

HUMAN ANATOMY AND PHYSIOLOGY- 1(BP101T)

UNIT: 1 TISSUE LEVEL OF ORGANIZATION

CLASS: 7

TOPIC: CLASSIFICATION OF TISSUES, STRUCTURE, LOCATION AND FUNCTIONS OF EPITHELIAL TISSUE

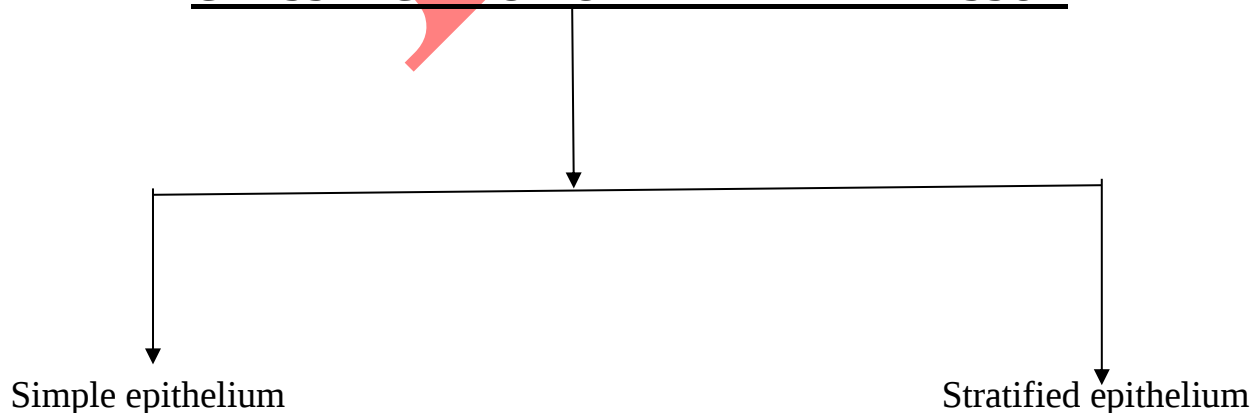
TISSUES: A tissue is a group of cells that usually have a common origin in an embryo and function together to carry out specialized activities.

CLASSIFICATION OF TISSUES: Body tissues can be classified into four basic types according to their structure and function.

- ✚ Epithelial tissue
- ✚ Connective tissue
- ✚ Muscular tissue
- ✚ Nervous tissue

✚ **EPITHELIAL TISSUE:** It covers body surfaces and lines hollow organs, body cavities, and ducts. It also forms glands. This tissue allows the body to interact with both its internal and external environments.

CLASSIFICATION OF EPITHELIAL TISSUE



A. Simple squamous epithelium:

1. Endothelium
2. Mesothelium

B. Simple cuboidal epithelium:**C. Simple columnar epithelium**

1. Nonciliated (lacks cilia)
2. Ciliated (contains cilia)

D. Pseudostratified columnar epithelium

1. Nonciliated (lacks cilia)
2. Ciliated (contains cilia)

A. SIMPLE SQUAMOUS EPITHELIUM:

It is a single layer of flat cells that resembles a tiled floor when viewed from apical surface; centrally located nucleus that is flattened and oval or spherical in shape.

LOCATION: Most commonly

- (1) Lines the cardiovascular and lymphatic system (heart, blood vessels, lymphatic vessels), where it is known as **Endothelium**.
- (2) Forms the epithelial layer of serous membranes (peritoneum, pericardium), where it is called **Mesothelium** (means middle).
- (3) Also found in air sacs of lungs, glomerular (Bowman's) capsule of kidneys.

FUNCTION:**A. Stratified squamous epithelium:**

1. Nonkeratinized (lacks keratin)
2. Keratinized (contains keratin)

B. Stratified cuboidal epithelium**C. Stratified columnar epithelium****D. Transitional epithelium or urothelium**

- Blood filtration
- Diffusion (such as diffusion of oxygen into blood vessels of lungs).



