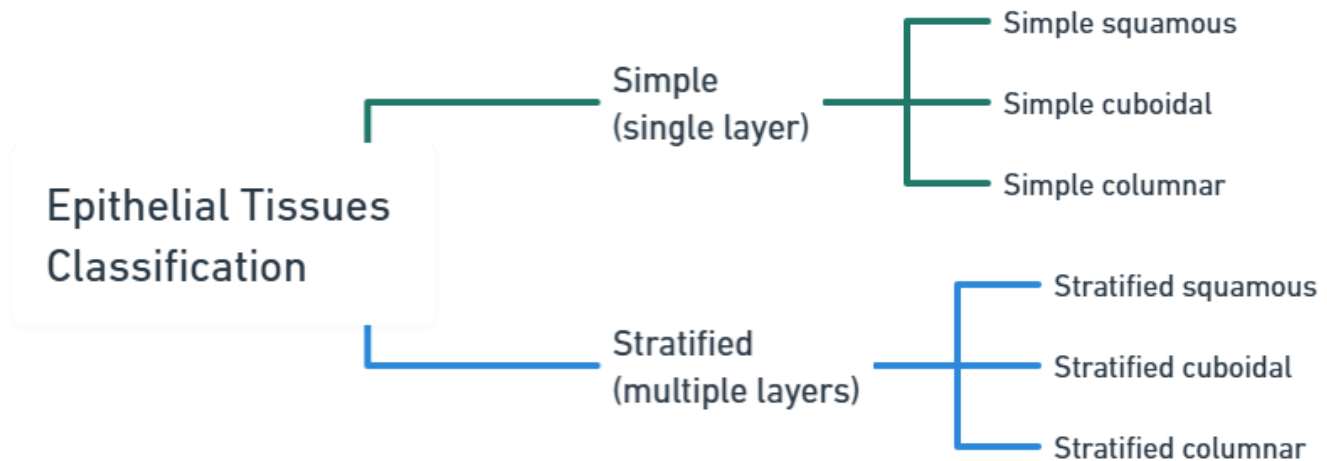


Elementary tissues of the human body

Epithelial Tissue

- Epithelial tissues cover body surfaces, line cavities and form glands.
- They function in protection, secretion, absorption, and transportation.

Epithelial tissues are classified based on the number of cell layers and cell shape:



1. Simple Epithelium:

- Single layers of cells primarily functions in absorption, secretion, and filtration.

Types:

A. Simple Squamous Epithelium:

- **Structure:** Single layer of flat cells.
- **Location:** Alveoli of lungs, glomeruli of kidneys, lining of blood vessels (endothelium), and lining of body cavities (mesothelium).
- **Function:** Allows for rapid diffusion and filtration.

B. Simple Cuboidal Epithelium:

- **Structure:** Single layer of cube-shaped cells.
- **Location:** Kidney tubules, ducts of small glands, ovary surface.
- **Function:** Secretion and absorption.

C. Simple Columnar Epithelium:

- **Structure:** Single layer of tall, column-shaped cells.
- **Location:** Lining of the gastrointestinal tract, gallbladder, and some ducts of glands.
- **Function:** Absorption and secretion; may have microvilli for increased surface area or cilia for movement of substances.

2. Stratified Epithelium:

- Multiple layers of cells, primarily functions in protection against abrasion.

Types:

A. Stratified Squamous Epithelium:

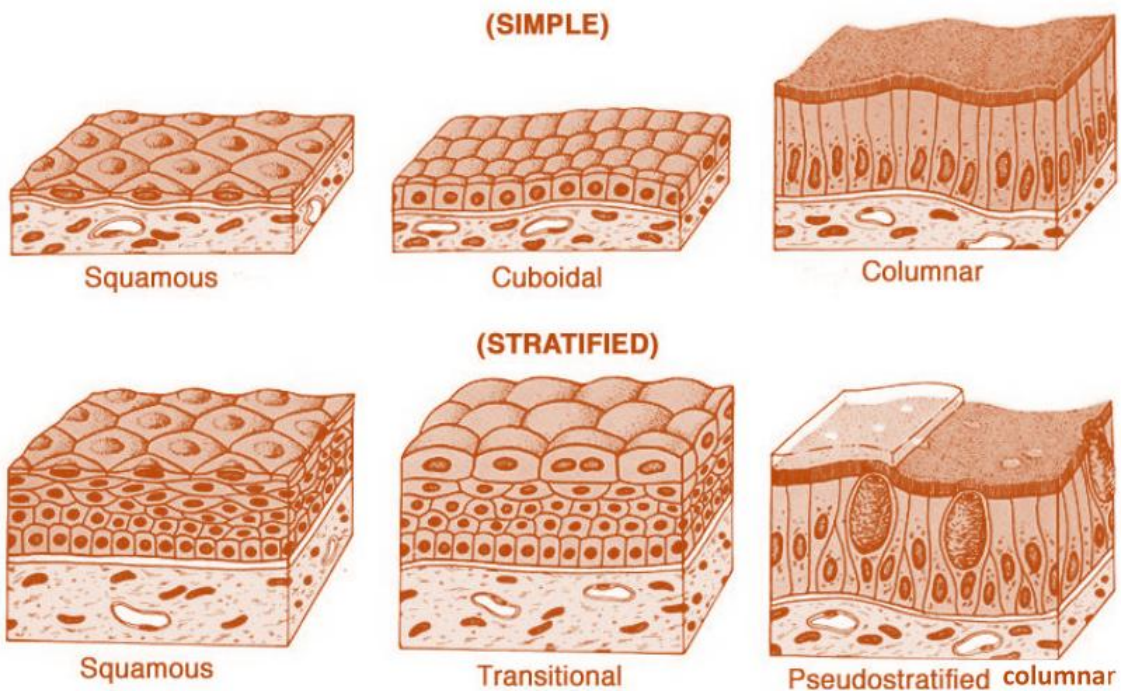
- **Structure:** Multiple layers with flat apical cells.
- **Location:**
 - **Keratinized:** Epidermis of the skin.
 - **Non-keratinized:** Lining of the mouth, esophagus, and vagina.
- **Function:** Protects underlying tissues from abrasion and pathogens.

