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# Classification of Tissue

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# Definition of Tissues

**Biological tissue** is a collection of interconnected

cells that perform a similar function within an organism.

In other words, it is a group of cells working together mainly inside an organ.



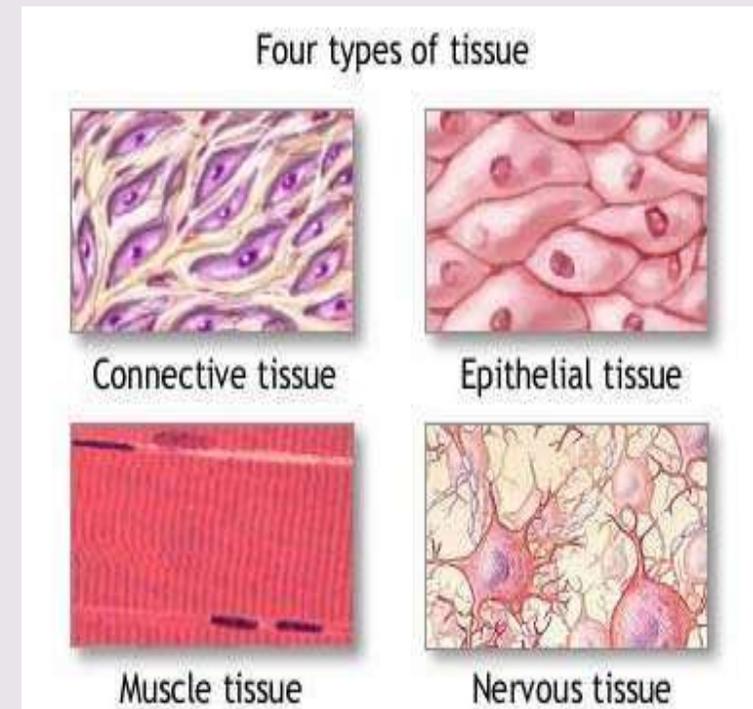
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# Classification of Tissues

**Human body is composed of  
4 basic types of tissue:**

- **Epithelial tissue**
- **Connective tissue**
- **Muscular tissue**
- **Nervous tissue**



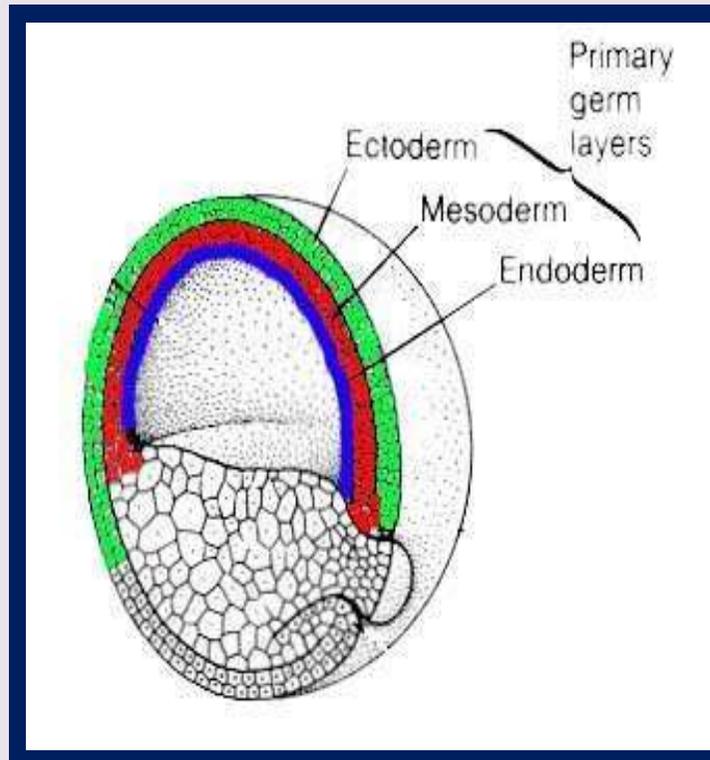


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# Origin of Tissue

**A fertilized egg divides to produce 3 primary germ cell layers. These layers differentiate to form the tissues of the body.**





