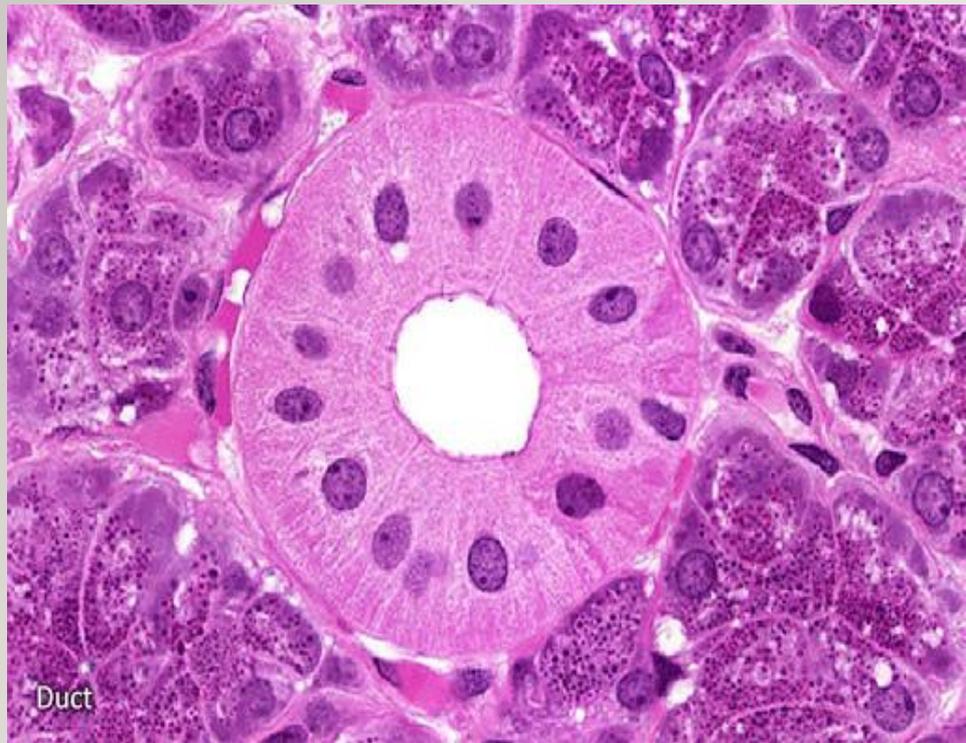




# Medical Biology – Year I



## Chapter 2: Histology

### Lecture 7

By **Lecturer: Dr. Hanaa Ali Hussein**  
Department: Basic Sciences  
College of Dentistry  
University of Basrah

# *Objectives*

- The term of the histology/tissues definition, classification, origin and general properties.
- Describe the definition, classification, origin, characteristics and functions of Epithelial tissue.
- Describe the definition and classification of Exocrine and Endocrine glandular epithelium

# Histology

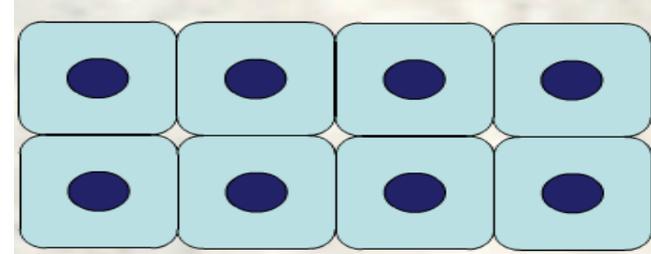
- **Histology** is a science deals with the studying of the structure, function and origin of different type of tissues.
- **The tissues** is a collection of similar cells and the substances surrounding them.
- All body tissues are originally raised from the three specialized embryonic layers: **ectoderm, mesoderm, or endoderm.**
- Tissue classification based on **structure of cells, composition of noncellular extracellular matrix, and cell function**
- **There are (4) types of tissue:**
  1. **Epithelial**
  2. **Connective**
  3. **Muscle**
  4. **Nervous**

