

العلوم	الكلية
علوم حياة	القسم
Histology	المادة باللغة الانجليزية
علم الانسجة	المادة باللغة العربية
الثالثة	المرحلة الدراسية
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Epithelial Tissue	عنوان المحاضرة باللغة الانجليزية
النسيج الطلائي	عنوان المحاضرة باللغة العربية
1	رقم المحاضرة
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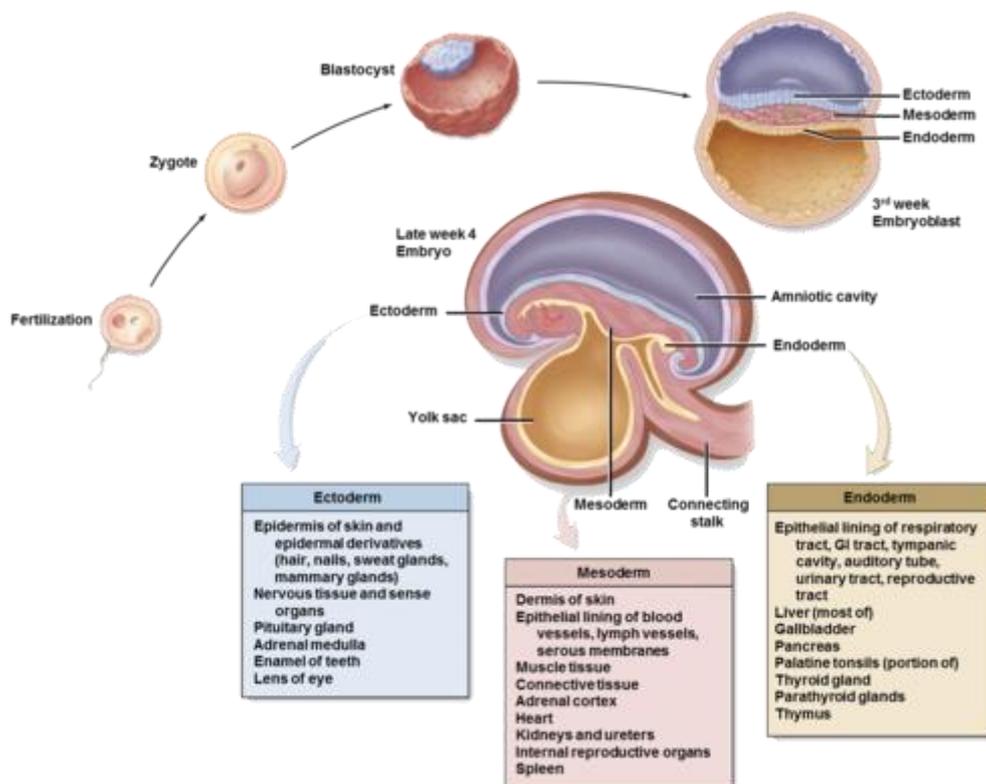
Epithelial tissue

General features of Epithelium:

1. Can be derivate of all three germ layers
2. Cells show polarity
3. Little intercellular material
4. Cells are laying close to each other
5. Tend to form junctions
6. Rest on a basement membrane
7. Lack vessels
8. Cover or Line surfaces and cavities or form glands
9. Mitotically active

Derivation

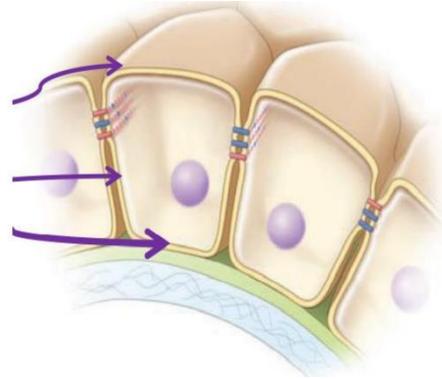
Ectoderm Endoderm Mesoderm



- **Ectoderm** : Epidermis of skin , Sweat glands and ducts
- **Mesoderm**: Endothelium lining of blood vessels Mesothelium lining of body cavities Lining of urinary and genital organs
- **Endoderm**: Lining of gastrointestinal tract Lining of respiratory tract

Cells show polarity : They have an

- apical pole
- lateral domain
- basal pole

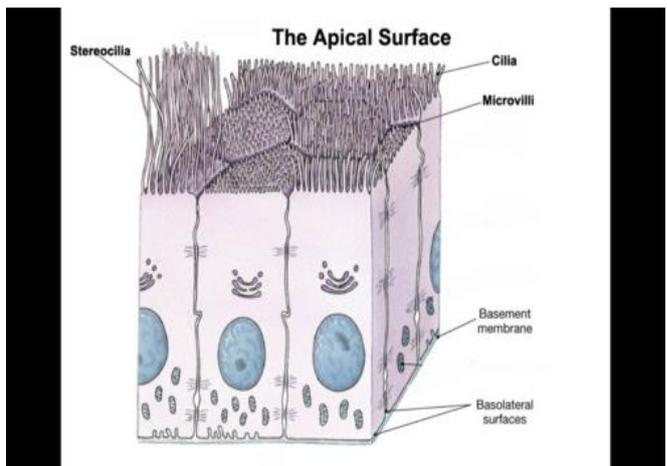


The apical pole Part of the epithelial cell that looks towards the lumen or the surface