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# Epithelial Tissue

**Epithelial cells cover or line all body surfaces, cavities and tubes. So, These are called *covering epithelia*.**

**Epithelial cells form the functional units of secretory glands. So, These are called *glandular epithelia*.**



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# General Characteristic

- ✓ **Closely attached to each other forming a protective barrier.**
- ✓ **Always has one free (apical) surface open to outside the body or inside (cavity) an internal organ.**
- ✓ **Always has one fixed (basal) section attached to underlying connective tissue.**
- ✓ **Has no blood vessels but can soak up nutrients from blood vessels in connective tissue underneath.**
- ✓ **Can have lots of nerves in it (innervated).**
- ✓ **Very good at regenerating (fixing itself). i.e. sunburn, skinned knee.**



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# Functions

- ❑ **To protect the tissues that lie beneath it from radiation, desiccation, toxins, invasion by pathogens, and physical trauma.**
- ❑ **The regulation and exchange of chemicals between the underlying tissues and a body cavity.**
- ❑ **The secretion of hormones into the blood vascular system, and/or the secretion of sweat, mucus, enzymes, and other products that are delivered by ducts glandular epithelium.**
- ❑ **To provide sensation.**
- ❑ **Absorbs stomach and intestinal lining (gut).**
- ❑ **Filters the kidney.**
- ❑ **Forms secretory glands.**



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# Classification of Epithelia

## According to thickness

- ✓ **"simple"** - one cell layer
- ✓ **"stratified"** –more than one layer of cells (which are named according to the shape of the cells in the apical layer)

## According to shape

- ✓ **"squamous"** –wider than tall
- ✓ **"cuboidal"** –as tall as wide
- ✓ **"columnar"** - taller than wide



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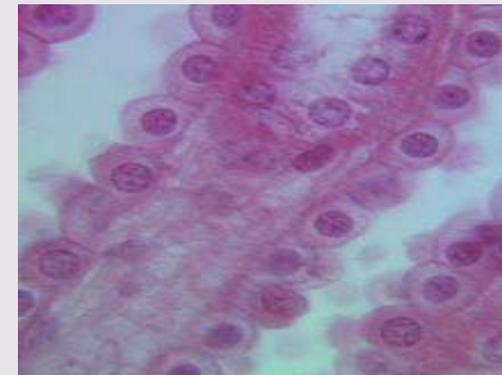
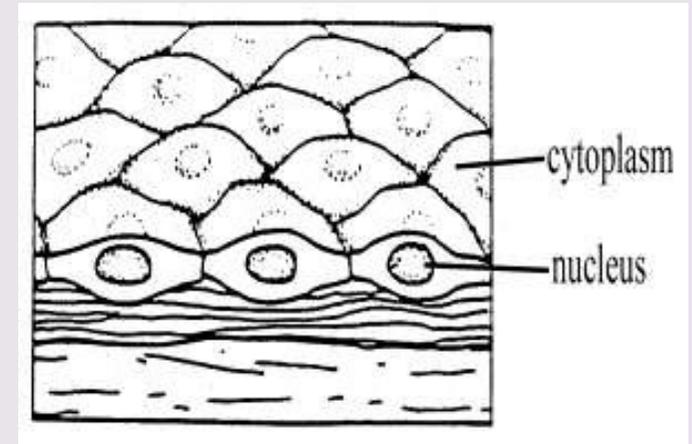
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# Simple squamous epithelium

**Description: Single layer of flattened cells with disc-shaped central nuclei and sparse cytoplasm; the simplest of the epithelia.**