---

# **The Epithelial Tissues**

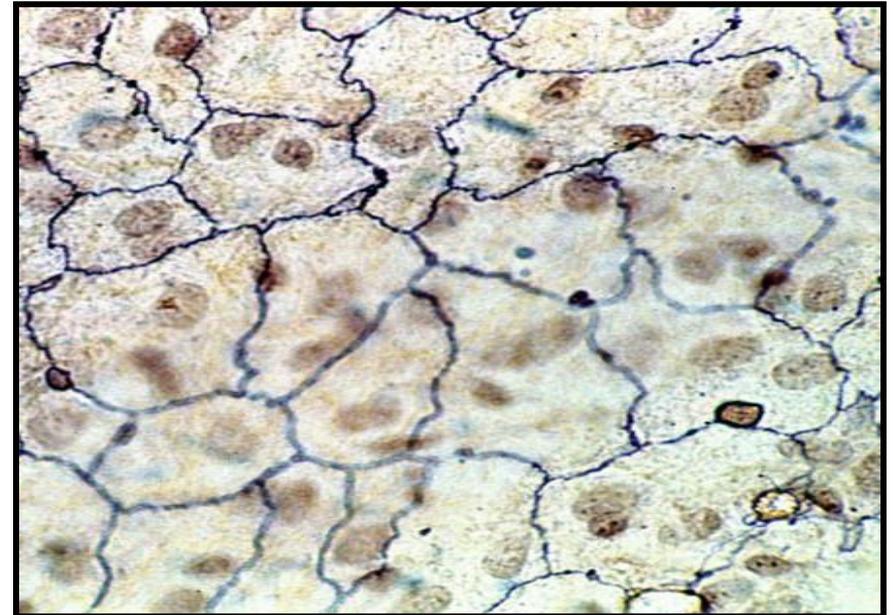
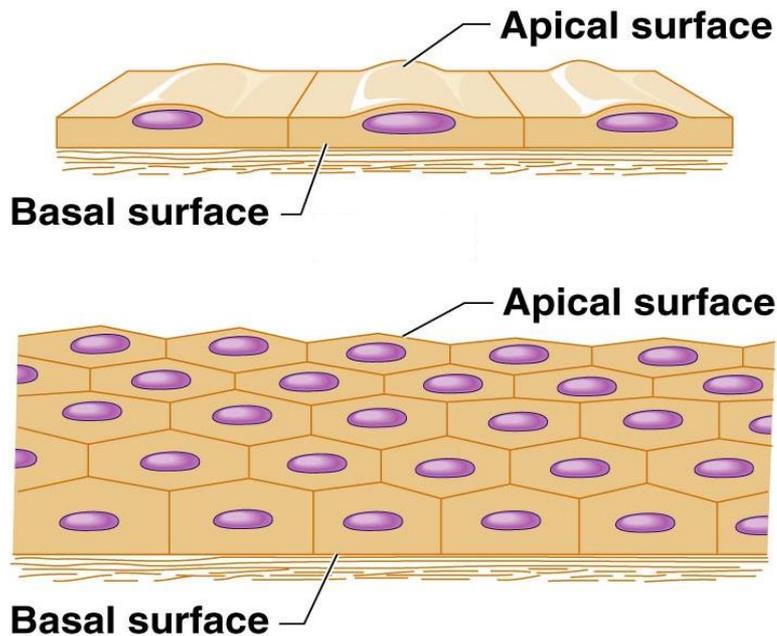
# The epithelial tissue General Characteristics

- **The epithelial tissue** consist of sheets of cells that cover the external surfaces of the body, line the internal cavities, form various organs and gland, and line their ducts.
- **Cellularity:** Epithelial cell are in contact with each other, either in a single or multiple layers.
- **Avascular:** Epithelium is nonvascular (lacks blood vessels). Oxygen, nutrients and metabolites diffuse from the blood vessels located in the underlying C.T to the epithelium. And from which the nerve ending penetrate to the epithelial tissue.



# The epithelial tissue General Characteristics

- **Polarity:** The portion of epithelial cells that faces the connective tissue is called **basal layer**, whereas the opposite side usually facing the space called **apical layer**.