Can have: - **stereocilia** – **microvilli** – **cilia**

Microvilli • Fingerlike

Cytoplasmic projections on the apical surface, Increase the surface of absorption (small intestine)



Stereocilia • Unusually long, immotile microvilli, In sense organs (hair cells) serve as mechanoreceptors, In male reproductive system (epididymis) have absorptive function

Cilia • capable of moving fluid and particles along the epithelial surface (bronchial tree, oviducts) • present in sperm cell as flagella (forward movement)

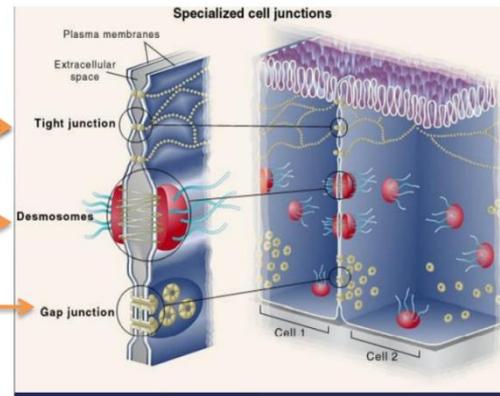
The lateral pole

Provide cellular connections • Bind cells together • Form permeability layer • Intercellular communications

Functions as a permeability barrier(ex. makes us waterproof)

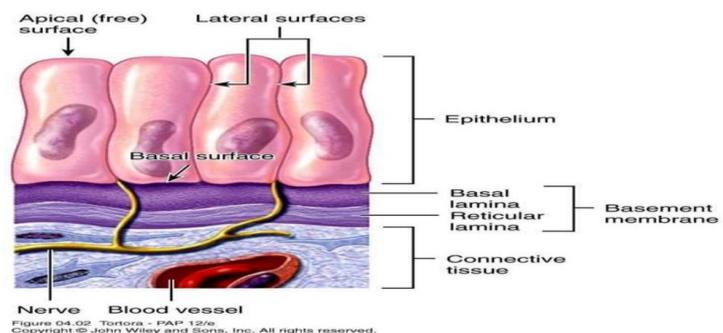
Do not prevent the flow of substances around cells

cardiac muscle – allows to spread action potential for contraction of cardiomyocytes



The basal pole : A part of the cell faced towards the basement membrane

Basement membrane a thin, fibrous, extracellular matrix that separates the epithelial cells from underlying connective tissue



Functions of the basement membrane:

- Anchoring the epithelial cells to underlying connective tissue
- Mechanical barrier
- Accelerates the differentiation of endothelial cells
- Allow nutrients and waste to diffuse

Mitotic activity . Most epithelial cells have a life span less than of the whole organism
The stratified squamous epithelium of skin is replaced in approximately 28 day
Cell in the stratum basale undergo mitosis to provide for cell renewal
As these cells differentiate they are pushed toward the surface by new cells in the basal layer
Ultimately, the cells become keratinized and slough off.
Thus a steady state is maintained within the epithelium , with new cells normally replacing exfoliated cells at the same rate. Cells arising by division in the basal layer may remain in the progenitor cell population or undergo a process of maturation as they move to surface.

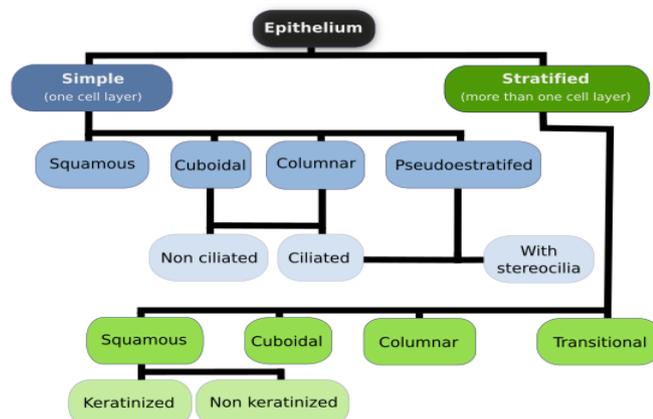
DESCRIPTIVE TERMINOLOGY

- **"Simple"** signifies a single layer of epithelial cells.
- **"Stratified"** signifies two or more layers of epithelial cells.
- A stratified epithelium is described according to the shape of cells *on its free surface*. Regardless of whether the surface cells are squamous, cuboidal, or columnar, the underlying cells are usually cuboidal.
- **Pseudostratified** signifies that two or more rows of nuclei give the (false) appearance of a stratified epithelium. But because each cell rests on the basement membrane, this is "really" a single layer of cells.

