Connective Tissue
Lec . 5

Second year

Histology

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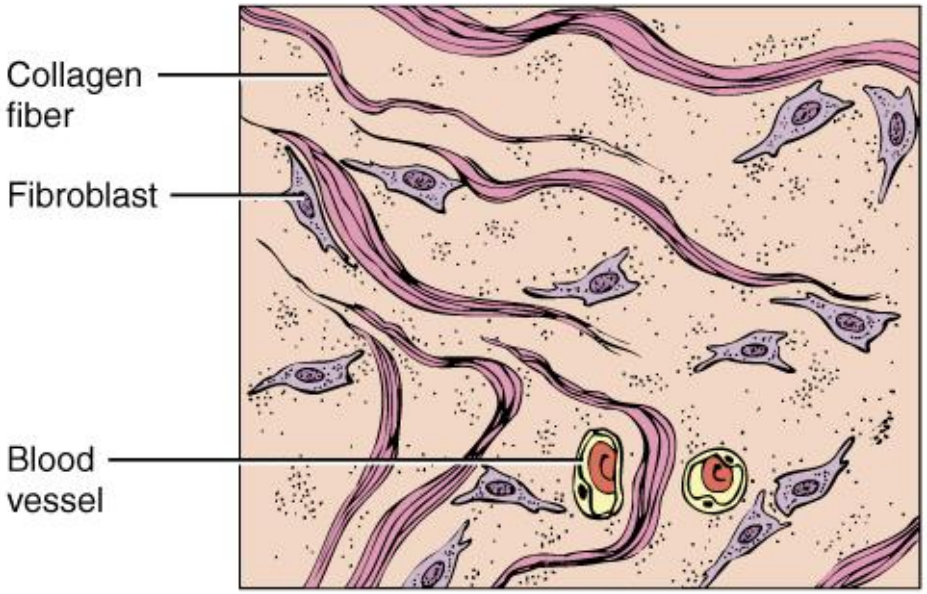
Dense Connective Tissue:

2. Dense Irregular CT

- consists of randomly-arranged collagen fibers and a few fibroblasts
- Found in dermis of skin, joint capsules, and heart valves
- Function = provide strength