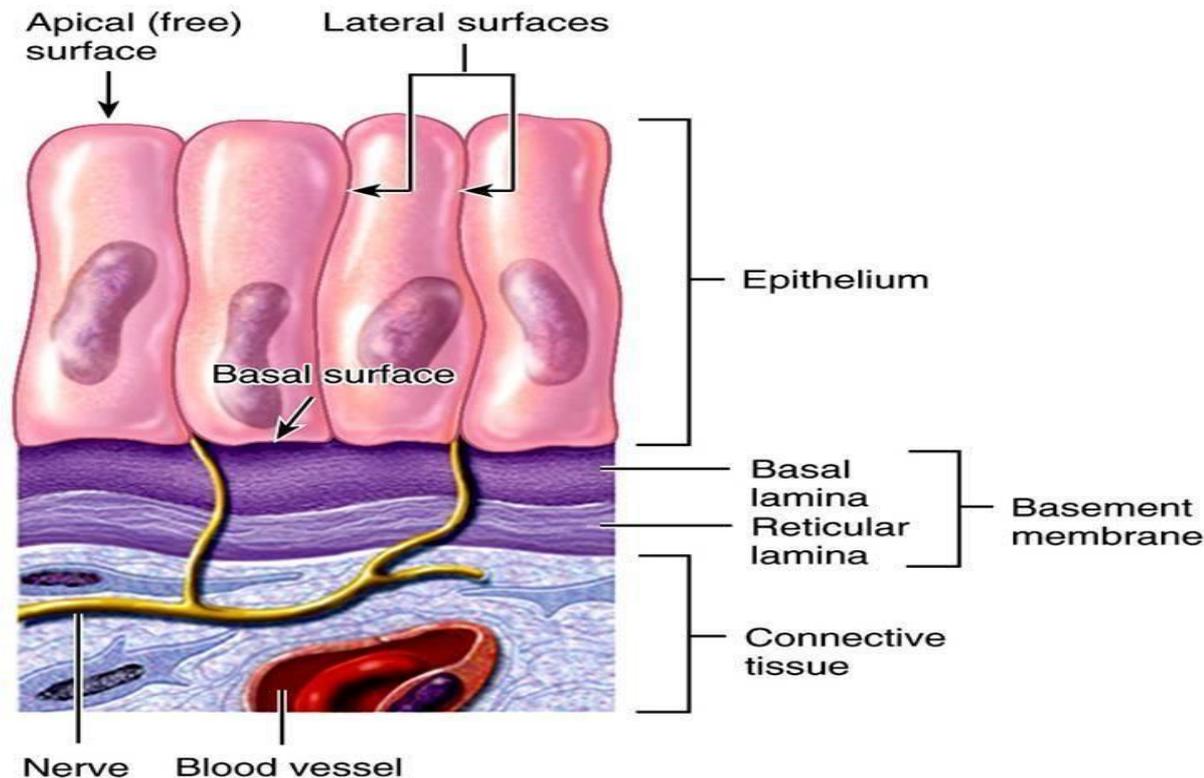


# Basement membrane

❑ **The basement membrane** is a basal layer of variable thickness, found under the epithelial cell, composed of a delicate membrane known as **basal lamina** rests on network of **reticular connective tissue fibers (reticular lamina)**, rich with blood vessels.

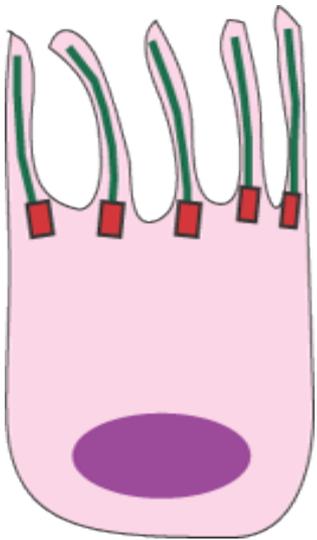
❑ **Basal lamina** consist of collagen type IV, Heparan sulfate, and fibronectin and laminin