B. SIMPLE CUBOIDAL EPITHELIUM:

Simple cuboidal epithelium is a single layer of cube-shaped cells; round, centrally located nucleus.

LOCATION: Covers surface of ovary, eye.

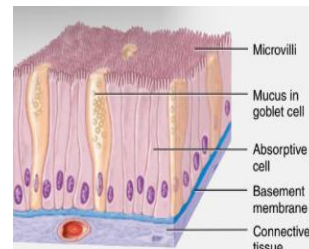
FUNCTION: Secretion and absorption.

C. SIMPLE COLUMNAR EPITHELIUM:

NONCILATED SIMPLE COLUMNAR EPITHELIUM: Epithelium is a single layer of non-ciliated columnlike cells with oval nuclei near base of cells. It contains columnar epithelial cells with **microvilli** at apical surface **goblet cells**.

Microvilli: fingerlike cytoplasmic projections, increase surface area of plasma membrane thus increasing cell's rate of absorption.

Goblet cells: are modified columnar epithelial cells that secrete mucus, a slightly sticky fluid, at their apical surfaces.



LOCATION: From stomach to anus, ducts of many glands, and gallbladder.

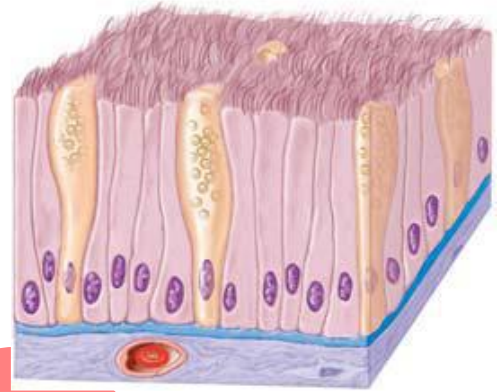
FUNCTION: Secretion and absorption; larger columnar cells contain more organelles and thus are capable of higher level of secretion and absorption than are cuboidal cells.

CILIATED SIMPLE COLUMNAR EPITHELIUM:

Ciliated simple columnar epithelium is a single layer of ciliated columnlike cells with oval nuclei near base of cells. Goblet cells are usually interspersed.

LOCATION: Lines some bronchioles (small tubes) of respiratory tract, uterine (fallopian) tubes, uterus, some paranasal sinuses, central canal of spinal cord, and ventricles of brain.

FUNCTION: Help move oocytes expelled from ovaries through uterine (fallopian) tubes into uterus.



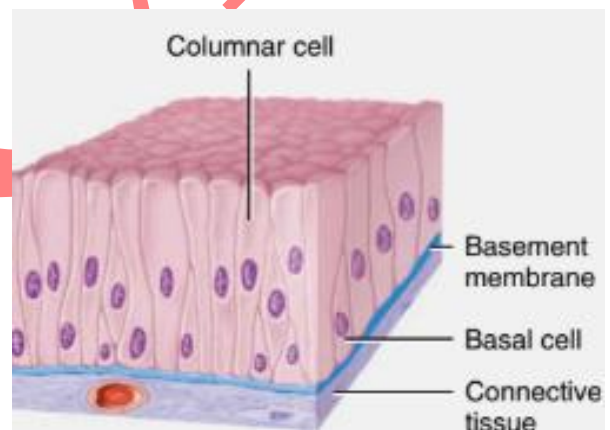
D.PSEUDOSTRATIFIED COLUMNAR EPITHELIUM:

NON-CILIATED PSEUDOSTRATIFIED COLUMNAR EPITHELIUM:

Nonciliated pseudostratified columnar epithelium appears to have several layers because the nuclei of the cells are at various levels. Even though all the cells are attached to the basement membrane in a single layer, some cells do not extend to the apical surface.

LOCATION: Lines epididymis, larger ducts of many glands, and parts of male urethra.

FUNCTION: Absorption and secretion.