**Function: Passive transport of gases and fluids.**

**Location: Alveoli of lungs, lining body cavities (mesothelium), lining blood vessels (endothelium)**





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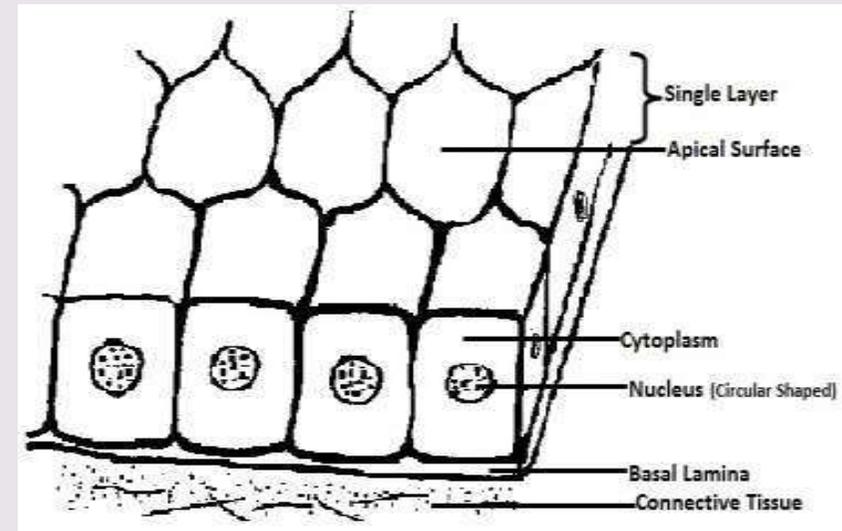
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# Simple cuboidal epithelia

**Description :** Single layer of cubelike cells with large, spherical central nuclei.

**Function :** Secretion and absorption.

**Location:** Kidney tubules; ducts and secretory portions of small glands; ovary surface.





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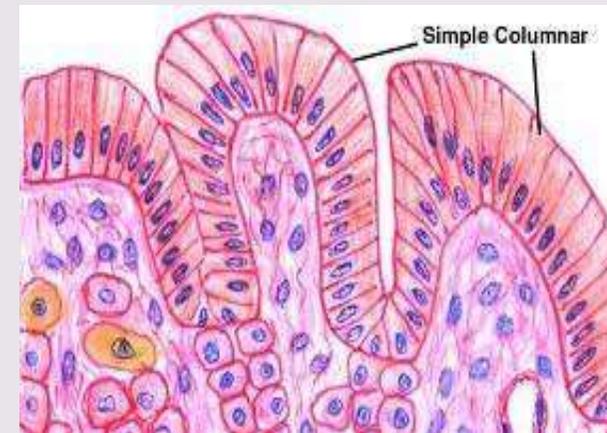
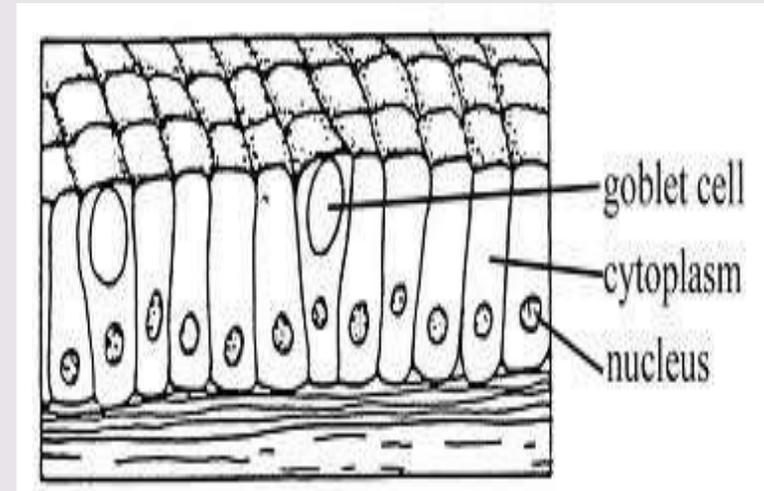
# Simple columnar epithelia

