

The Four Primary Tissues

The body is composed of only three basic elements :- **cells, intercellular substances, and body fluids**. During development, the embryo consists of three cellular layers (**ectoderm, mesoderm, and endoderm**), each specialized in respect of function, future development, and differentiation. All adult tissues develop from these layers and in the adult only four primary tissues are present.

A primary basic tissue may be defined **as a group of similar cells specialized in a common direction and able to perform a common function**, In turn, organs are formed from these tissues, and, usually, all four types are present in a single organ.

The four primary tissues **are epithelium, connective tissues, muscles, and nervous tissue**.

The subdivisions and varieties of these primary tissues can be classified according to structure and function.

Classification of Tissues

- 1-Epithelial tissue.
- 2-Connective tissue.
- 3-Muscles.
- 4-Nervous tissue

Epithelium: Epithelial tissues are formed by closely apposed polygonal cells with little or no intercellular material.

They occur as membranes and as glands. Membranes are formed by sheets of cells that cover an external surface or line on an internal surface. All epithelia lie upon or are surrounded by a basal lamina that separates the epithelium from subjacent connective tissue, blood vessels, and nerves lying in that connective tissue. Functionally, epithelia from the coverings or linings of surfaces, **provide secretions from both membranes and glands and are involved in the process of absorption.**

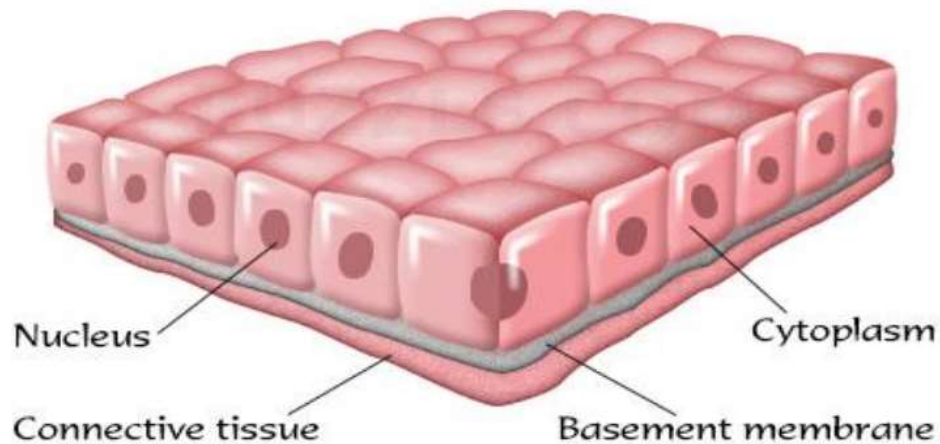


Figure 1-1: Epithelial tissue.

Types of epithelia

Epithelia are classified according to their structure and function into two main groups (membranes epithelia and glandular epithelia).

A. Membranes epithelia:

1- Simple

- A. Simple Squamous epithelium – Endothelium, mesothelium.
- B. Simple Cuboidal epithelium – Small ducts.
- C. Simple Columnar epithelium – Gallbladder (non-ciliated), uterine tube (ciliated).

2- Pseudo stratified columnar – Male urethra (non-ciliated), trachea (ciliated).

3- Stratified

- A. Stratified Squamous – cornea, skin.
- B. Stratified Cuboidal – sweat gland ducts.
- C. Stratified Columnar – male urethra.
- D. Transitional – urinary tract.

B. Glandular epithelia: multicellular.

1-Exocrine

- A. Simple – gastric glands, sweat glands.
- B. Compound – salivary glands, pancreas.

2- Endocrine

- A. Cord and clump – Hypophysis.
- B. Follicle – thyroid gland.

A. Membranes (covering)

Being packed closely together most epithelial cells are polygonal in outline although they may be highly irregular. Their **shape and arrangement in layers** are the two factors that provide the basis for the classification of membranes.

Simple epithelia

A-Simple squamous epithelium: Is composed of very thin flat cells of irregular outline fitted closely together to form a continuous sheet. From the surface, this epithelium has the appearance of a tiled floor, but with grossly irregular outlines, in section, the cells show attenuated cytoplasm with local protuberances where the cytoplasm contains the nuclei. e.g. **endothelium lining blood and lymph vessels and mesothelium lining the serous cavities (pleura, pericardium, and peritoneum).**

