Connective Tissue-1

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Introduction

Connective tissue provides a matrix that supports and physically connects other tissues and cells together to form the organs of the body.

Unlike the other tissue types (epithelium, muscle, and nerve), which consist mainly of cells, the major constituent of connective tissue is the **extracellular matrix (ECM)**.

Extracellular matrices consist of different combinations of **protein fibers** (collagen and elastic fibers) and **ground substance.**

The variety of connective tissue types in the body reflects differences in composition and amount of the cells, fibers, and ground substance.

Components

Cells

Protein Fibers

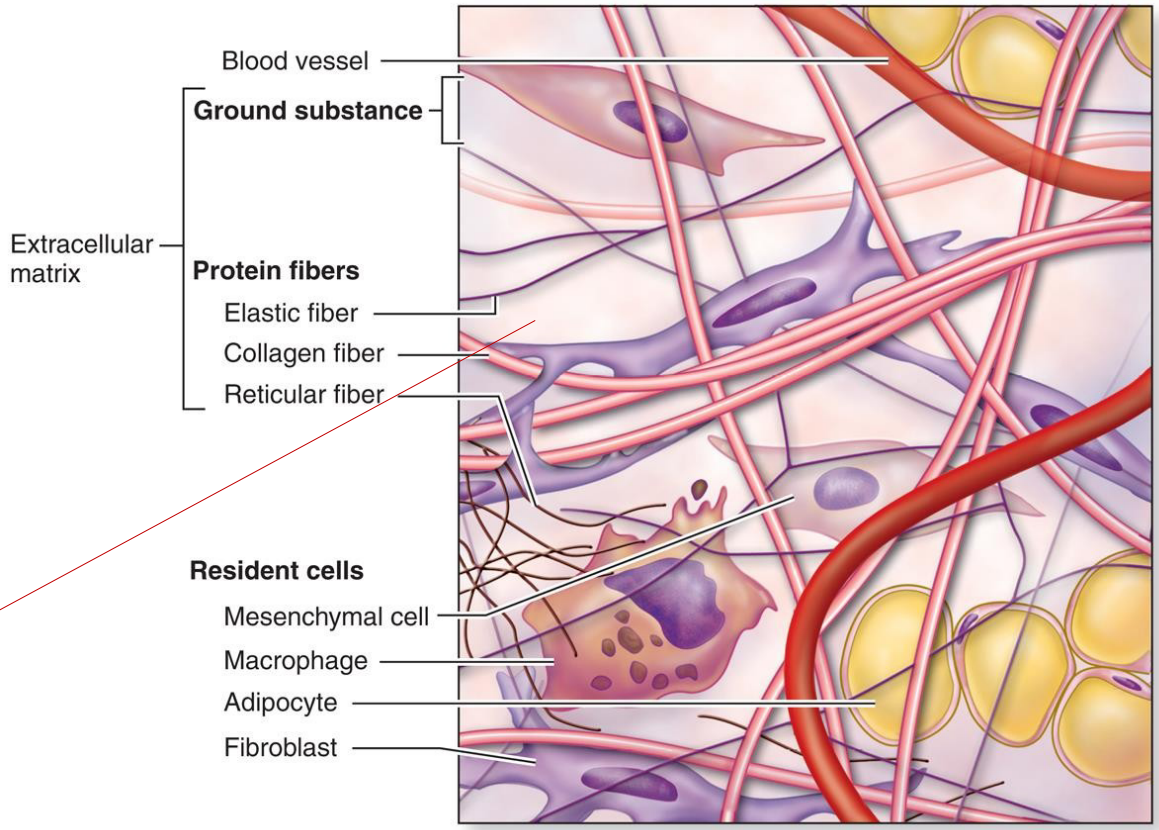
Ground Substance

Extracellular matrix **(secreted by cells)**

Fibers and cells are embedded within the ground substance.

Connective tissue is found in places where you need support & connection, for example: stroma that support organs, ligaments that connect bones in joints, tendons of muscles that connect them to bones.