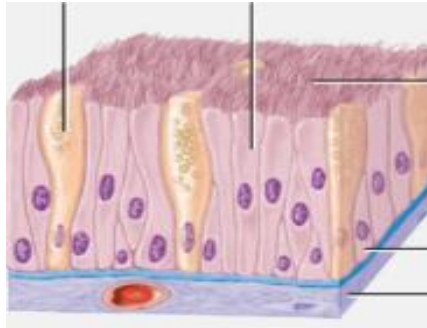


CILIATED PSEUDOSTRATIFIED COLUMNAR EPITHELIUM:

Ciliated pseudostratified columnar epithelium appears to have several layers because cell nuclei are at various levels. All cells are attached to basement membrane in a single layer, but some cells do not extend to apical surface. When viewed from side, these features give false impression of a multilayered tissue.

LOCATION: Upper respiratory tract.

FUNCTION: Secretes mucus that traps foreign particles.



2.STRATIFIED EPITHELIUM:

A. STRATIFIED SQUAMOUS EPITHELIUM: It has two or more layers of cells; cells in apical layer and several layers deep to it are squamous; cells in deeper layers vary from cuboidal to columnar.

Keratinized stratified squamous epithelium: keratin present in apical layer of cells and several layers. Keratin is a tough, fibrous intracellular protein that helps protect skin and underlying tissues from heat, microbes, and chemicals.

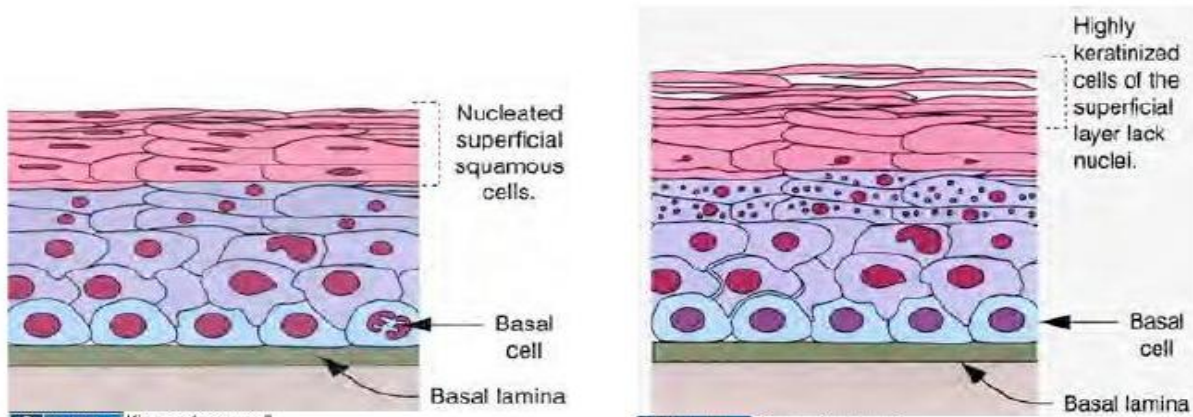
Nonkeratinized stratified squamous epithelium: does not contain large amounts of keratin in apical layer and several layers deep and is constantly moistened by mucus from salivary and mucous glands, organelles are not replaced.

LOCATION: Skin, mouth, esophagus, pharynx, and vagina.

FUNCTION: Protection against abrasion, water loss, ultraviolet radiation, and foreign invasion. Both types form first line of defense against microbes.

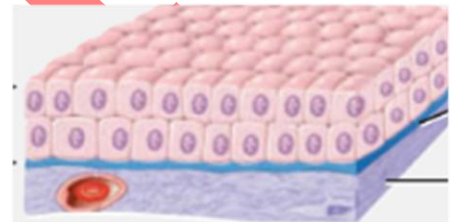
Stratified Squamous Epithelium

non-keratinized keratinized



B. STRATIFIED CUBOIDAL EPITHELIUM:

Stratified cuboidal epithelium has two or more layers of cells; cells in apical layer are cube-shaped; fairly rare type.