- **Squamous** (from squama, scale) describes cells that are flattened. Squamous epithelial cells are typically inconspicuous in cross section, appearing as thin lines with a bulge at the nucleus.
- **A simple squamous epithelium** is so thin as to be barely visible by light microscopy.
- A stratified squamous epithelium is quite thick, with squamous cells on the surface overlying deeper layers of taller cells.
 - **Cuboidal** describes cells that are rather box-shaped, not flattened.
 - Cuboidal epithelial cells typically appear square or rectangular in cross section, with a round, centrally placed nucleus.
 - A **cuboidal epithelium** is typical of glandular ducts.
 - **Columnar** signifies that the cells at the free surface are considerably taller than wide.
 - cells are called columnar if their height is at least twice their width, and cuboidal if not so tall.
 - A **columnar epithelium** is often associated with secretion or absorption.
 - **Glandular** describes epithelial tissue found in **glands** and specialized for exocrine or endocrine secretion.
 - **Transitional** describes a specialized type of epithelium which lines **urinary passages**.

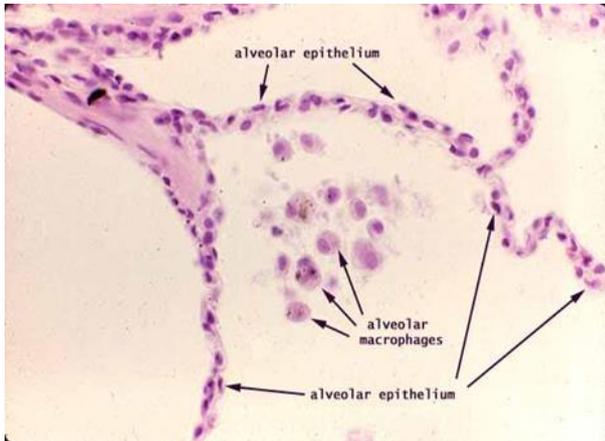
TYPES OF EPITHELIAL TISSUE

The most common types of epithelial tissue are regularly associated with particular functions and locations.

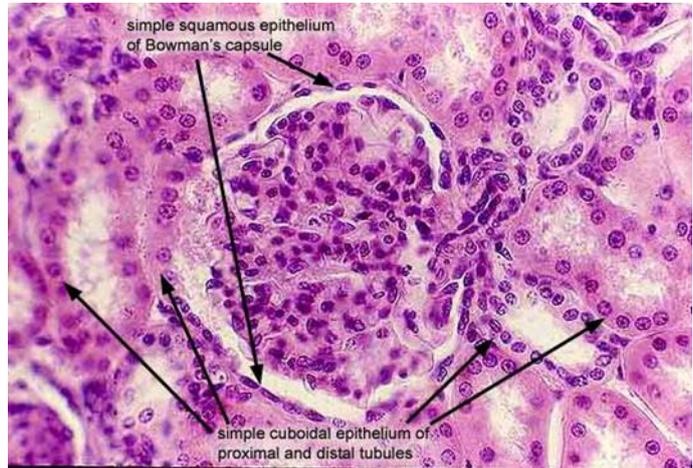


1. Simple squamous epithelium is made up of a single layer of thin, flattened cells. Because it is suited for diffusion, it functions in the exchange of gases in the lungs and lines blood and lymph vessels as well as body cavities.

Lung epithelium



Kidney epithelial

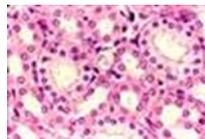


2. Simple Cuboidal Epithelium consists of a single layer of cube-shaped cells with centrally located nuclei. It functions in secretion and absorption in the kidneys, and in secretion in glands.

Duct



kidney



3. Simple Columnar Epithelium is made up of a row of elongated cells whose nuclei are all located near the basement membrane. It may be ciliated.

It lines the uterus, stomach, and intestines where it protects underlying tissues, secretes digestive fluids, and absorbs nutrients. In the intestine, these cells possess microvilli that increase the surface area available for absorption. Mucus-secreting goblet cells can be found among columnar cells.