❑ **Reticular lamina** consist of collagen type III

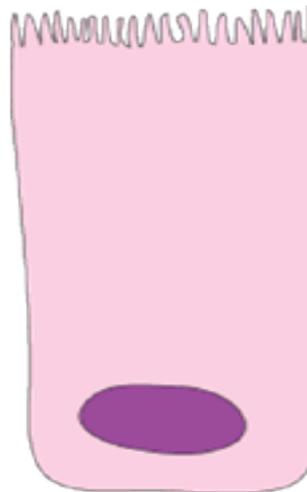


# Specialization of the cell surface

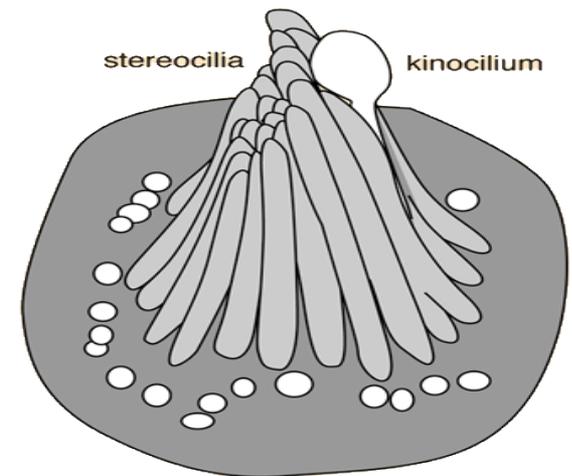
- Cilia
- Microvilli
- Stereocilia



**cilia**

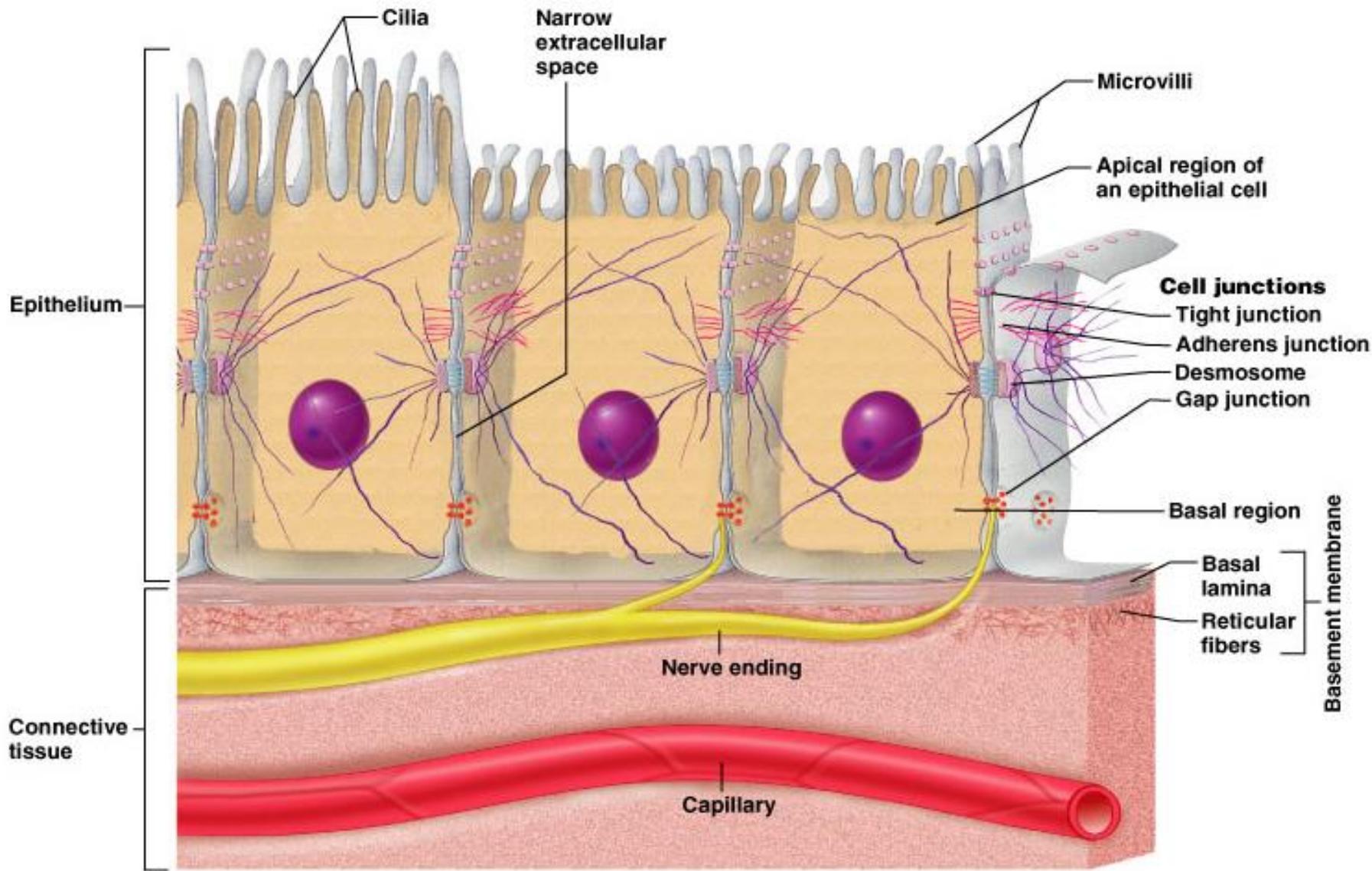


**Microvili**



**Stereocilia**

# Special Characteristics of Epithelia



# Function of Epithelial Tissue

The principle function of epithelial tissue are :