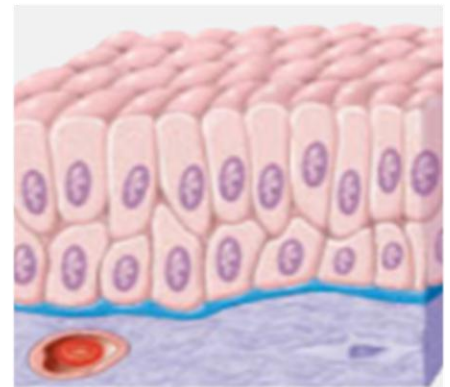


LOCATION: Ducts of adult sweat glands and esophageal glands, part of male urethra.

FUNCTION: Protection, limited secretion and absorption.

C.STRATIFIED COLUMNAR EPITHELIUM:

Stratified columnar epithelium usually consist of shortened, irregularly shaped cells, only apical layer has columnar cells.



LOCATION: Urethra; large excretory ducts of some glands, such as esophageal glands; small areas in anal mucous membrane, eye.

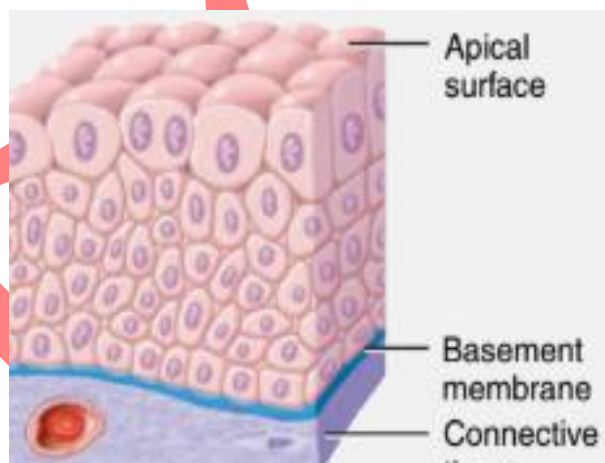
FUNCTION: Protection and secretion.

TRANSITIONAL EPITHELIUM (UROTHELIUM):

It has a variable appearance. In relaxed or unstretched state, looks like stratified cuboidal epithelium, except apical layer cells tend to be large and rounded. In relaxed (or) unstretched state, looks like stratified cuboidal epithelium, except apical layer cells to be large and rounded. When tissue stretched, cells become flatter giving appearance of stratified squamous epithelium.

LOCATION: Urinary bladder and portions of ureters and urethra.

FUNCTION: Allows urinary organs to stretch and maintain protective lining.