Stomach



Small intestine



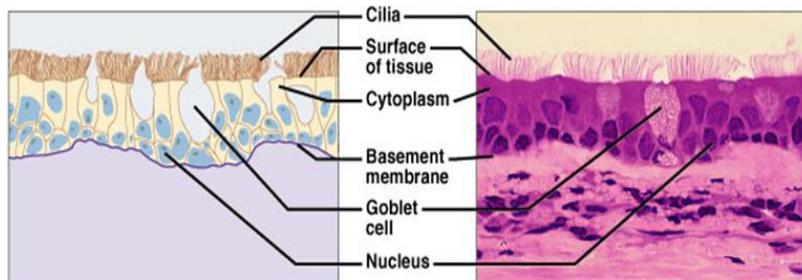
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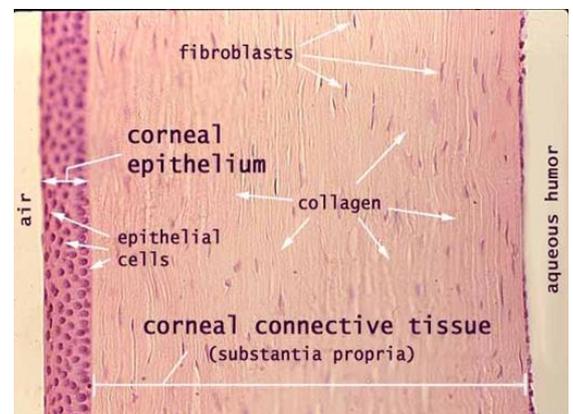
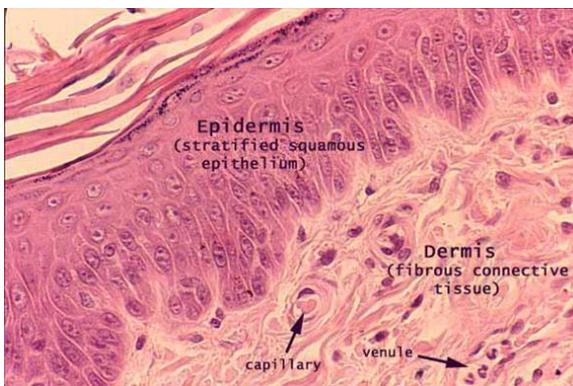
Fallopian tube



4. **pseudostratified columnar epithelium** appears stratified, typically with nuclei located in at least two more-or-less distinct levels. But in fact every cell rests on the basement membrane and characteristic of the [respiratory tract](#) and of the ducts in the [male reproductive system](#).



5. **Stratified squamous epithelium** consists of flattened (squamous) cells on the surface overlying multiple layers of cells that are usually cuboidal. Stratified squamous epithelium is usually **protective**. The multiple layers are too thick for efficient transport of materials (neither secretory or absorptive). The innermost layer continually produces cells (via mitosis) to replace those lost from the outer surface. Outer layers may be keratinized (dead and hardened) on dry surfaces such as skin. Keratinization provides extra protection against abrasion and desiccation.



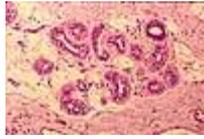
Alternatively, outer layers may be nonkeratinized on wet, mucous surfaces, such as the cornea of the eye



the lining of the upper GI tract (e.g., cheek and esophagus)

6. **Stratified Cuboidal Epithelium** This tissue consists of two to three layers of cuboidal cells lining a lumen of the mammary glands, sweat glands, salivary glands, and pancreas. Several layers of cells provide greater protection than one single layer.

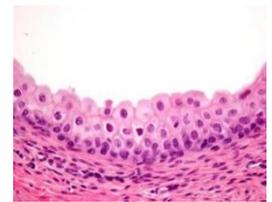
Sweet gland



7. **Stratified Columnar Epithelium** This tissue consists of several layers of cells and is found in the part of the male urethra and parts of the pharynx.



8. **Transitional Epithelium** Transitional epithelium is designed to distend and return to its normal size, as it does in the lining of the urinary bladder. This design provides distensibility and keeps urine from diffusing back into the internal cavity.



Endothelium and **mesothelium** are special names given to the lining of certain internal surfaces.

The entire [circulatory system](#) (heart, arteries, veins, capillaries, sinusoids and lymphatics) is lined by a simple squamous epithelium that is called [endothelium](#). (The inner lining of the cornea is also called "[corneal endothelium](#)," but that is a different specialized tissue.)

The major body cavities (peritoneal, pleural, pericardial) are lined by a mesodermally derived simple squamous epithelium that is called **mesothelium**.

Glandular Epithelium This tissue is made up of cells designed to produce and secrete substances into ducts or into body fluids. Glands that secrete products into ducts are exocrine; those that secrete into body fluids and blood are called endocrine. **Glands are classified by the ways** they secrete their products. **a. Merocrine glands** release fluid products by exocytosis (pancreas) and are grouped as serous which produce a watery fluid or mucus which produce a thicker, protective substance.

b. Apocrine glands lose portions of their cell bodies during secretion (mammary glands).

c. Holocrine glands release entire cells (sebaceous glands).

