Tissues of the human body

Epithelial tissue

Definition:

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

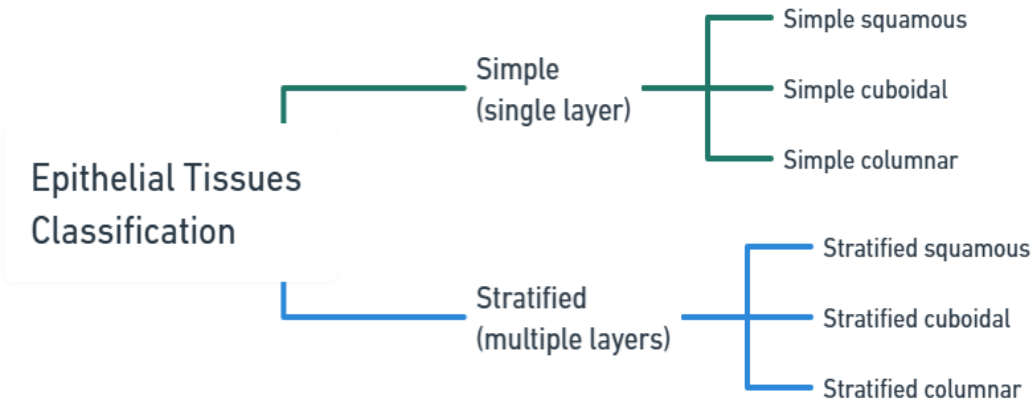
General Structure

- Composed of closely packed cells with minimal extracellular matrix.
- Cells are joined by tight junctions, desmosomes, and gap junctions.
- It has two surfaces:
    A. **Apical surface** – faces the body cavity, lumen, or external environment.
    B. **Basal surface** – attached to the **basement membrane**, which connects to the underlying connective tissue.

Classification of Epithelial Tissue

Epithelial tissues are classified based on:

1. **Number of cell layers:**
    - **Simple epithelium** – one cell layer.
    - **Stratified epithelium** – two or more cell layers.



2. **Shape of cells:**
    - **Squamous** – flat.
    - **Cuboidal** – cube-shaped.
    - **Columnar** – tall and column-like.

Special Locations

- **Surface Epithelium**: Covers **external body surfaces** (e.g., skin) and **internal cavities** (e.g., mouth, respiratory tract, GI tract).

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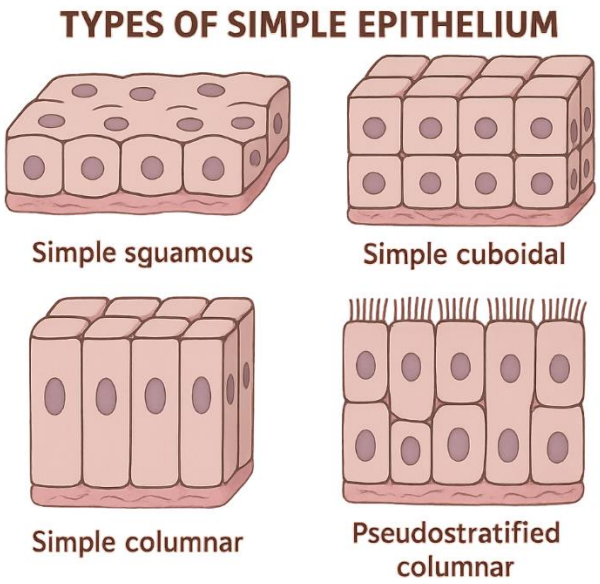
- **Glandular Epithelium**: Forms **glands** (e.g., sweat glands, salivary glands, thyroid).

Functions of Epithelial Tissue

1. **Protection**: Shields body from injury, pathogens, and harmful substances.
2. **Secretion**: Glandular epithelium releases hormones, mucus, enzymes.
3. **Absorption**: Especially in **simple cuboidal** and **simple columnar** epithelium (e.g., kidney, intestines).
4. **Transportation**: **Ciliated epithelium** helps move mucus, particles (e.g., respiratory tract).

Simple Epithelium

All cells rest on the basement membrane. It's usually involved in absorption, secretion, and filtration.



1. Simple Squamous Epithelium

- **Shape:** Flat and thin cells
- **Function:** Allows diffusion and filtration
- **Location:** Alveoli (lungs), lining of blood vessels (endothelium), glomeruli (kidneys)

2. Simple Cuboidal Epithelium

- **Shape:** Cube-shaped cells
- **Function:** Secretion and absorption
- **Location:** Kidney tubules, glands, ducts

3. Simple Columnar Epithelium

- **Shape:** Tall, column-like cells
- **Function:** Absorption and secretion (often mucus via goblet cells)
- **Location:** Lining of stomach, intestines, gallbladder

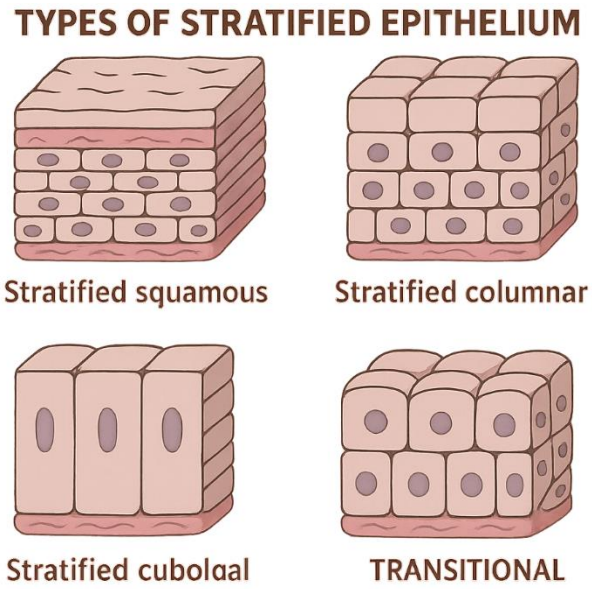
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4. Pseudostratified Columnar Epithelium

- **Shape:** Appears layered but isn’t (all cells touch the basement membrane)
- **Function:** Secretion and movement of mucus
- **Location:** Trachea, upper respiratory tract (usually ciliated)

Stratified Epithelium

Mainly protective in function.