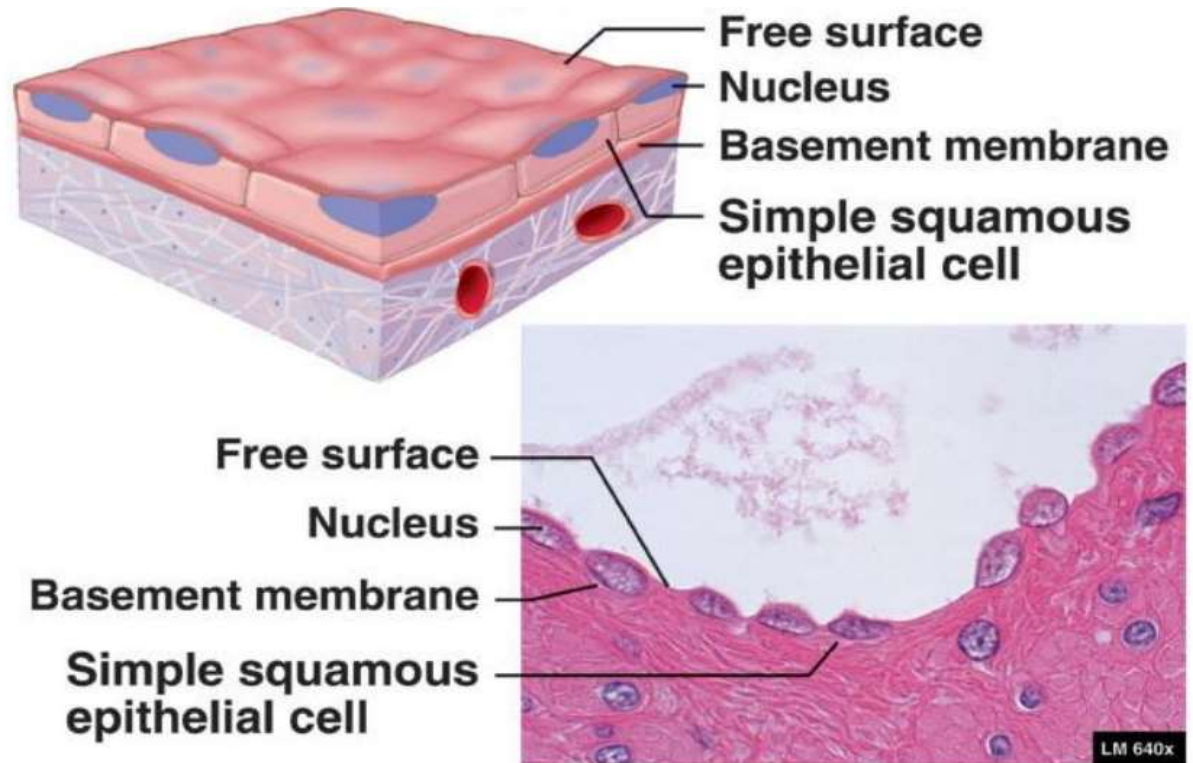


Figure 1-2: Simple squamous epithelium.

B- Simple cuboidal (cubical epithelium): Is so termed because of its appearance in sections at right angles to the surface of the membrane, each cell appearing box-like or cube-like.

From the surface, the cells appear as polygons. Such on epithelium is found **in many glands both in secreting units and ducts and for example, covering the surface of the ovary.**