Dense irregular connective tissue

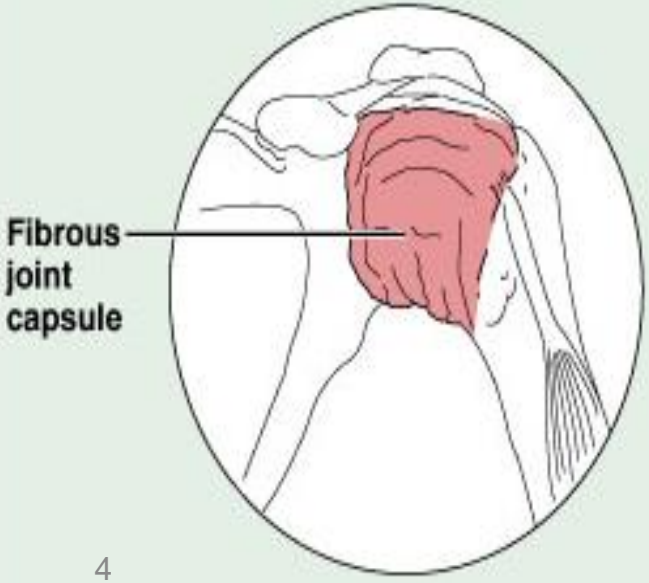
Part 3: Slide 9

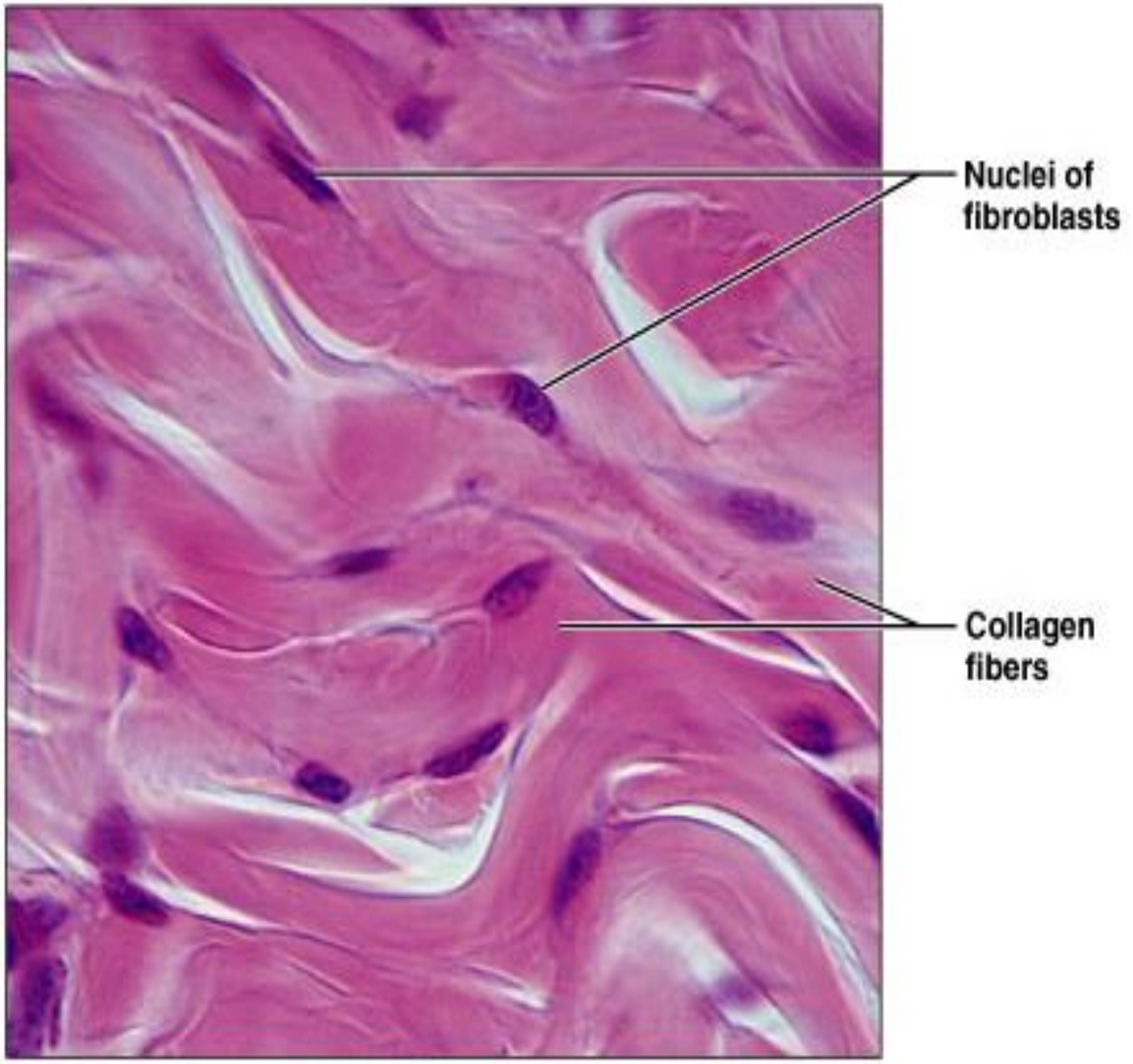
(e) Connective tissue proper: dense connective tissue, dense irregular

Description: Primarily irregularly arranged collagen fibers; some elastic fibers; major cell type is the fibroblast.

Function: Able to withstand tension exerted in many directions; provides structural strength.