- 1- **Covering and lining** (skin, intestine)
- 2- **Absorption** ( intestine)
- 3- **Secretion** ( gland)
- 4- **Sensation** ( Olfactory neuroepithelium)
- 5- **Contractility** ( myoepithelial cells)

# Classification of Epithelium

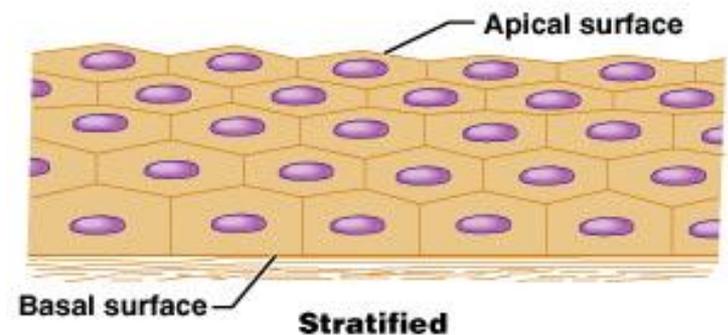
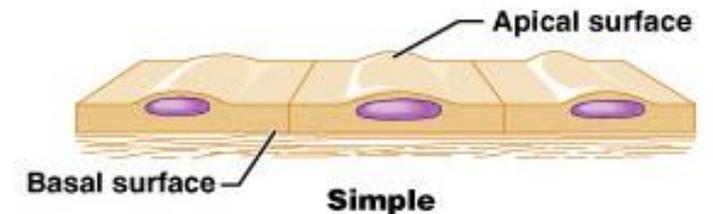
The **epithelial tissue** can be classified according **functional specialization** into two type:-

## 1- Lining and covering epithelia

Epithelial tissue covers the external and internal surfaces, including cavities and tubes of the body, can be Classified by number of layers into :-

➤ **Simple**- one layer of cells. Each extends from basement membrane to the free surface

➤ **Stratified**- more than one layer.



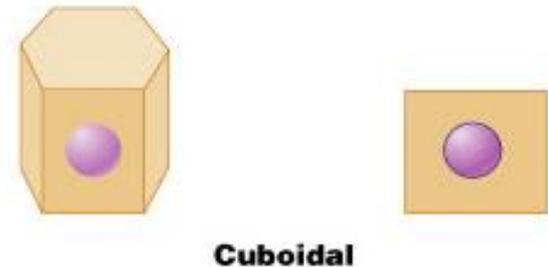
# Classifications of Epithelia

## ■ Classified by shape of surface cells

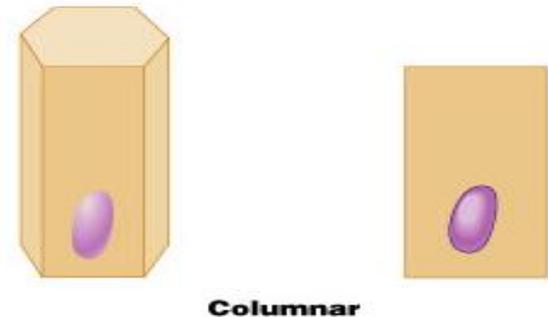
□ **Squamous** – cells wider than tall (plate or “scale” like)