B. Stratified Cuboidal Epithelium:

- **Structure:** Typically, two layers of cube-shaped cells.
- **Location:** Ducts of sweat glands, mammary glands, and salivary glands.
- **Function:** Protection and limited secretion/absorption.

C. Stratified Columnar Epithelium:

- **Structure:** Multiple layers with columnar apical cells.
- **Location:** Rare; found in the male urethra and large ducts of some glands.
- **Function:** Protection and secretion.



Structure:

- Epithelial cells are closely packed together with little extracellular matrix, and they form a continuous sheet held together by cell junctions such as tight junctions, gap junctions, and desmosomes.

- They have an apical surface facing the body cavity or external environment and a basal surface attached to the underlying connective tissue via a basement membrane.

Location:

1. **Surface epithelium:** External body surfaces (skin), internal cavities (mouth, respiratory tract, and gastrointestinal tract)
2. **Glandular epithelium:** Forms glands (e.g., sweat glands, salivary glands, thyroid gland)

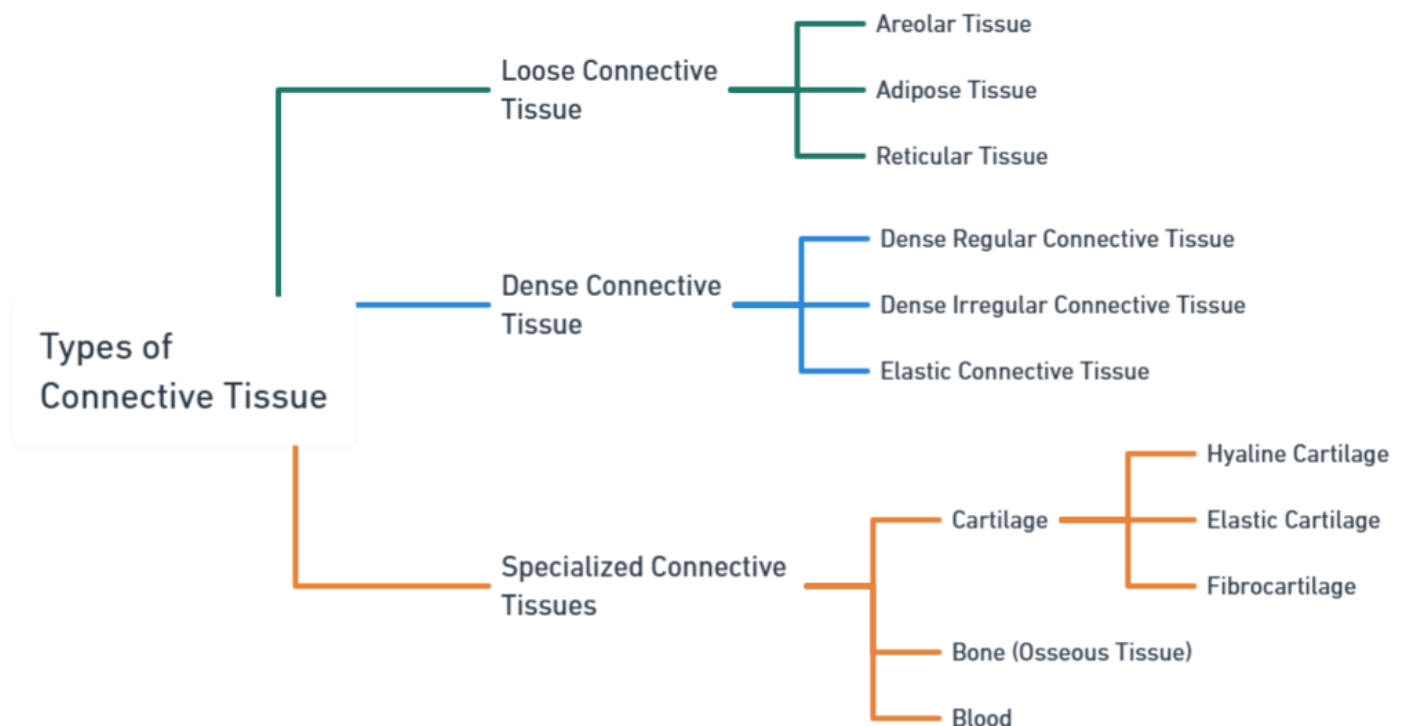
Functions:

1. **Protection:** Epithelial tissues protect the body from mechanical injury, harmful substances, and pathogens.
2. **Secretion:** Glandular epithelium secretes substances like hormones, enzymes, and mucus.
3. **Absorption:** Simple columnar and simple cuboidal epithelia help absorb nutrients in the gastrointestinal tract and kidney tubules.
4. **Transportation:** Ciliated epithelial cells help transport particles and mucus across their surfaces.

Connective tissue

- Connective tissues provide support, protection, and structure to the body.

Types of Connective Tissue



1. Loose Connective Tissue:

I. Areolar Tissue:

- **Structure:** Contains a loose arrangement of fibers and various cell types.
- **Location:** Widely distributed under epithelia, surrounds capillaries.
- **Function:** Provides cushioning, binds tissues, and allows for nutrient diffusion.

II. Adipose Tissue:

- **Structure:** Comprised mainly of adipocytes filled with fat droplets.
- **Location:** Under the skin (subcutaneous layer), around kidneys and eyeballs, within the abdomen, and in breasts.
- **Function:** Stores energy insulates against heat loss, and cushions organs.

III. Reticular Tissue:

- **Structure:** Network of reticular fibers with supportive cells.
- **Location:** Lymphoid organs (lymph nodes, bone marrow, and spleen).
- **Function:** Provides a supportive framework for soft organs.

2. Dense Connective Tissue:

I. Dense Regular Connective Tissue:

- **Structure:** Parallel collagen fibers with a few elastic fibers; major cell type is fibroblasts.
- **Location:** Tendons, ligaments, and aponeuroses.
- **Function:** Attaches muscles to bones or to muscles and bones to bones; withstands great tensile stress in one direction.

II. Dense Irregular Connective Tissue:

- **Structure:** Irregularly arranged collagen fibers with some elastic fibers; major cell type is fibroblasts.
- **Location:** Dermis of the skin, submucosa of digestive tract, fibrous capsules of organs and joints.
- **Function:** Withstands tension exerted in many directions; provides structural strength.

III. Elastic Connective Tissue:

- **Structure:** Dense regular connective tissue containing a high proportion of elastic fibers.
- **Location:** Walls of large arteries, within certain ligaments associated with the vertebral column, within the walls of the bronchial tubes.
- **Function:** Allows tissue to recoil after stretching; maintains pulsatile flow of blood through arteries; aids passive recoil of lungs following inspiration.

3. Specialized Connective Tissues

I. Cartilage:

A. Hyaline Cartilage:

- **Structure:** Amorphous but firm matrix with collagen fibers; chondrocytes lie in lacunae.
- **Location:** Embryonic skeleton ends of long bones in joint cavities, costal cartilages of the ribs, nose, trachea, and larynx.
- **Function:** Supports and reinforces; serves as a resilient cushion; resists compressive stress.

B. Elastic Cartilage:

- **Structure:** Similar to hyaline cartilage, but more elastic fibers in matrix.
- **Location:** External ear (pinna), epiglottis.
- **Function:** Maintains the shape of a structure while allowing great flexibility.

C. Fibrocartilage:

- **Structure:** Matrix similar to but less firm than that in hyaline cartilage; thick collagen fibers predominate.
- **Location:** Intervertebral discs, pubic symphysis, discs of knee joint.
- **Function:** Tensile strength allows it to absorb compressive shock.

II. Bone (Osseous Tissue):

- **Structure:** Hard, calcified matrix containing many collagen fibers; osteocytes lie in lacunae. Very well vascularized.
- **Location:** Bones.
- **Function:** Supports and protects (by enclosing); provides levers for the muscles to act on; stores calcium and other minerals and fat; marrow inside bones is the site for blood cell formation (hematopoiesis).

III. Blood:

- **Structure:** Red and white blood cells in a fluid matrix (plasma).
- **Location:** Contained within blood vessels.
- **Function:** Transports respiratory gases, nutrients, wastes, and other substances.

Structure:

- Connective tissues have fewer cells and more extracellular matrix than other tissues.
- The extracellular matrix consists of protein fibers (collagen, elastin, reticular) and ground substance.

Location:



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