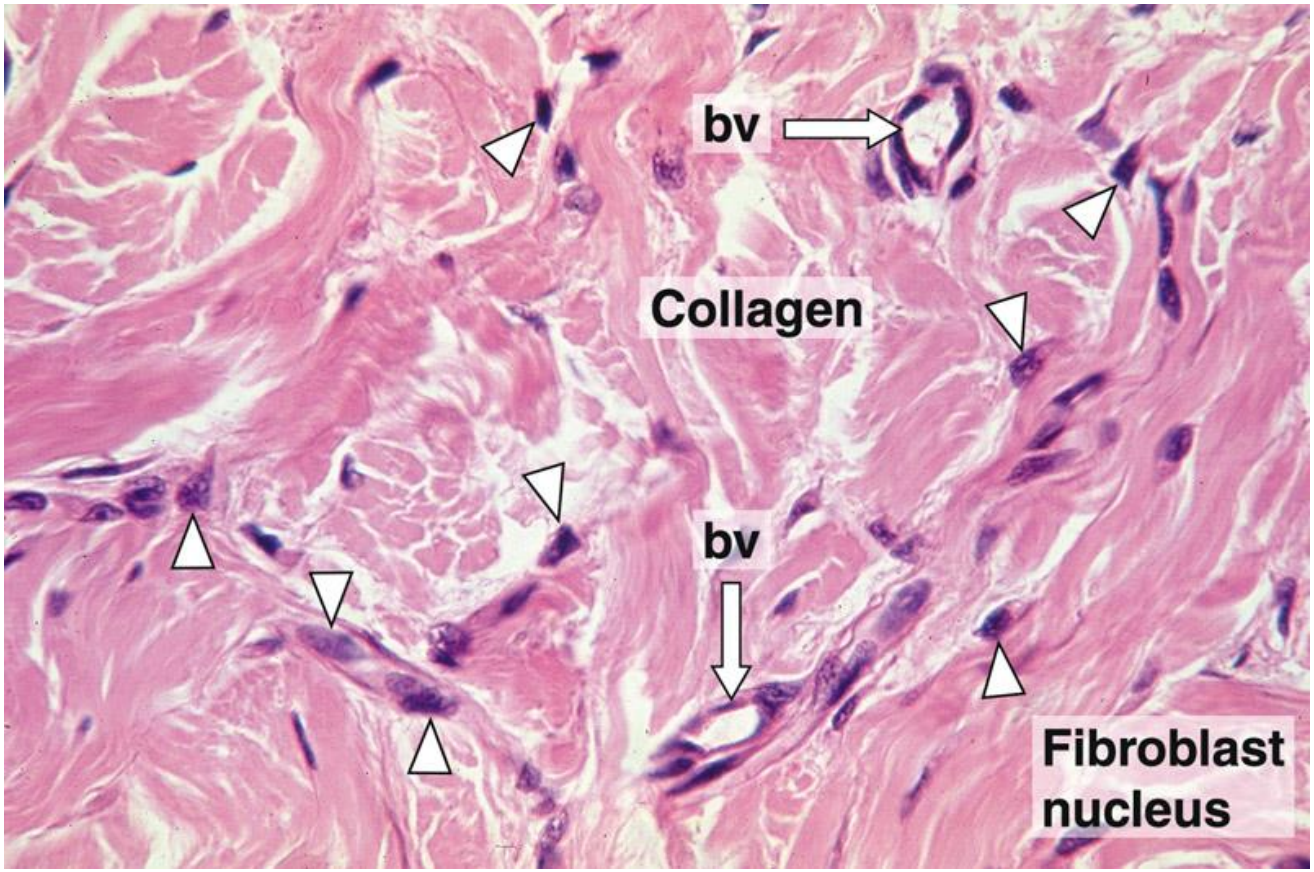
Location: Dermis of the skin; submucosa of digestive tract; fibrous capsules of organs and of joints.