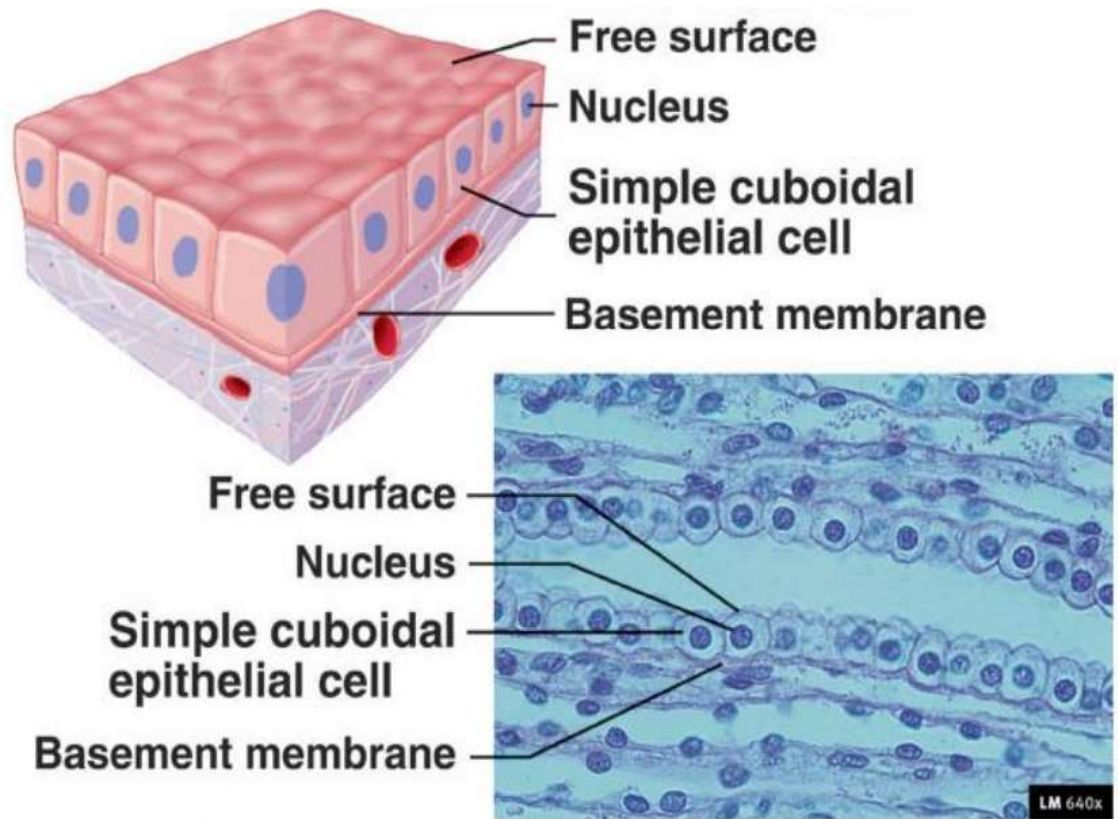


Figure 1-3: Simple cuboidal epithelium.

C-Simple columnar epithelium.

The simple non-ciliated columnar epithelium has a similar appearance in surface view to simple cuboidal type but in perpendicular sections, it is seen to be composed of tall cells, the nuclei of which usually are all approximately at the same level and situated nearer to the basal than to the apical (luminal) surface. Such an epithelium usually is associated with **secretion or absorption** and thus is found **lining much of the digestive system and the larger ducts of many glands.**

The other type is the **ciliated columnar epithelium**, high magnification shows that the free surfaces of the cells are covered with cilia.

This type of epithelium **lines the uterus and uterine tubes**.

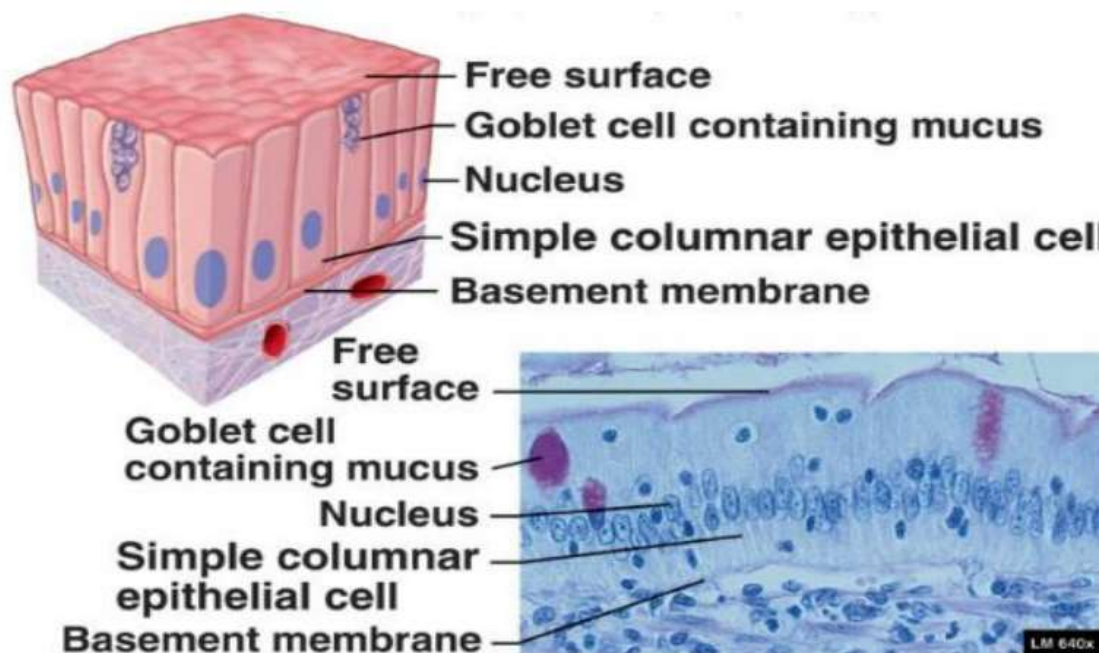


Figure 1-4: Simple columnar epithelium