**Description: Single layer of tall cells with round to oval nuclei.**

**Types: (i) Ciliated columnar epithelia.  
(ii) Non-ciliated columnar epithelia.**

**Function:**  
**Absorption**  
**; secretion of mucus,**  
**Enzymes and other**  
**substances.**

**Location: Digestive tract, gall bladder etc.**





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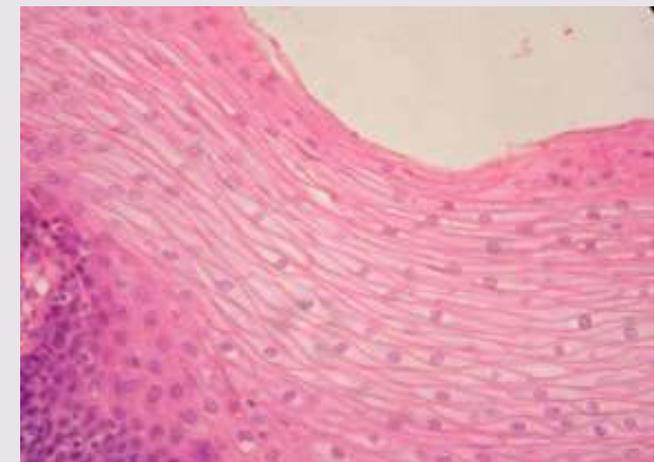
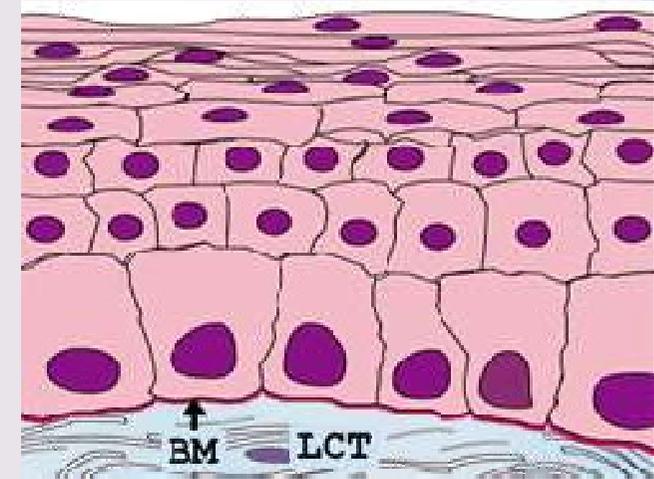
# Stratified squamous epithelia

## Description:

**Multilayered, surface cell are squamous, basal cells are cuboidal and divided constantly.**

**Function: Protection.**

**Location: Oral cavity, cervix, anal canal.**





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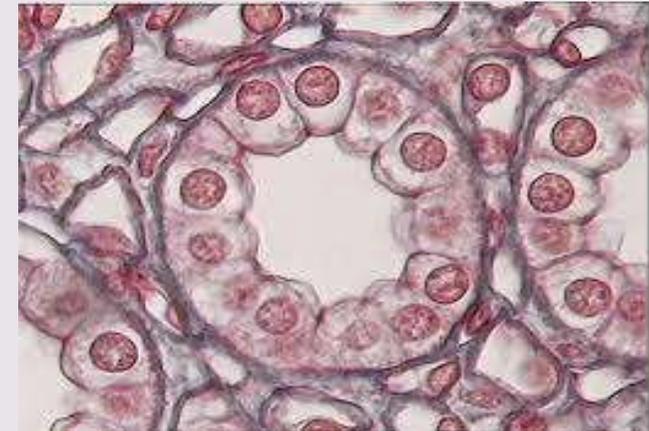
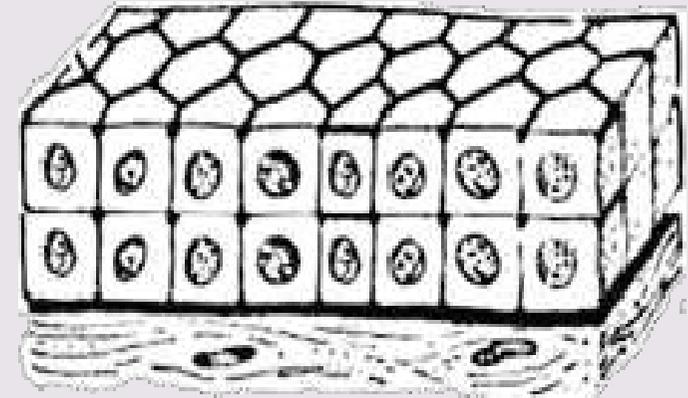
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# Stratified cuboidal epithelia