□ **Cuboidal** – cells equal in height and width



□ **Columnar** – cells are taller than they are wide, like columns

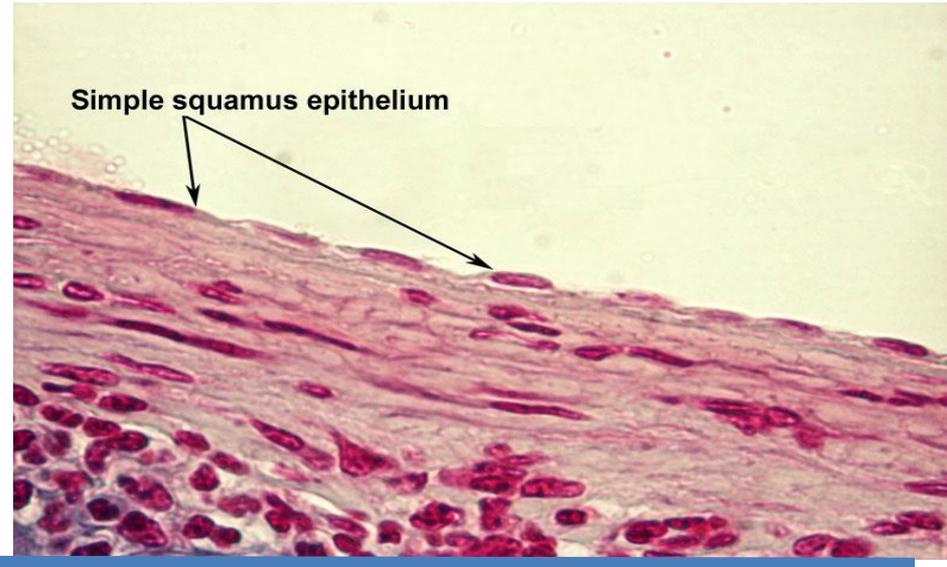
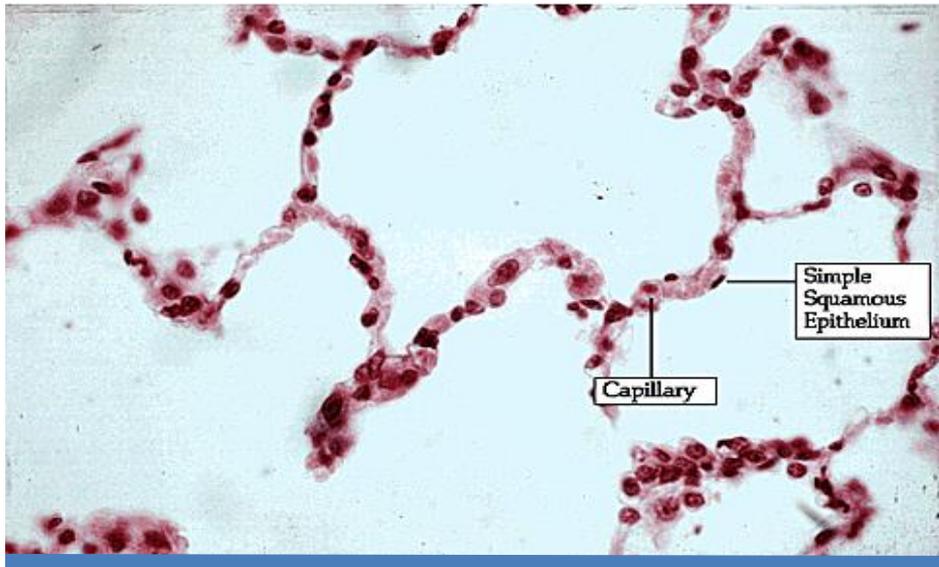


# The simple Epithelia

- ▶ The simple epithelium consists of single layer of cells, which are classified according to the morphology of that cells into four different type .
  - 1- Simple squamous epithelium
  - 2- Simple cuboidal epithelium
  - 3- Simple columnar epithelium
  - 4- pseudostratified epithelium

