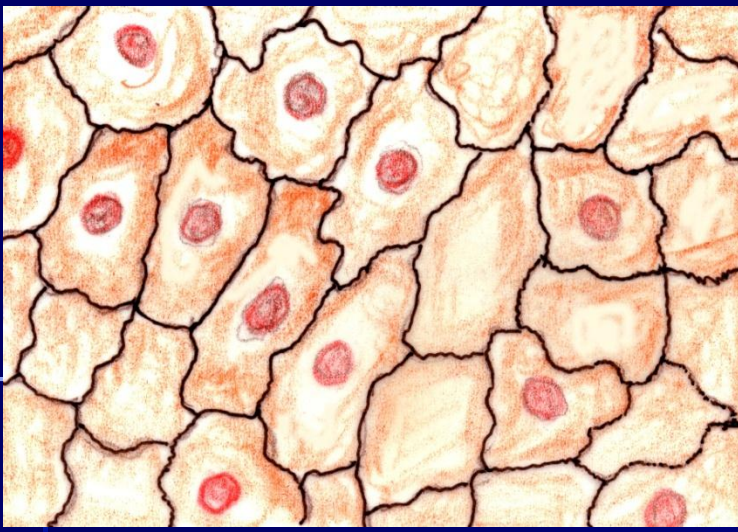


# Histology

م.م نسيم عماد دايم



Simple Cuboidal Epithelium  
Kidney, urinary tubules

# Epithelial Tissues



Simple Cuboidal Epithelium  
Kidney, medulla

# Tissues – Introduction

- a group of similar cells specialized to carry on a particular function
- tissue = cells + extracellular matrix
- There are 4 types of tissues :
  - epithelial = covers exposed surfaces, lines passageways and forms glands.
    - protection, secretion, absorption
    - connective = fills internal space , support soft body parts and bind structures together
  - muscle = contracts for specific movements.
  - nervous = carries information from one part of the body to another.

# Epithelial Tissues

## Characteristics

- free surface open to the outside or an open internal space
- basement membrane anchors epithelium to underlying connective tissue
- lack blood vessels
- readily divide (ex. skin healing)
- tightly packed with little extracellular space

# Epithelial Classifications

- classified based on shape and number of cell layers.
- shape
  - squamous = thin, flat cells
  - cuboidal = cube-shaped cells
  - columnar = tall, elongated cells
- number
  - simple = single layer
  - stratified = 2 or more layers