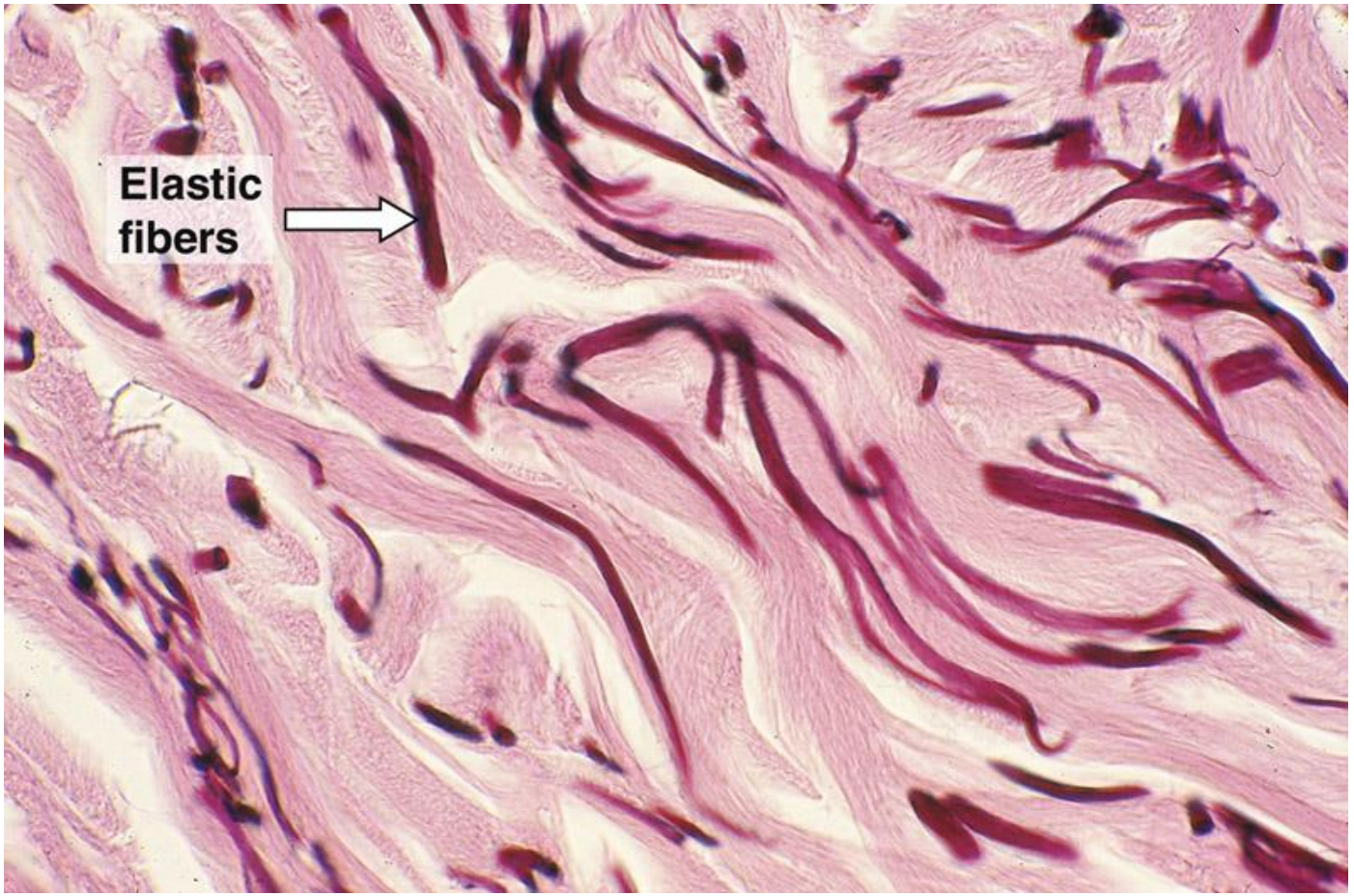
Photomicrograph: Dense irregular connective tissue from the dermis of the skin (400×).

Dense irregular connective tissue



Dense irregular connective tissue from human dermis contains thick bundles of collagen fibers, fibroblast nuclei (arrowheads), and a few small blood vessels (bv). H&E stain. Medium magnification.

