

Tissues

I. Introduction to Tissue (p. 118)

- A. Tissues are groups of cells that are similar in structure and function.
- B. There are four primary tissue types: epithelial (covering), connective (support), nervous (control), and muscular (movement).

II. Preparing Human Tissue for Microscopy (p. 118) – Mentioned briefly in lab when we start working with prepared slides.

- A. Tissue specimens must be fixed (preserved) and sectioned (sliced) thinly enough to allow light transmission.
- B. Tissue sections must be stained with dyes that bind to different parts of the cell in slightly different ways so that anatomical structures are distinguished from one another.

III. Epithelial Tissue (pp. 118–126)

- A. Features of Epithelia (p. 118)
 - 1. An epithelium is a sheet of cells that covers a body surface or lines a cavity.
 - 2. Epithelium occurs in the body as covering or lining epithelium, and as glandular epithelium.
- B. Special Characteristics of Epithelium (pp. 118–119)
 - 1. Composed of closely packed cells with little extracellular material between.
 - 2. Adjacent epithelial cells are bound together by specialized contacts such as desmosomes and tight junctions.
 - 3. Exhibits polarity by having an apical surface (free) and a basal surface (attached).
 - 4. Supported by the underlying connective tissue.
 - 5. Innervated but avascular.
 - 6. Has a high regeneration capacity.
- C. Classification of Epithelia (pp. 119–124; Marieb Figs. 4.1–4.2)
 - 1. Each epithelial tissue is given two names.
 - a. The first name indicates the number of layers present, either simple (one) or stratified (more than one).
 - b. The second name describes the shape of the cells.
 - 2. Simple epithelia are mostly concerned with absorption, secretion, and filtration.
 - a. Simple squamous epithelium is a single layer of fish scale-shaped cells.
 - b. Simple cuboidal epithelium is a single layer of cube-shaped cells forming the smallest ducts of glands and many kidney tubules.
 - c. Simple columnar epithelium is a single layer of column-shaped cells that line the digestive tract.
 - d. Pseudostratified columnar epithelium contains cells of varying heights giving the false impression of the presence of many layers. Is typically ciliated.
 - 3. Stratified epithelia's main function is protection.

- a. Stratified squamous epithelium is composed of several layers with the cells on the free surface being squamous-shaped and the underlying cells being cuboidal or columnar in shape.
 - b. Stratified cuboidal epithelium is rare, found mostly in the ducts of some of the larger glands.
 - c. Stratified columnar epithelium – not covered; rare in the body.
 - d. Transitional epithelium – may be briefly mentioned in the urinary system in A&P2; only found in the urinary bladder.
- D. Glandular Epithelia (pp. 124–126; Marieb Figs.4.3–4.5)
- 1. Endocrine glands are ductless glands that secrete hormones by exocytosis directly into the blood or lymph.
 - 2. Exocrine glands have ducts and secrete their product onto a surface or into body cavities.
 - a. Exocrine glands may be unicellular or multicellular.
 - b. Exocrine secretions in humans may be merocrine, which are products released through exocytosis, or holocrine, which are synthesized products released when the cell ruptures.

IV. Connective Tissue (pp. 126–138)

- A. Functions of Connective Tissue (pp. 126–127)
- 1. The major functions of connective tissue are binding and support, protection, insulation, and transportation.
- B. Common Characteristics of Connective Tissue (p. 127)
- 1. All connective tissue arises from an embryonic tissue called mesenchyme.
 - 2. Connective tissue ranges from avascular to highly vascularized.
 - 3. Connective tissue is composed mainly of nonliving extracellular matrix that separates the cells of the tissue.
- C. Structural Elements of Connective Tissue (pp. 127–130; Marieb Fig. 4.3)
- 1. Ground substance is the unstructured material that fills the space between the cells and contains the fibers.
 - 2. Fibers of the connective tissue provide support.
 - a. Collagen fibers are extremely strong and provide high tensile strength to the connective tissue.
 - b. Elastic fibers contain elastin, which allows them to be stretched and to recoil.
 - 3. Each major class of connective tissue has a fundamental cell type that exists in immature (distinguished by the suffix *-blast*) and mature (*-cyte*) forms.
- D. Types of Connective Tissue (pp. 131–139; Marieb Figs. 4.6, 4.9)
- 1. Loose connective tissue is one of the two subclasses of connective tissue proper.
 - a. Areolar connective tissue serves to bind body parts together while allowing them to move freely over one another, wraps small blood vessels and nerves, surrounds glands, and forms the subcutaneous tissue.
 - b. Adipose (fat) tissue is a richly vascularized tissue that functions in nutrient storage, protection, and insulation.
 - 2. Dense connective tissue is one of the two subclasses of connective tissue proper.
 - a. Dense regular connective tissue contains closely packed bundles of collagen fibers running in the same direction and makes up tendons and ligaments.

- b. Dense irregular connective tissue contains thick bundles of collagen fibers arranged in an irregular fashion, and is found in the dermis.
- 3. Cartilage lacks nerve fibers and is avascular.
 - a. Hyaline cartilage is the most abundant cartilage providing firm support with some pliability.
 - b. Elastic cartilage and fibrocartilage is covered later in the skeletal system.
- 4. Bone (osseous tissue) has an exceptional ability to support and protect body structures due to its hardness, which is determined by the additional collagen fibers and calcium salts found in the extracellular matrix.
- 5. Blood – covered in A&P2 (not here).

V. Muscle Tissue (pp. 139–141; Marieb Fig. 4.11)

- A. Muscle tissues are highly cellular, well-vascularized tissues responsible for movement.
- B. There are three types of muscular tissue:
 - 1. Skeletal muscle attaches to the skeleton and produces voluntary body movement.
 - 2. Cardiac muscle is responsible for the involuntary movement of the heart.
 - 3. Smooth muscle is found in the walls of the hollow organs.

VI. Nervous Tissue (p. 139; Marieb Fig. 4.10) – Covered later in the nervous system

VII. Covering and Lining Membranes (pp. 141–143; Marieb Fig. 4.12)

- A. Cutaneous membrane, or skin – Covered in the integumentary system
- B. Mucous membranes line body cavities that open to the exterior and contain either stratified squamous or simple columnar epithelia (pp. 141–142).
- C. Serous membranes consist of simple squamous epithelium resting on a thin layer of loose connective (areolar) tissue. (pp. 142–143)