**Description: Generally two layers of cube-like cells.**

**Function: Protection.**

**Location: Large ducts of sweat glands, mammary glands, and salivary glands.**





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# Stratified columnar epithelia

**Description:**

**Multilayered, superficial cells elongated and columnar.**

**Function:**

**Protection;  
secretion.**

**Location: Rare in the body;  
small amount in the male  
urethra.**





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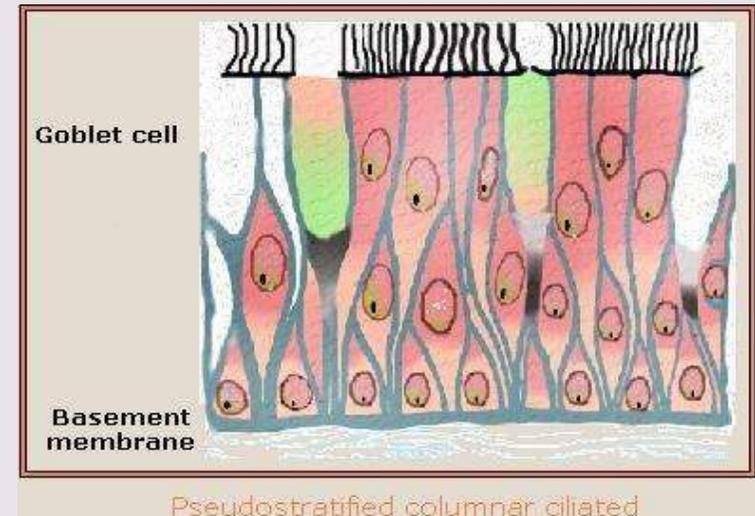
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# Pseudo stratified columnar epithelia

**Description:** Single cell layered, all cell attach to the basement membrane but not all reach the free surface. Nuclei at varying depth.

**Function:** Secretion of mucus, propulsion of mucus by ciliary action.

**Location:** Lines of trachea.





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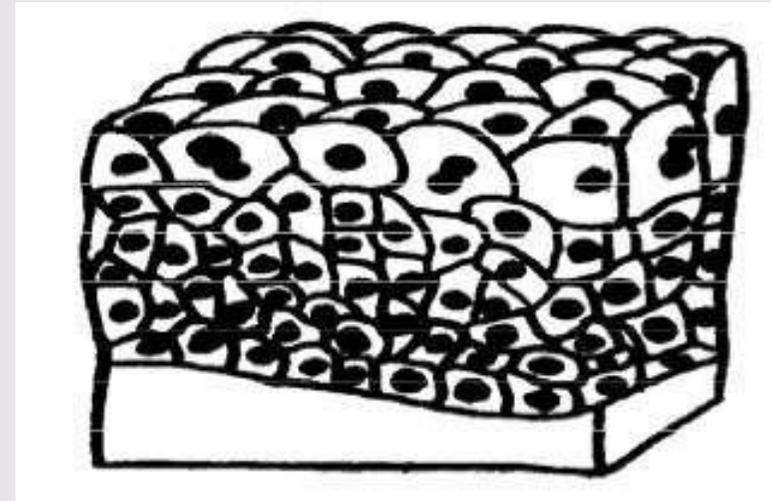
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# Transitional epithelia

**Description:** Characterized by domelike cells that are neither squamous nor columnar. The form of the cells changes.

**Function:** Stretching and protection.

**Location:** Bladder and part of urethra.





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# Connective Tissues

**The tissues that connect the different parts of the body together are called connective tissues.**



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# General characteristic

- ✓ The intercellular material is maximum where as the cellular component is minimum.
- ✓ Unlike the other tissues, (e.g. epithelium, muscle and nerve) which are formed mainly by cells, the major constituent of connective tissue is ECM (Extra-cellular matrix).
- ✓ Possess cells, fibers and ground substances.



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# Basic Functions

- ❑ **Support and binding of other tissues**
- ❑ **Holding body fluids**
- ❑ **Defending the body against infection**
  - ❑ **macrophages, plasma cells, mast cells, WBCs**
- ❑ **Storing nutrients as fat**



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# Classification of connective tissues