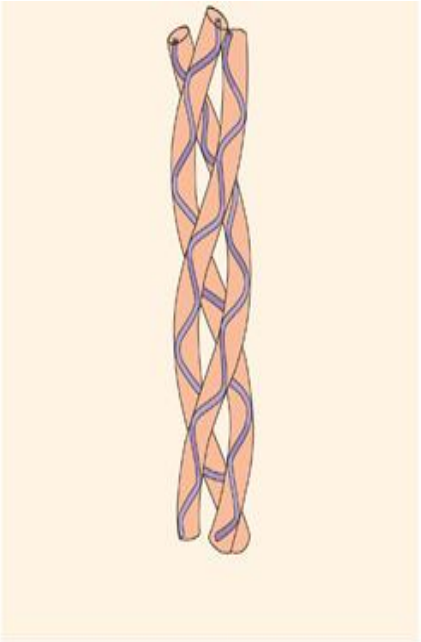
Dense irregular connective tissue

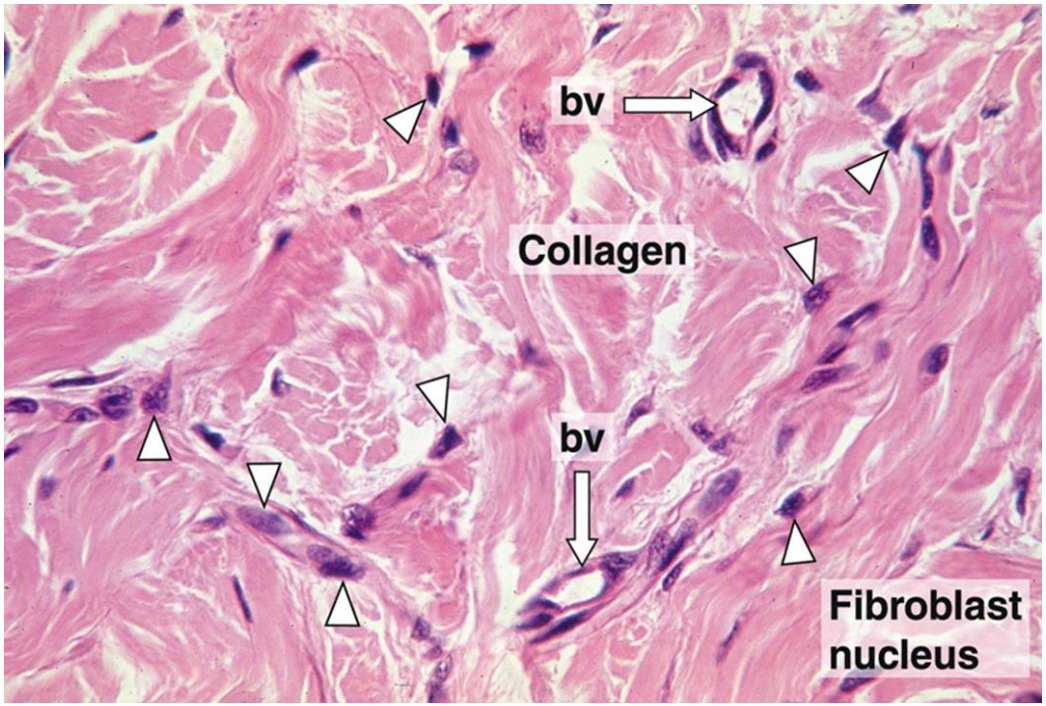


Skin dermis, selectively stained for elastic fibers. Dark elastic fibers are interspersed with pale red collagen fibers. The elastic fibers are responsible for skin's elasticity. Medium magnification.

