

Human Organization

General Biology
Mid-South Community College
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Types of Tissues

- Describe the *biological levels of organization*
- Define *tissue*
- Epithelial tissue covers body surfaces and lines body cavities
- Connective tissue binds and supports body parts
- Muscular tissue moves the body and its parts
- Nervous tissue receives stimuli and conducts nerve impulses

Types of Tissues

- Cancers are classified according to the type of tissue from which they arise
- Carcinomas arise from epithelial tissue
- Sarcomas arise from muscle or connective tissue
 - Lymphomas are cancers of the lymphoid tissue
- Leukemias are cancers of the blood

Epithelial Tissue

- Consists of tightly packed cells that form a continuous layer
- Covers surfaces and lines body cavities
- Usually has a protective function; can be modified for secretion, absorption, excretion and filtration
- Protects the body from injury, drying out, and possible pathogen invasion

Epithelial Tissue

- Secretes mucus along the digestive tract and sweeps up impurities from lungs by cilia; absorbs molecules from kidney tubules and from the intestine because cellular extensions called microvilli
- Squamous epithelium is composed of flattened cells (lung and blood vessels)
- Cuboidal epithelium contains cube-shaped cells (kidney tubules)

Epithelial Tissue

- Columnar epithelium has cells resembling rectangular pillars of columns, with nuclei located near the bottom of each cell (digestive tract, oviducts)
- Also classified according to the number of layers in the tissue; simple or stratified
- Simple means single layer of cells; stratified means there are layers of cells piled one on top of the other
- Pseudostratified appears to be layered, but each cell touches the base line (trachea)

Epithelial Tissue

- Basement membrane joins epithelium to underlying connective tissue
- When epithelium secretes a product, it is said to be glandular; can be singular or contain many cells

- Glands that secrete into ducts are called exocrine glands; those that secrete their product directly into the bloodstream are called endocrine glands

Connective Tissue

- Binds organs together, provides support and protection, fills spaces, produces blood cells, and stores fat
- Connective tissue cells are widely separated by a matrix (noncellular material that varies in consistency from solid to fluid)
- Three types of fibers: collagen, reticular, elastic

Connective Tissue

Loose Fibrous and Dense Fibrous Tissues

- Both contain fibroblasts that are located some distance from one another; separated by a jellylike matrix containing collagen fibers and elastic fibers
- Loose forms a protective covering enclosing many internal organs such as muscles, blood vessels, and nerves
- Dense fibrous connective tissue contains many collagen fibers; tendons (muscle to bone), ligaments (bone to bone)

Connective Tissue

Adipose Tissue and Reticular Connective Tissue

- Adipose tissue, enlarged fibroblasts that store fat
- Used for energy, insulation, and organ protection
- Reticular connective tissue forms supporting meshwork of lymphoid tissue present in lymph nodes, spleen, thymus, and bone marrow
- Blood cells are produced in red bone marrow

Connective Tissue

Cartilage

- Cells lie in small chamber called lacunae, separated by a matrix that is solid yet flexible
- Lacks direct blood supply; heal fast or slow?
- Hyaline cartilage found in the nose, ends of long bones and ribs, forms tracheal rings, fetal skeleton
- Elastic cartilage found in framework of outer ear
- Fibrocartilage found in pads between vertebrae

Bone

- Most rigid connective tissue
- Consists of hard matrix of inorganic salts, mainly calcium, deposited around collagen fibers
- Two types of bone: compact and spongy

Blood

- Connective Tissue
- Red blood cells small biconcave, disk-shaped cells without nuclei
- Hemoglobin makes the cells red; carries oxygen
- White blood cells larger the RBCs and contain nucleus; fight infection (phagocytic, and antibody production)

- Platelets fragments of giant cells; help in clotting process

Muscular Tissue

- Composed of cells called muscle fibers
- Contain actin and myosin filaments, whose interaction accounts for movement
- Skeletal muscle (voluntary muscle) attached by tendons to bones, when contracts body parts move
- Skeletal muscle has a striated appearance
- Smooth (visceral) muscle lacks striations; is not under voluntary control; found in the walls of internal organs
- Cardiac muscle found only in the walls of the heart; has striations but under involuntary control

Nervous Tissue

- Nerve cell called neurons
- 3 parts to neuron: dendrite, cell body, and axon
- Outside brain and spinal cord, fibers bound by connective tissue form nerves
- Nervous system has three functions: sensory input, integration of data, and motor output