1. Stratified Squamous Epithelium

- **Shape:** Flat surface cells; deeper layers may be cuboidal or columnar
- **Function:** Protection against abrasion
- **Location:**
  - **Keratinized:** Skin (epidermis)
  - **Non-keratinized:** Mouth, esophagus, vagina

2. Stratified Cuboidal Epithelium

- **Shape:** Multiple layers of cube-shaped cells (usually 2)
- **Function:** Protection and secretion
- **Location:** Sweat gland ducts, mammary glands

3. Stratified Columnar Epithelium

- **Shape:** Top layer columnar; rare type
- **Function:** Protection and secretion
- **Location:** Male urethra, some glandular ducts

4. Transitional Epithelium

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- **Shape:** Changes shape (stretchable)
- **Function:** Allows stretching
- **Location:** Urinary bladder, ureters, part of the urethra

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Connective tissue

Definition:

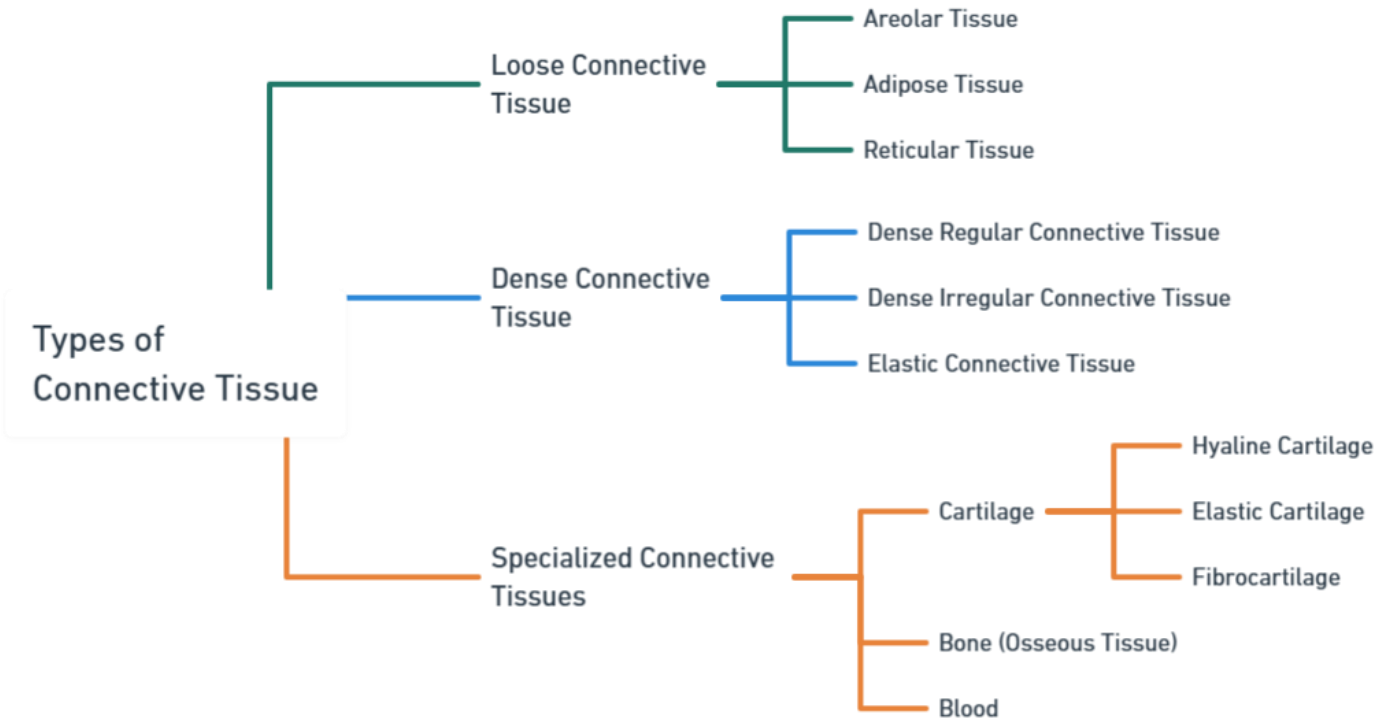
- Connective tissues provide **support, protection, insulation, and structure** to the body.
- They are characterized by having **fewer cells** and a **prominent extracellular matrix** composed of **fibers (collagen, elastic, reticular)** and **ground substance**.

General Structure

- **Fewer cells**, widely spaced.
- **Extracellular matrix** dominates:
    - **Fibers**: Collagen (strength), Elastic (flexibility), Reticular (support).
    - **Ground substance**: Gel-like material that fills space between cells and fibers.

Types of Connective Tissue

1. Loose Connective Tissue
2. Dense Connective Tissue
3. Specialized Connective Tissues



Locations of Connective Tissue

- **Connective tissue proper**: Beneath skin, around organs, tendons, ligaments, bone marrow.
- **Specialized connective tissue**: Cartilage (joints, ribs, ear), bone (skeleton).
- **Fluid connective tissue**: Blood (vessels), lymph (lymphatic system).

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