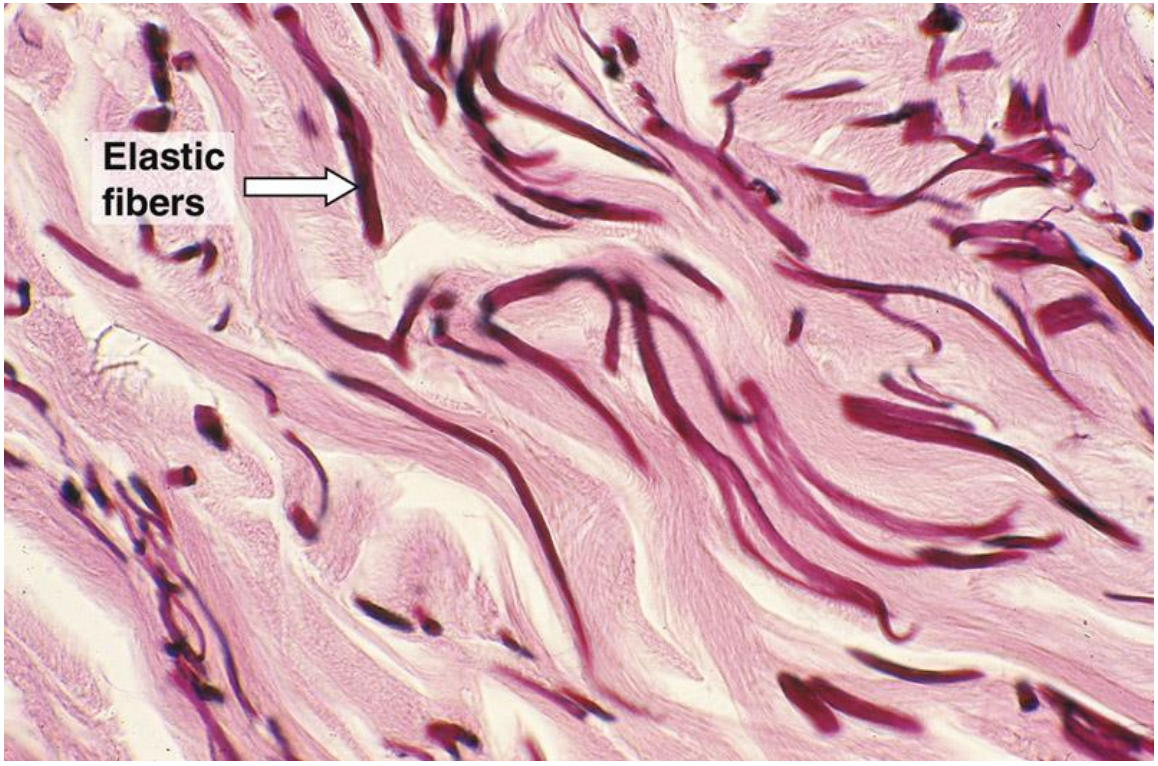
Matrix Fibers

<u>Collagen Fibers</u>: Large fibers made of the protein collagen and are typically the most abundant fibers. fibrous proteins that do not branch . Gives varying degrees of rigidity, elasticity and strength. Chief examples are present in the skin, bone, cartilage, smooth muscles and basal lamina, tendons, and ligaments.