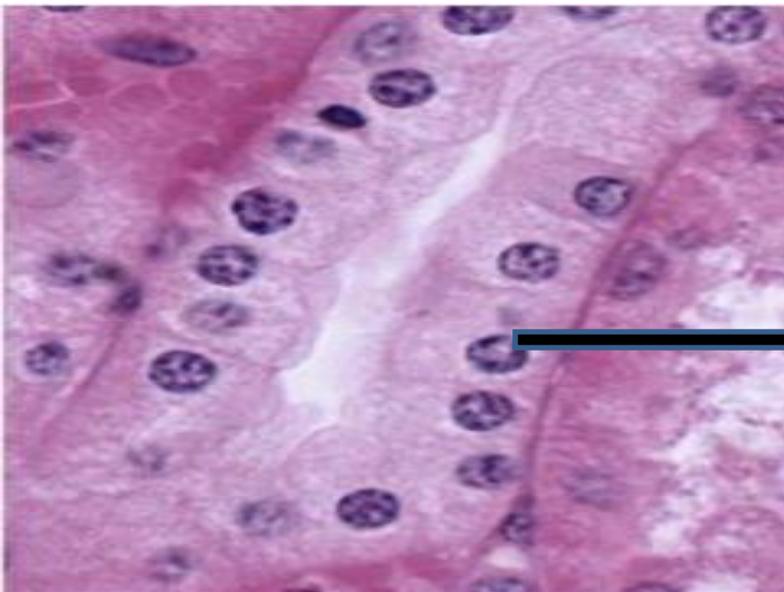
# 1- Simple squamous epithelium

- **Simple squamous (SS)** tissue is composed of flat, scale-like cells consists of flattened nuclei surrounded by little indistinct cytoplasm .
- The epithelium that covers the external surfaces of the digestive organs, lung and heart called **mesothelium**, while the epithelium that covers the Lumina of the heart chambers, blood vessels is called **endothelium**
- **Function :-** Allows for rapid diffusion across the epithelium.
- Secretes lubricating substances in serous membranes

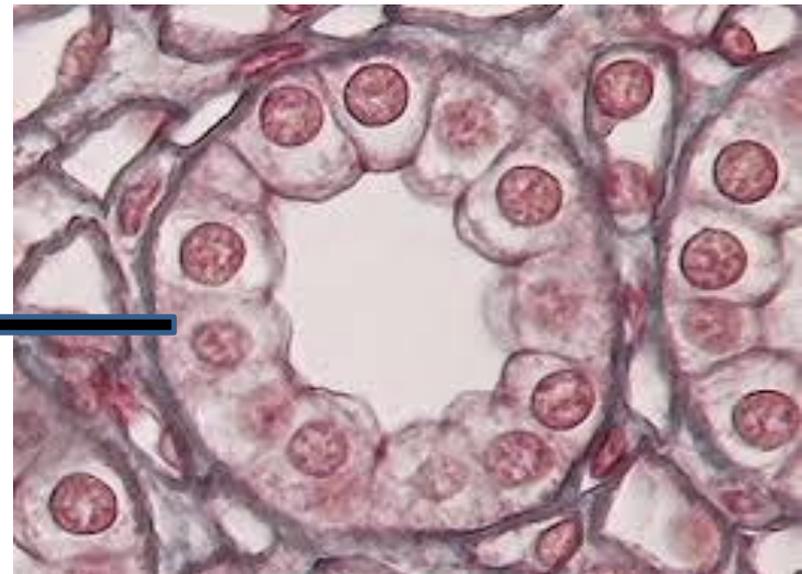


# 1- Simple cuboidal epithelium

- ❖ This tissue is composed of a single layer of **cubical cells** have equal dimensions. The cells consists of **centric spherical nuclei**, appear at one level in all epithelial cells.
- ❖ It lines the walls of **kidney tubules**, covers the surface of **ovaries**, and is common in **glands** and their ducts.
- ❖ **Function.** Usually have a role in active transport or synthesis.



