CONNECTIVE TISSUE PROPER

Dr. Larry Johnson

Mesenchyme connective tissue
Slide 39

Adipose connective tissue
Slide 38b

Loose connective tissue
Slide 61

Reticular connective tissue
Slide 45

Dense connective tissue
Slide 15

Elastic connective tissue
Slide 28

Mucus connective tissue
Slide 87
Objectives

• Describe each type of connective tissue (CT) and explain where they are found.

• List the types of cells, fibers, and other extracellular matrix components found in connective tissues.

• Relate the functions of each connective tissue to their structural organization.
FUNCTION OF CT

MECHANICAL SUPPORT – STROMA BELOW EPITHELIUM

METABOLITE EXCHANGE - VASCULAR BEDS

ENERGY STORAGE - ADIPOSE TISSUE

INFLAMMATION - SITE OF ACTION FOR BLOOD BORNE IMMUNE CELLS

FIBROSIS - WOUND HEALING - OVER-PRODUCTION OF COLLAGEN
CONNECTIVE TISSUE

Connective tissue proper

Loose (areolar)

Dense

Regular

Irregular

Connective tissue with special properties

Adipose tissue (Chapter 6)

Elastic tissue

Hematopoietic (lymphatic and myeloid) tissue (Chapter 14)

Mucous tissue

Supporting connective tissues

Cartilage (Chapter 7)

Bone (Chapter 8)
Types of connective tissue

- Mesenchyme connective tissue  
  Slide 39

- Adipose connective tissue  
  Slide 38b

- Dense connective tissue  
  Slide 15

- Elastic connective tissue  
  Slide 28

- Loose connective tissue  
  Slide 61  
  Alternative slide 250

- Reticular connective tissue  
  Slide 45

- Mucus connective tissue  
  Slide 87
Slide 61: Terminal Ileum

Lamina propria consisting of loose connective tissue (more cells and less fibers)

Note the abundance of cells and low density of fibers in the lamina propria compared to this tendon (dense regular CT) which is mostly fibers and few cells.
CELLS OF CT (all from mesoderm)

FIBROBLASTS
MESENCHYMAL CELLS
ADIPOSE CELLS
MACROPHAGE
PLASMA CELLS
MAST CELLS
OTHERS
Slide 61: Terminal Ileum

- Eosinophils
- Fibroblasts
- Collagen Type I bundles
Slide 61: Terminal Ileum

- Lymphocytes
- Plasma cells
- Mast cell
Slide 40: Trachea

- Eosinophils
- Fibroblast
- Collagen Type I bundles
Slide 40: Trachea

- Lymphocyte
- Plasma cell
- Mast cell
Plasma cells are identified by their small, eccentrically placed nucleus with condensed, coarse chromatin clumps distributed peripherally in a characteristic radial pattern and one central mass. A prominent, clear area in the cytoplasm is adjacent to the nucleus.
EM 35 & 56

Fibroblasts & Collagen

F - Fibroblast
N - Nucleus
P - Processes
G - Golgi Apparatus
M - Mitochondria
rER - Rough ER

Cf - Bundles of Collagen fibrils
* - Transverse section
** - Longitudinal section
arrows - Banding
Slide 44: Lymph node

- Spleen
- Macrophage
- Lamina propria
Small intestinal villus

Macrophages in lamina propria
Function of macrophages

Macrophages are attracted to inflammation sites. They function to ingest bacteria, dead cells, cell debris, and other foreign matter. Macrophages also enhance the immunologic activities of lymphocytes by acting as antigen-presenting cells.
Slide 42: Lung (Cannon-Sampson stain for mast cells)
Epithelium is avascular and must get its nourishment (oxygen, nutrients, and metabolites) from that diffused through the blood capillaries located in the underlying connective tissue.
EXTRACELLULAR MATRIX - COLLAGEN SYNTHESIS BY FIBROBLASTS
EXTRACELLULAR MATRIX - TYPES OF COLLAGEN

FIBROUS

TYPE I - FIBER
FORMING – MOST CT

TYPE II - FIBRIL
FORMING
HYALINE CARTILAGE AND
VITREOUS BODY OF EYE

TYPE III - RETICULAR
NETWORK
BRANCHING

Type IV
Type III
Type I
EXTRACELLULAR MATRIX – **COLLAGEN (Type I)**

**GENERAL CHARACTERISTICS** – FLEXIBLE WITH HIGH TENSILE STRENGTH, CROSS-LINKING OF FIBRIL ADDS STABILITY, AND RESIST COLLAGENASE DIGESTION
Ground substance is rich in Hyaluronic acid, sulfated glycosaminoglycans, proteoglycans, glycoproteins, water, ions, metabolites, and regularity molecules.
The ground substance supports, surrounds, and binds all connective tissue cells and fibers. It facilitates the diffusion of oxygen, electrolytes, nutrients, fluids, metabolites, waste, and other water soluble molecules between connective tissue cells and blood vessels. The ground substance also acts as a barrier from pathogen invasion of the connective tissue.
Slide 47: Spleen

Dense irregular connective tissue capsule
Slide 15: Tendon

- Dense regular connective tissue
- Fibroblasts
- Collagen
Slide 45: Lymph node (reticular fiber stain)

- Reticular fibers
- Connective tissue capsule
- Lymphocyte cluster
The presence of elastic fibers in the aorta (and other large arteries) allows for stretching and recoiling of these vessels during powerful blood ejections from the heart ventricles.
Slide 33: Kidney (PAS stain)

- Ground substance
- Basement membrane
- Epithelial cells of tubules
Umbilical arteries and vein are more similar in wall structure than is typical because the pressure is low compared to an adult. In this absence of high pressure, arteries lack the thick walls seen in adults and resemble veins.
Adventitia or Serosa

Digestive organs (oral cavity or upper esophagus) that lie outside the peritoneal cavity are covered by adventitia. The serosa covers organs that are located within the peritoneal cavity.

The adventitia is provides direct, firm attachment to the body surrounding tissues/structures. The serosa is a serous membrane that consists of slick simple squamous epithelium called mesothelium and thin layers of underlying loose connective tissue.

The adventitia facilitates a firmer attachment while the serosa allows more movement of the organs it covers by providing a slippery surface coating.
MESENCHYMAL CELLS

Endothelial cells
Smooth muscle cells
Fibroblasts
MESENCHYMAL CELLS

Endothelial cells
Smooth muscle cells
Fibroblasts
Mast cells are connective tissue cells that release granules that contain chemicals like histamine and heparin which act in immediate hypersensitivity reactions.
In a highly sensitized individual, a potentially fatal, dramatic immediate hypersensitivity reaction (anaphylactic shock) may occur. The reaction may be fatal because the chemicals released during anaphylactic shock may swell airways shut and cardiac effects may also occur.
Many illustrations in these VIBS Histology YouTube videos were modified from the following books and sources: Many thanks to original sources!


- Douglas P. Dohrman and TAMHSC Faculty 2012 Structure and Function of Human Organ Systems, Histology Laboratory Manual - Slide selections were largely based on this manual for first year medical students at TAMHSC
The End!