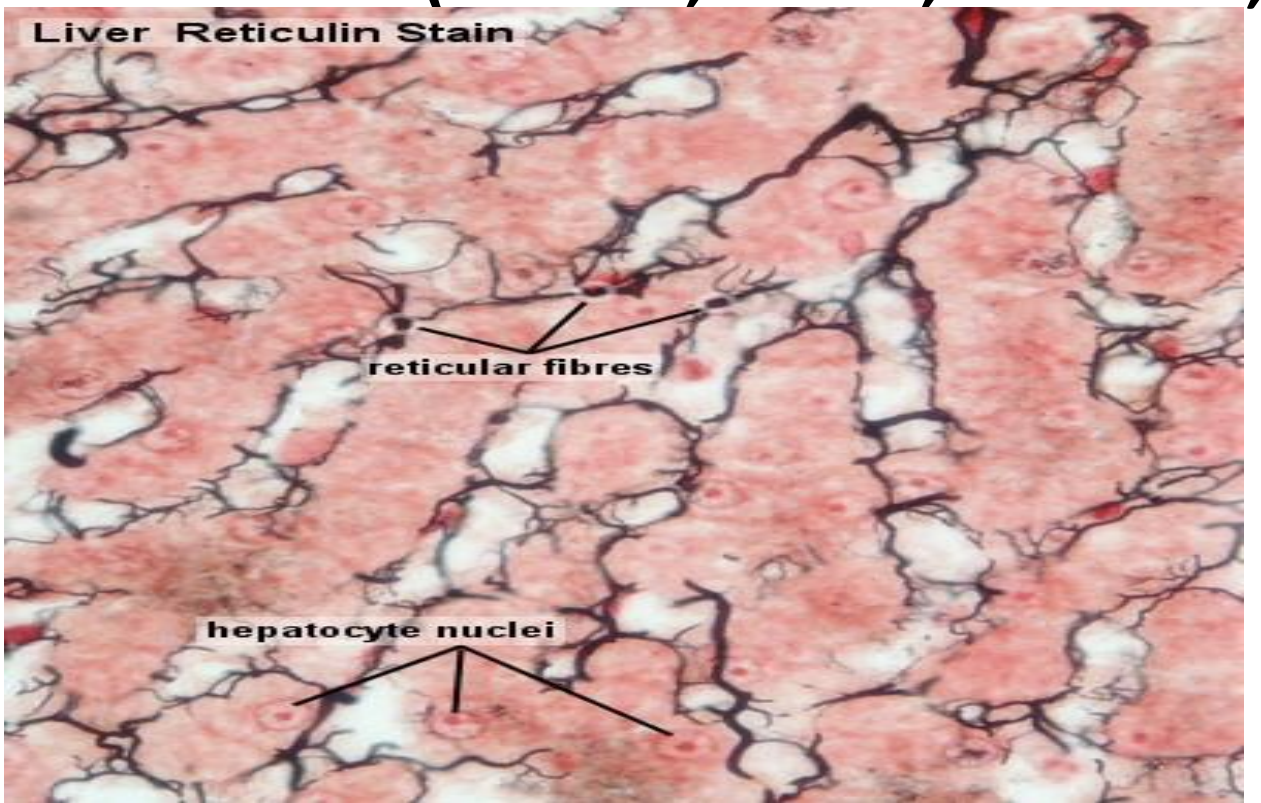




- **<u>Elastic Fibers</u>: Intermediate fibers made of the protein elastin. Branching fibers that allow for stretch and recoil.**
- **Less tensile strength than collagen fibers.**
- **- Found in abundance in the lungs, bladder and skin, also found in walls of aorta and pulmonary trunk.**



- **<u>Reticular Fibers</u>: Small delicate, branched fibers that have same chemical composition of collagen. Forms structural framework for organs such as spleen and lymph nodes, red bone marrow.**
- **Reticular fibers are extremely thin fibers. Creating flexible networks in the above organs, and others that are subject to changes in form or volume (arteries, uterus, intestinal, muscle layers).**



Ground substance

- - **Fills the space between cells and fibers of connective tissue.**
- **- Because it is viscous acts as both lubricant and barrier to the penetration of invaders.**
- **- Allows diffusion of molecules and oxygen between blood and tissues.**
- **- Participate in adhesion of epithelial cells to the basal lamina.**

Connective Tissue Cells

Connective tissue cells are usually divided into two groups based on their ability to move within the connective tissue.

A. *Fixed cells:*

- **Fibrocytes (or fibroblasts) .**
- **Adipocytes [Fat cells] are *fixed cells*.**

B. *Wandering cells*:

- **Macrophages, monocytes.**
- **Lymphocytes, plasma cells.**
- **Eosinophils and mast cells. *wandering cells*.**