**Squamous**



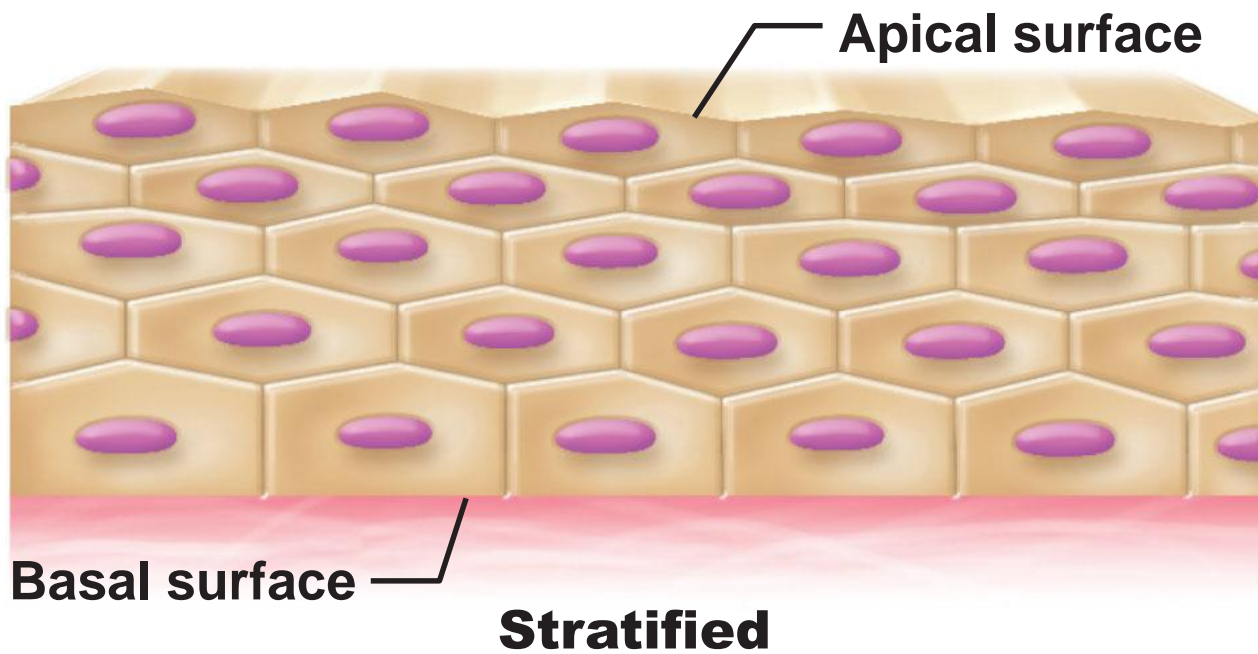
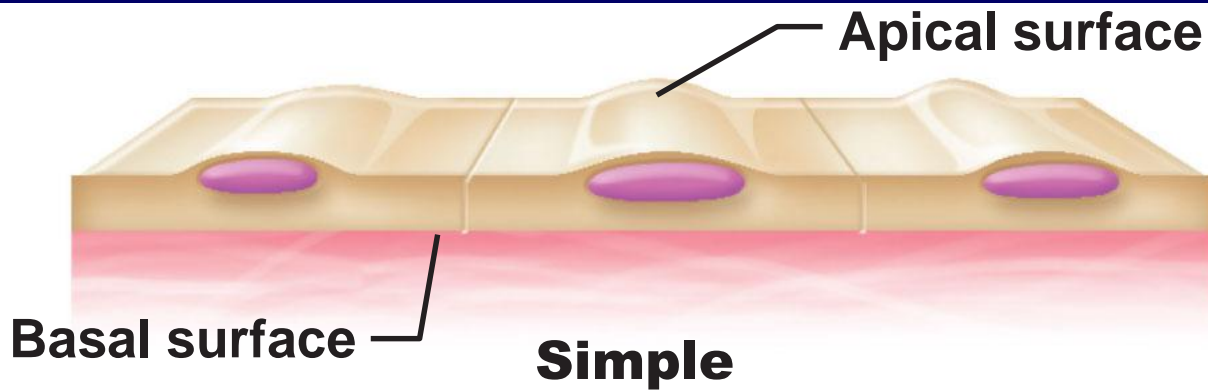
**Cuboidal**



**Columnar**

**Classification based on cell shape.**





**Classification based on number of cell layers.**

**Figure 4.3a Epithelial tissues**

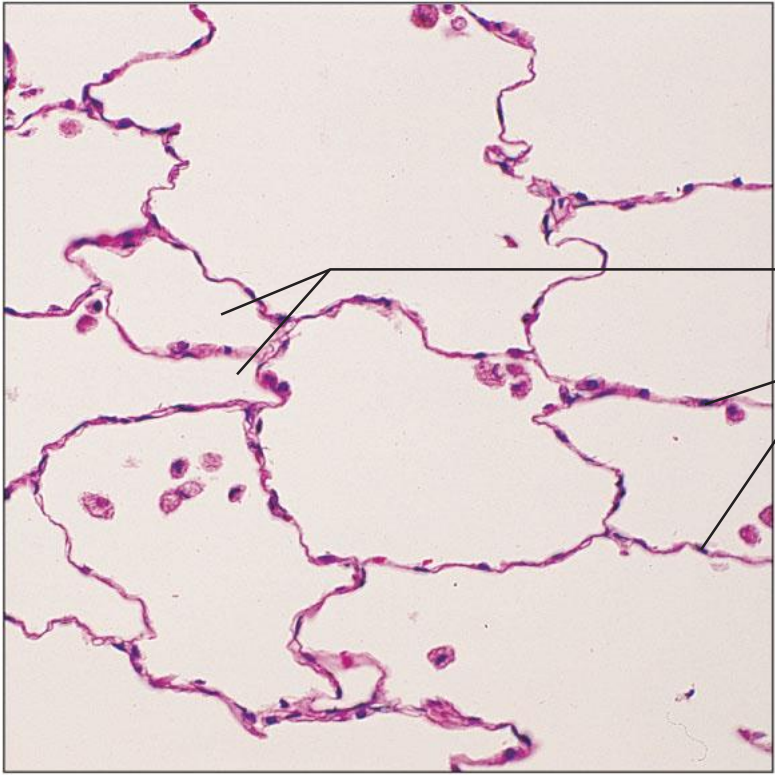
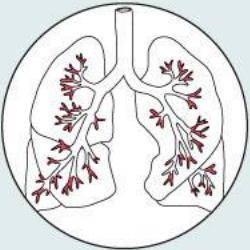
**(a) Simple squamous epithelium**