This image represents components of connective tissue: cells, different types of fibers & ground substance.



This is the ground substance (not empty space).

Embryonic origin of connective tissue

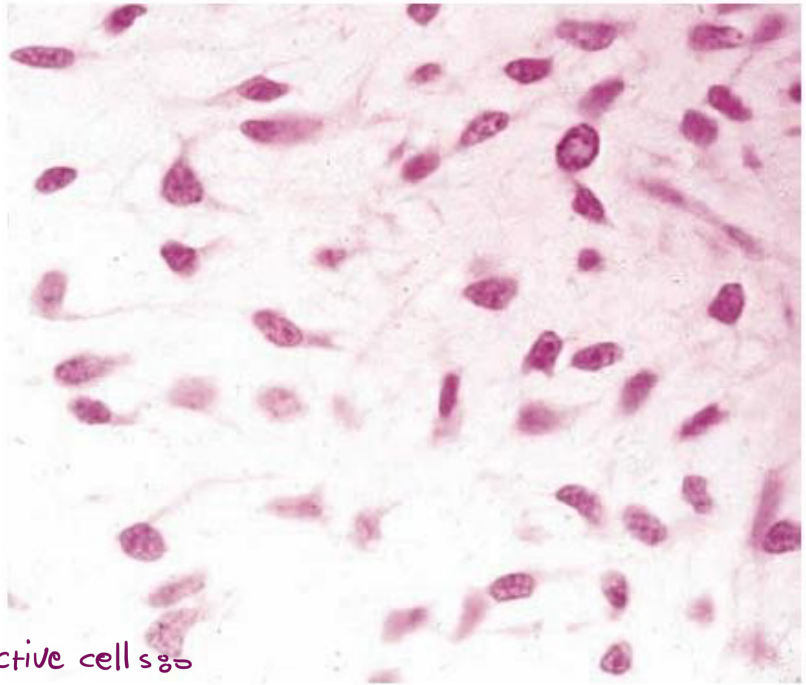
- All connective tissues originate from embryonic **mesenchyme**, a tissue developing mainly from the middle layer of the embryo, the mesoderm
- Mesenchyme consists largely of viscous ground substance with few collagen fibers
- **Mesenchymal cells** are undifferentiated and have large nuclei, with prominent nucleoli and fine chromatin.

In early embryonic stages, the embryo can be described as 3 intersecting layers, the outer one is the ectoderm, and it is the origin for skin and structures such as hair, nails…
The internal layer, the endoderm, is the origin for many of the inner linings of the body including the lining of most of the gastrointestinal tract, and other glands that open into the gastrointestinal tract , and inner structures.
The middle layer, the mesoderm, is the origin for the rest of structures (blood, bone, muscle…). It is the embryonic origin for connective tissue (unlike epithelium which takes origin from all 3 layers).

Mesenchyme consists of a population of undifferentiated cells, generally elongated but with many shapes, having large euchromatic nuclei and prominent nucleoli **(for ribosome assembly)** that indicate high levels of synthetic activity **(you will also notice they have diffused chromatin –for RNA transcription)**

These cells are called **mesenchymal cells.**

Mesenchymal cells are surrounded by an ECM that they produced and that consists largely of a simple ground substance rich in hyaluronan (hyaluronic acid), but with very little collagen



Active cells
- Big nucleus
- euchromatin

this is what we can distinguish from this picture

note:
the cytoplasm is Pinkish Because the cell is active and Produce Protiens.

Cells of Connective Tissue

-blast: means active (young)
-cyte: means inactive (old)

Permanent (resident) cells

Fibroblasts (the main cells responsible for producing fibers)

Adipocytes

Macrophages (resident immune cells)

Transient (temporary) cells (they circulate within the bloodstream & go into an area where they are needed where they perform various functions in connective tissue for a short period as needed and then die by apoptosis or return to the blood stream)

Mast cells

Leukocytes (white blood cells)

Plasma cells

These are types of Immune cells.