Fibroblast

Fat globule

Adipose cell

Plasma cell

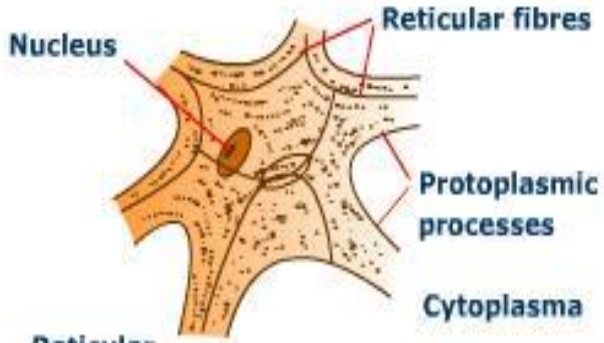
Mast cell

Macrophage or histocyte

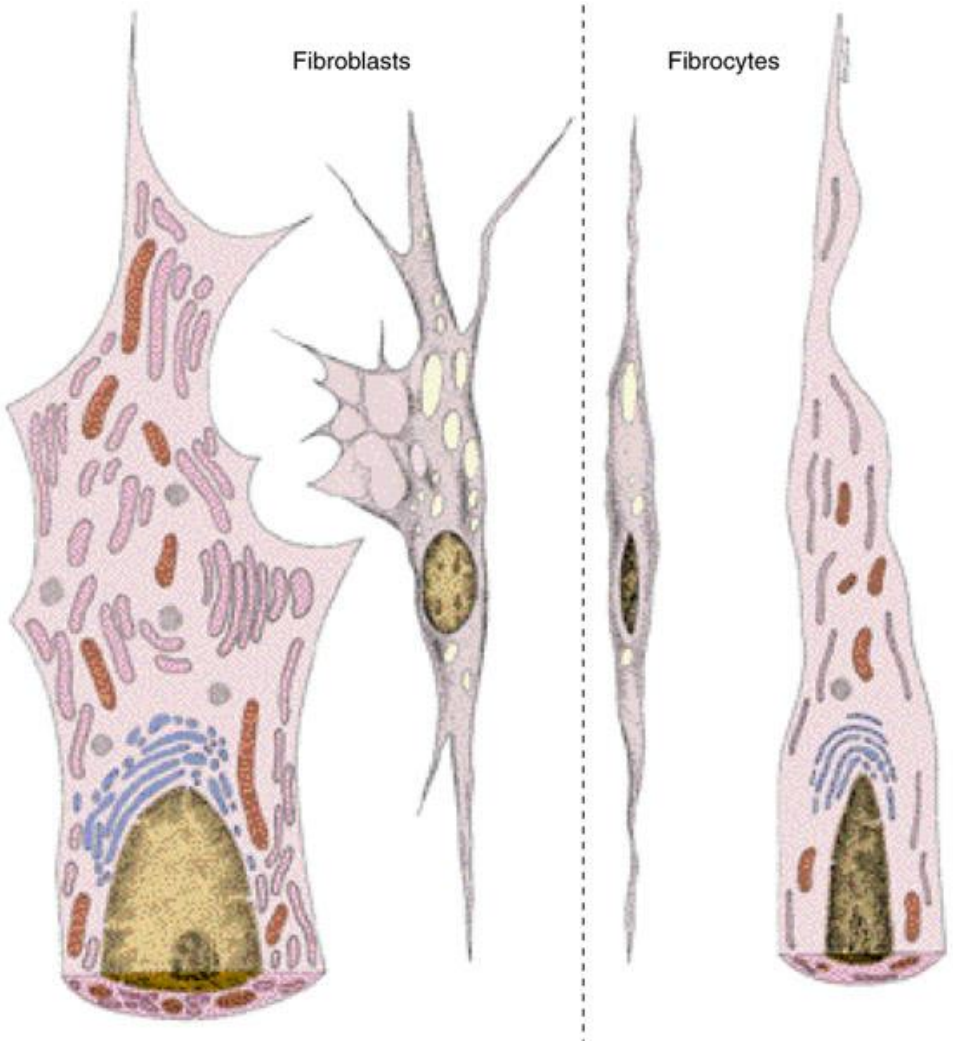
Lymphocyte

Mesenchyme cell

Chromatophore



- Fibroblasts: Secrete both fibers and ground substance of the matrix (fixed)
- Macrophages: Phagocytes that develop from Monocytes (wandering or fixed)
- Plasma Cells: Antibody secreting cells that develop from B Lymphocytes (wandering)
- Mast Cells: Produce histamine that help dilate small blood vessels in reaction to injury (wandering)
- Adipocytes: Fat cells that store triglycerides, support, protect and insulate (fixed)



Active (left) and quiescent (right) fibroblasts. External morphologic characteristics and Ultrastructure of each cell are shown. Fibroblasts that are actively engaged in synthesis are richer in mitochondria, lipid droplets, Golgi complex, and rough endoplasmic reticulum than are quiescent fibroblasts (Fibrocytes).