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



**Function:** Allows passage of materials by diffusion and filtration in sites where protection is not important; secretes lubricating substances in serosae.

**Location:** Kidney glomeruli; air sacs of lungs; lining of heart, blood vessels, and lymphatic vessels; lining of ventral body cavity (serosae).



Air sacs of lung tissue  
Nuclei of squamous epithelial cells

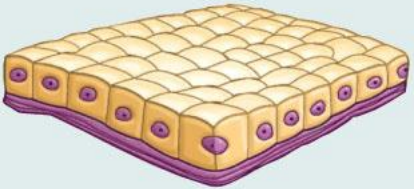
**Photomicrograph:** Simple squamous epithelium forming part of the alveolar (air sac) walls (125x).



Figure 4.3b Epithelial tissues.

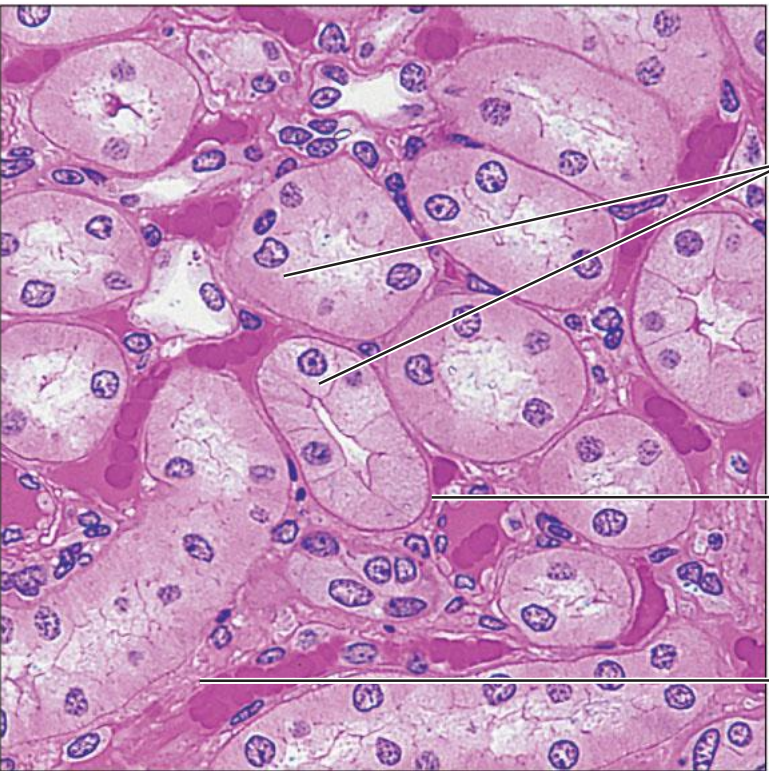
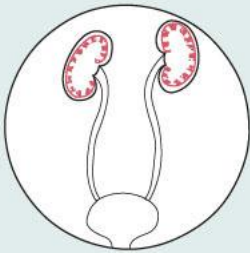
**(b) Simple cuboidal epithelium**

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



**Function:** Secretion and absorption.

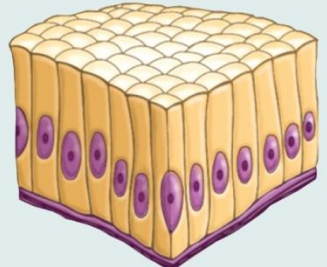
**Location:** Kidney tubules; ducts and secretory portions of small glands; ovary surface.



