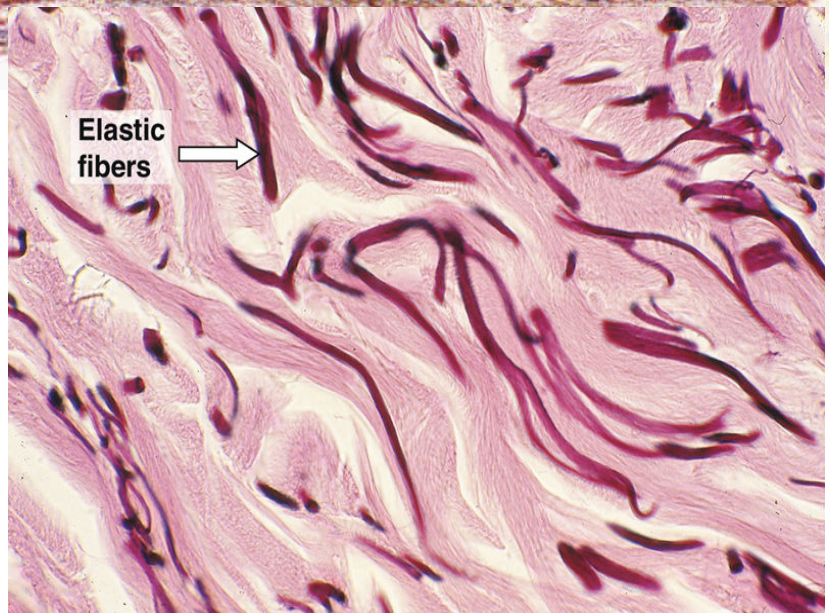
Functions:

Withstand stretch in different directions

Yellow Elastic Connective Tissue

- Elastic fibres predon
- Parallel elastic fibers
  + few fibroblasts
  + little matrix.
- Orcein → ***brown.***
- Elastic tissue; stretch
- **Sites:** (needing elasticity)
  - Aorta & large arteries.
  - Bronchial tree & alveoli.
  - ligamentum flavum & ligamentum nuchae.





Functions of Connective Tissue

1. Supports, Binds & Connects other tissues and organs.
2. Nourishes the surrounding structures, through its blood vessels.
3. Its Cells provide healing of injured tissues, secrete heparin, histamine & antibodies, store fat & preserve body temperature and defend the body against microorganisms.
4. Fibers provide rigidity or elasticity.


Thank you