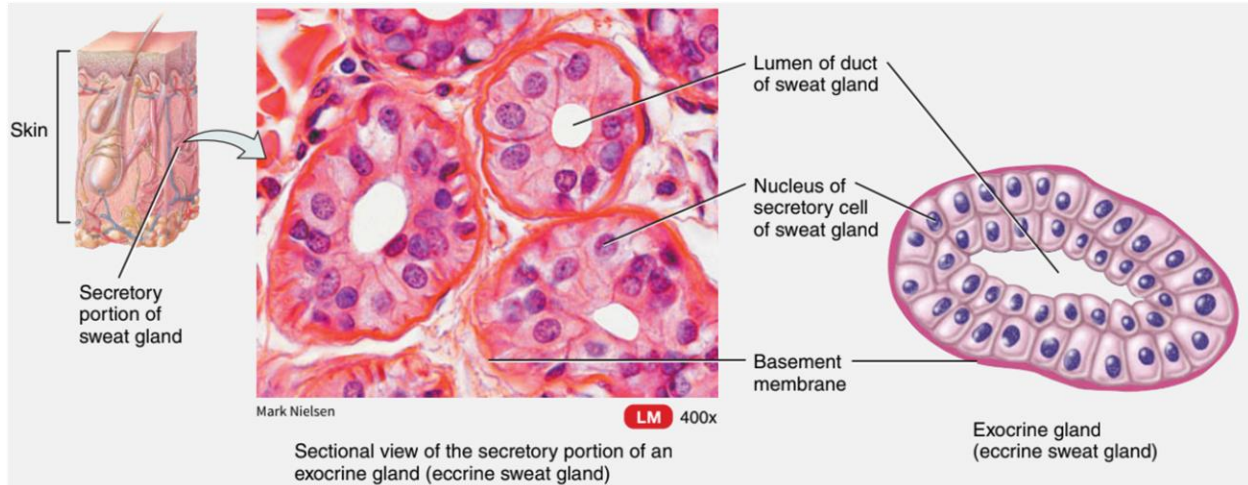


GLANDULAR EPITHELIUM:

The function of glandular epithelium is secretion, A gland consists of epithelium that secretes substances into ducts (tubes), onto a surface, or eventually into the blood in the absence of ducts. All glands of the body are classified as either **endocrine** or **exocrine**.

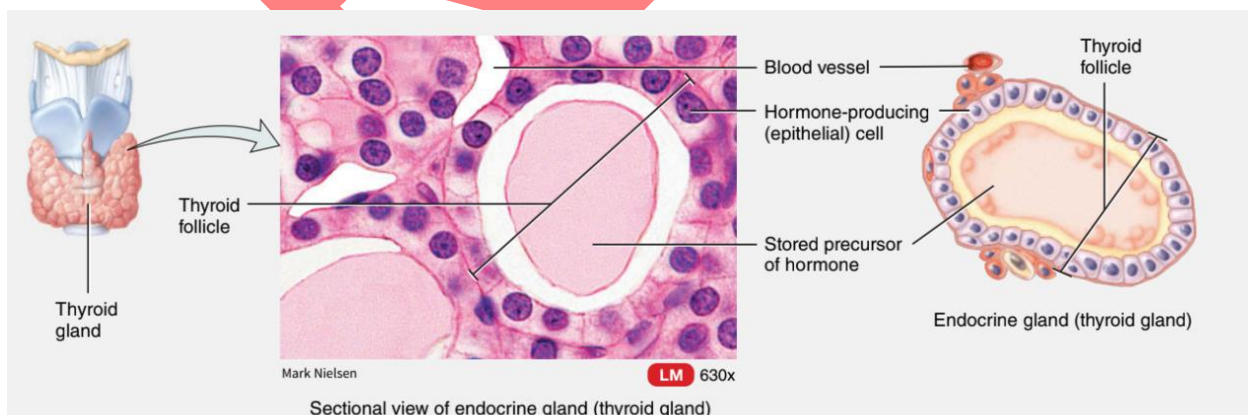
The secretions of **ENDOCRINE GLANDS** (**endo-inside; -crine secretion**), called **hormones**, enter the **interstitial fluid** and then diffuse into the **bloodstream** without flowing through a duct.

LOCATION: Examples include pituitary gland at base of brain, pineal gland in



brain, thyroid and parathyroid glands near larynx (voice box), adrenal glands superior to kidneys, pancreas near stomach, ovaries in pelvic cavity, testes in scrotum, thymus in thoracic cavity.

FUNCTION: Hormones regulate many metabolic and physiological activities to maintain homeostasis.



EXOCRINE GLANDS (exo- = outside;) secrete their products into **ducts** that empty onto the surface of a covering and lining epithelium such as the **skin surface** or the **lumen** of a hollow organ.

LOCATION: Sweat, oil, and earwax glands of skin; digestive glands such as salivary glands (secrete into mouth cavity) and pancreas (secretes into small intestine).

FUNCTION: Produce substances such as sweat to help lower body temperature, oil, earwax, saliva, or digestive enzymes.

Structural Classification of Exocrine Glands:

Unicellular glands are **single-celled glands**. Goblet cells are important unicellular exocrine glands that secrete mucus directly onto the apical surface of a lining epithelium.