**Photomicrograph:** Simple cuboidal epithelium in kidney tubules (430x).

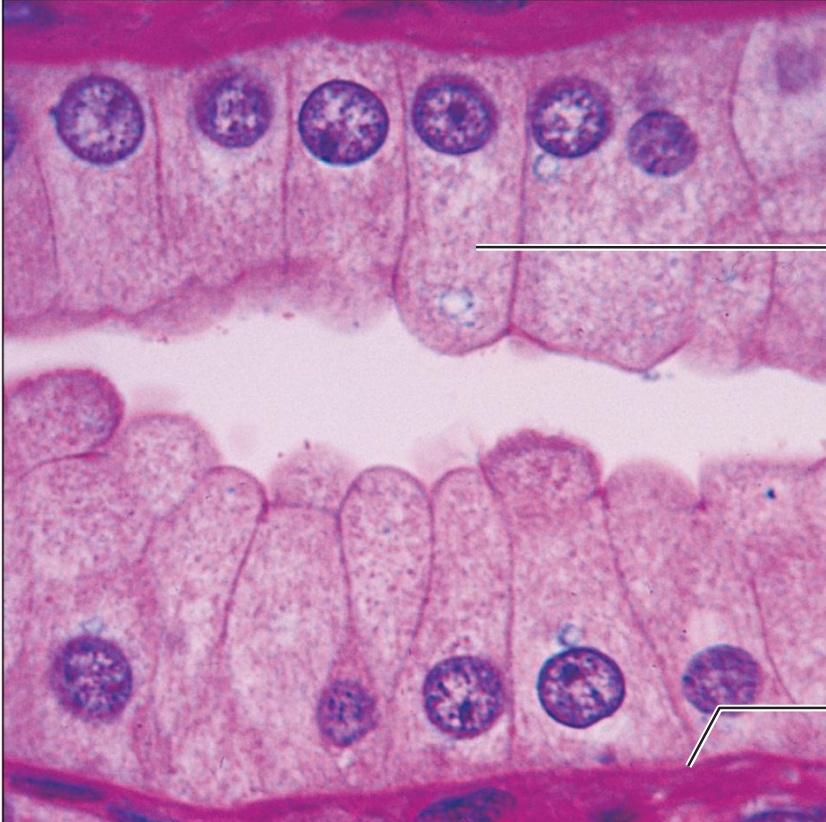
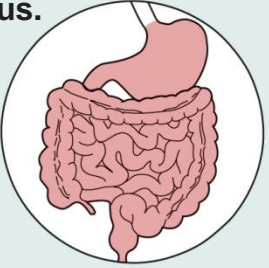
(c) Simple columnar epithelium

**Description:** Single layer of tall cells with *round to oval* nuclei; some cells bear cilia; layer may contain mucus-secreting unicellular glands (goblet cells).



**Function:** Absorption; secretion of mucus, enzymes, and other substances; ciliated type propels mucus (or reproductive cells) by ciliary action.

**Location:** Nonciliated type lines most of the digestive tract (stomach to anal canal), gallbladder, and excretory ducts of some glands; ciliated variety lines small bronchi, uterine tubes, and some regions of the uterus.