**L.S in kidney**



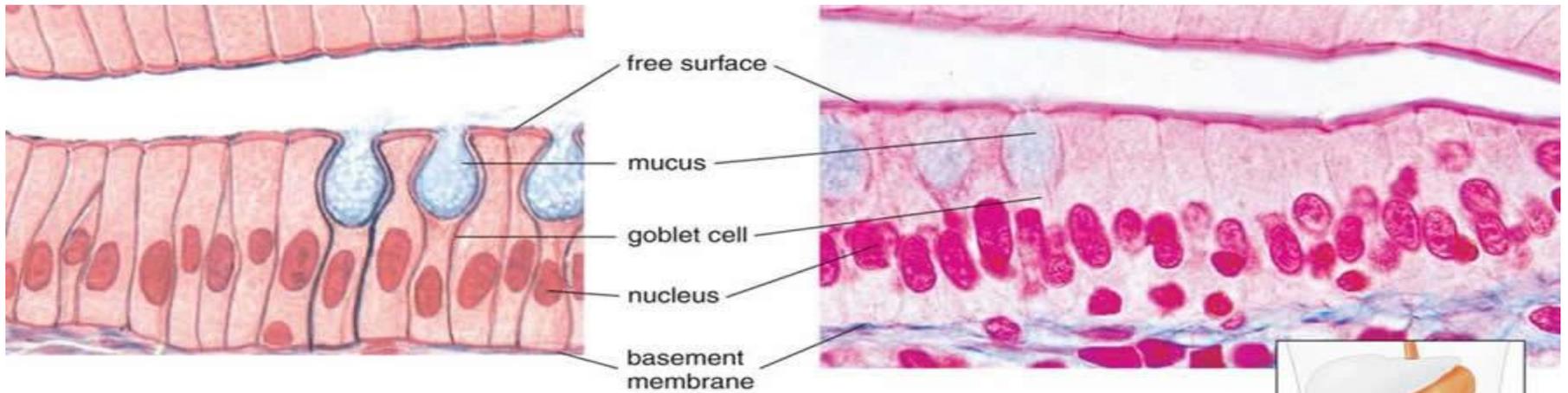
**T.S in kidney**

Cuboidal  
cell



# 1- Simple columnar epithelium

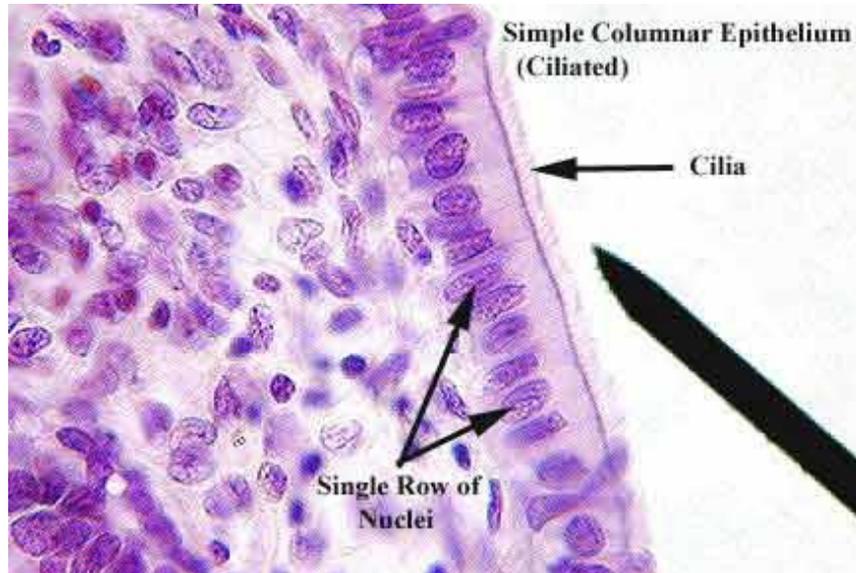
- ❑ This tissue is composed of a **single layer of tall cells**, their height is 2-3 times greater than their width.
- ❑ **The nuclei** are elongated and are usually located near the base of the cells.
- ❑ **Columnar epithelium** forms the lining of the **gastric gland** of the stomach and intestines, the **gall bladder**, and **fallopian tube** of the uterus.
- ❑ **Goblet cells (unicellular glands)** are found between the columnar epithelial cells of the stomach and small intestine to secrete mucous material that protect the surface of the cells from the acidic environment.
- ❑ **Cilia** are found in the surface of columnar epithelial cells. Ciliated epithelium is usually found in the air passages like the nose. It is also found in the uterus and Fallopian tubes of females. Which assist in movement of the ovum from the ovary to the uterine wall.
- ❑ **Function.** Metabolically active cells — absorption, synthesis.



**Simple Columnar Epithelium**

**Location:**  
Lines gastrointestinal tract; the ducts of many glands

**Function:**  
Protection; secretion; absorption



# 4- Pseudostratified Epithelium

- **The pseudostratified epithelium** has two kinds of cells, **tall columnar and short polyhedral**, both are sit on one basement membrane, but only the tall type reaches the free surface.
- Variation in height of the cells and the location of nuclei at different level give the appearance of a stratified epithelium.
- found lining of the **respiratory tract and much of the male reproductive system**.
- The epithelium of the trachea are also consisting of **goblet cells** secrete mucous and **cilia** spread the mucous overall the surface of the epithelial cells to protect the cells from drying and to get rid of trapped dust particles away from the trachea.
- **Function :-** Provides protection