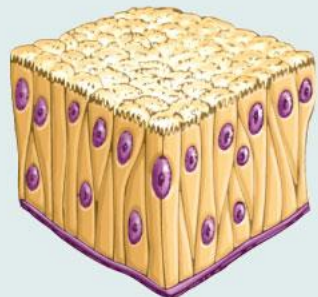
Simple columnar epithelial cell

Basement membrane

**Photomicrograph:** Simple columnar epithelium of the stomach mucosa (860X).

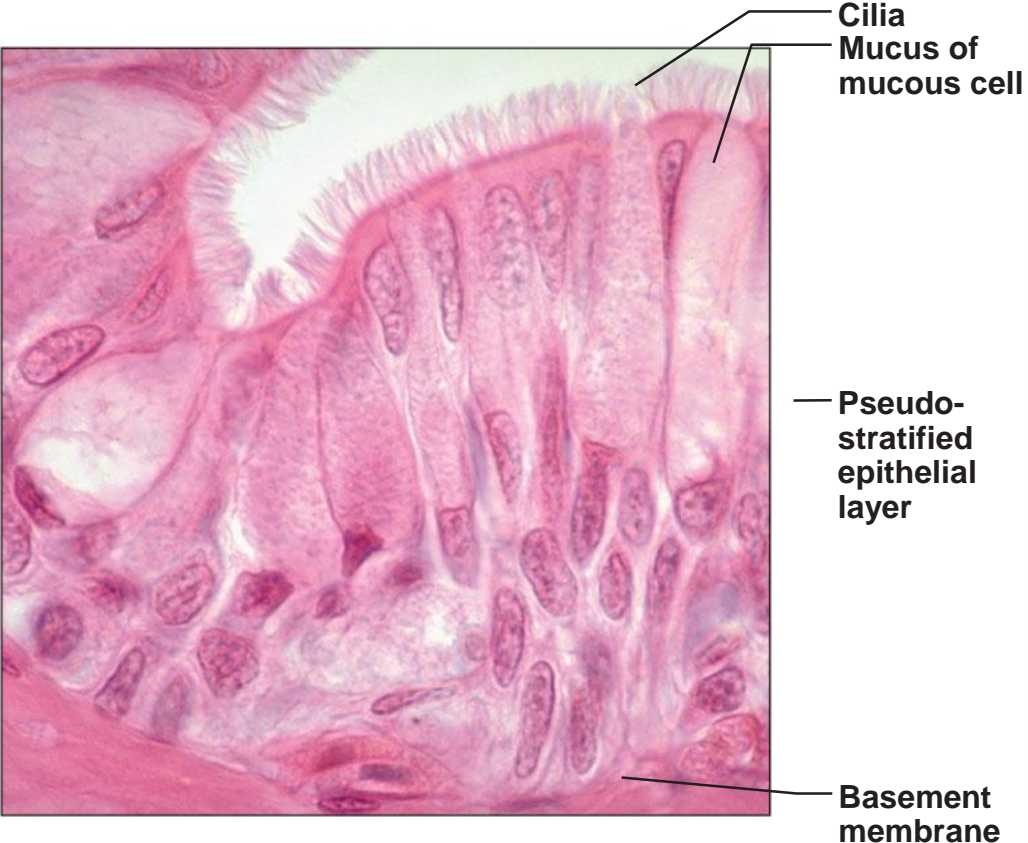
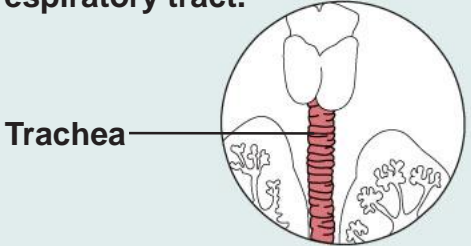
(d) Pseudostratified columnar epithelium

**Description:** Single layer of cells of differing heights, some not reaching the free surface; nuclei seen at different levels; may contain mucus-secreting cells and bear cilia.



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

**Location:** Nonciliated type in male's sperm-carrying ducts and ducts of large glands; ciliated variety lines the trachea, most of the upper respiratory tract.



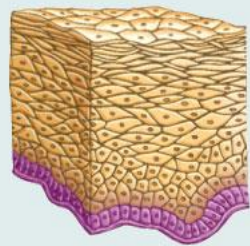
**Photomicrograph:** Pseudostratified ciliated columnar epithelium lining the human trachea (570x).



**Figure 4.3e Epithelial tissues**

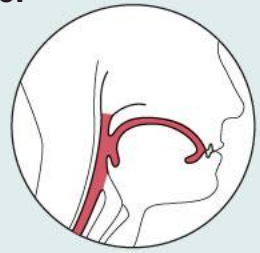
**(e) Stratified squamous epithelium**

**Description:** Thick membrane composed of several cell layers; basal cells are cuboidal or columnar and metabolically active; surface cells are flattened (squamous); in the keratinized type, the surface cells are full of keratin and dead; basal cells are active in mitosis and produce the cells of the more superficial layers.



**Function:** Protects underlying tissues in areas subjected to abrasion.

**Location:** Nonkeratinized type forms the moist linings of the esophagus, mouth, and vagina; keratinized variety forms the epidermis of the skin, a dry membrane.



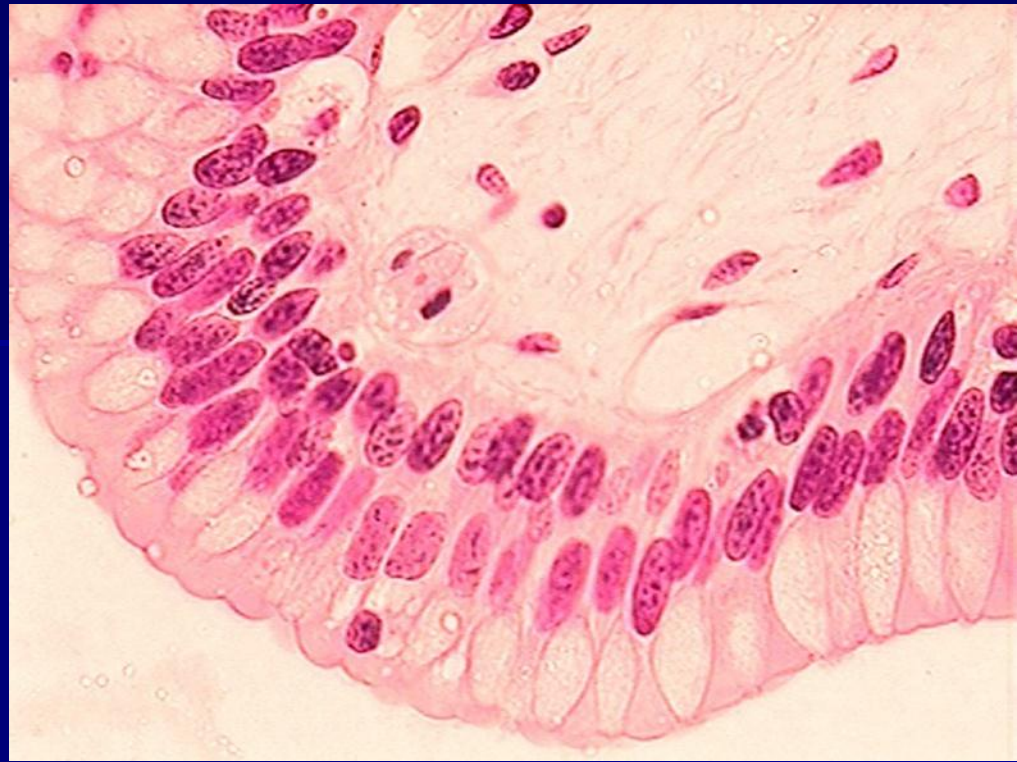
Stratified squamous epithelium  
Nuclei  
Basement membrane  
Connective tissue

**Photomicrograph:** Stratified squamous epithelium lining the esophagus (285x).

- **Stratified cuboidal epithelium**

- 2 or 3 layers of cuboidal cells
- protection
- linings of larger ducts of mammary glands, sweat glands, salivary glands, and pancreas





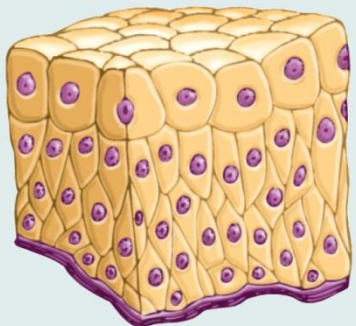
- **Stratified columnar epithelium**
- protection and secretion
- vas deferens, part of the male urethra, parts of the pharynx (throat)



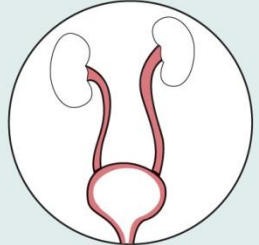
Figure 4.3f Epithelial tissues.

(f) Transitional epithelium

**Description:** Resembles both stratified squamous and stratified cuboidal; basal cells cuboidal or columnar; surface cells dome shaped or squamous like, depending on degree of organ stretch.



**Location:** Lines the ureters, urinary bladder, and part of the urethra.



— Transitional epithelium  
— Basement membrane  
— Connective tissue

**Photomicrograph:** Transitional epithelium lining the urinary bladder, relaxed state (360X); note the bulbous, or rounded, appearance of the cells at the surface; these cells flatten and become elongated when the bladder is filled with urine.

Thank you for  
listening