stratified epithelium

Assistant Lecturer : fatima tawfik alkhuzaie

جامعة المستقبل/ كلية الطب

college of medicine

Epithelial Tissue Classification

Epithelial tissues are classified based on:

1.Cellular Morphology (Shape):

- **Squamous = flat**
- **Cuboidal = cube-shaped**
- **Columnar = tall and rectangular**

2. Number of Cell Layers:

- **Simple epithelium = single layer of cells**
- **Stratified epithelium = multiple layers of cells**

B. Stratified Epithelium

1. Stratified Squamous Epithelium

This type serves protective functions, including:

- **Barrier against microorganisms**
- **Prevention of water loss**

Types:

a. Keratinized Stratified Squamous Epithelium

- **Found in skin (especially thick skin)**
- **Composed of several cell layers:**
  - **Superficial layer: Dead cells, no nuclei, filled with keratin (stratum corneum)**
  - **Middle layers: Polyhedral cells**
  - **Basal layer: Cuboidal stem cells, located near the basement membrane, responsible for continuous cell division and migration**
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- **The keratin layer is thicker in thick skin than in thin skin**

b. Non-Keratinized Stratified Squamous Epithelium

- Found in wet surfaces, such as:
  - Mouth
  - Oral pharynx
  - Esophagus
  - True vocal cords
  - Vagina
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- Similar structure to keratinized type except:
  - Surface cells retain their nuclei
  - No keratinization of surface cells
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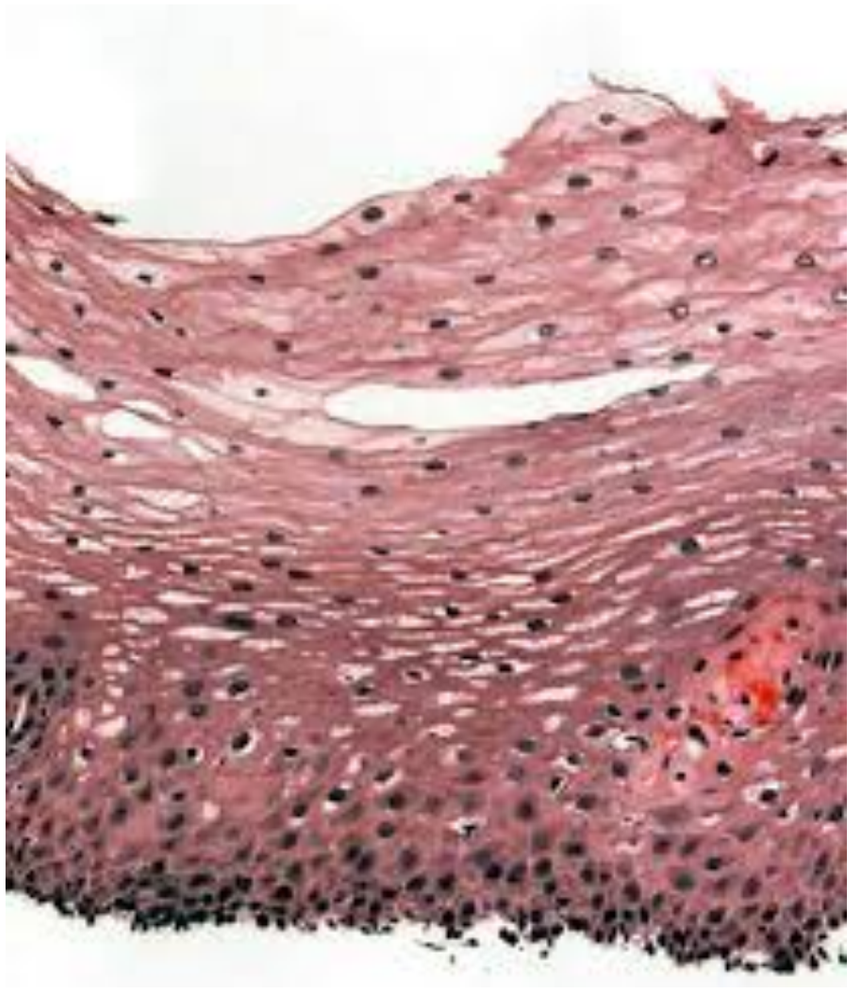
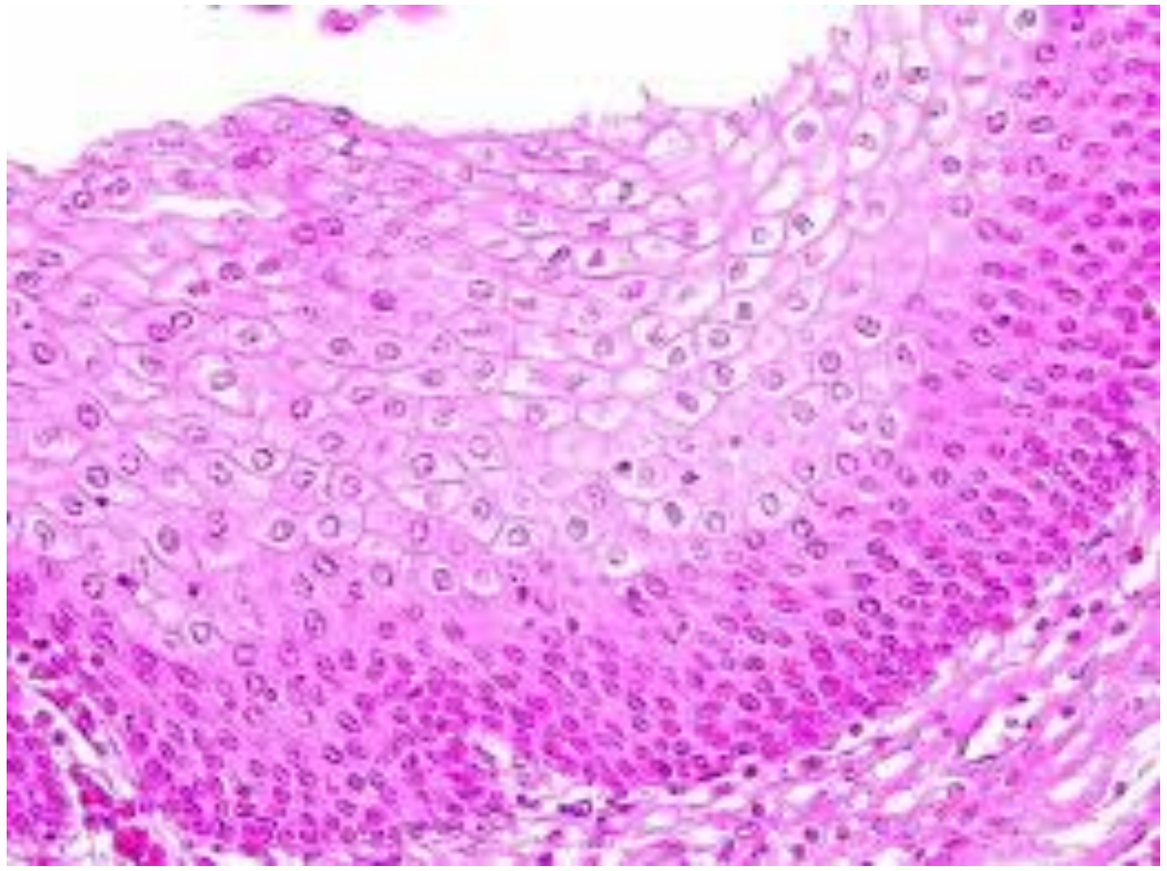
Non-Keratinized	Keratinized	Feature
Living cells with nuclei	Dead cells with **keratin**, no nuclei	Surface layer
Mouth, vagina, esophagus, etc.	**Skin** (especially thick skin)	Location
Protection in **moist environments**	Protection, water loss prevention	Function





2-Stratified Cuboidal Epithelium

Definition:

- A rare type of epithelium
- Made up of 2 (sometimes 3) layers of cuboidal cells

Location:

- Ducts of salivary glands
- Sweat glands
- Large exocrine gland ducts (limited distribution in the body)

Structure:

- Top layer: Uniform cuboidal cells
- Basal layer: May appear incomplete
- Nuclei: Usually centrally located
- Apical surface: Smooth

Function:

- Acts as a conduit (channel) for the secretory products of the gland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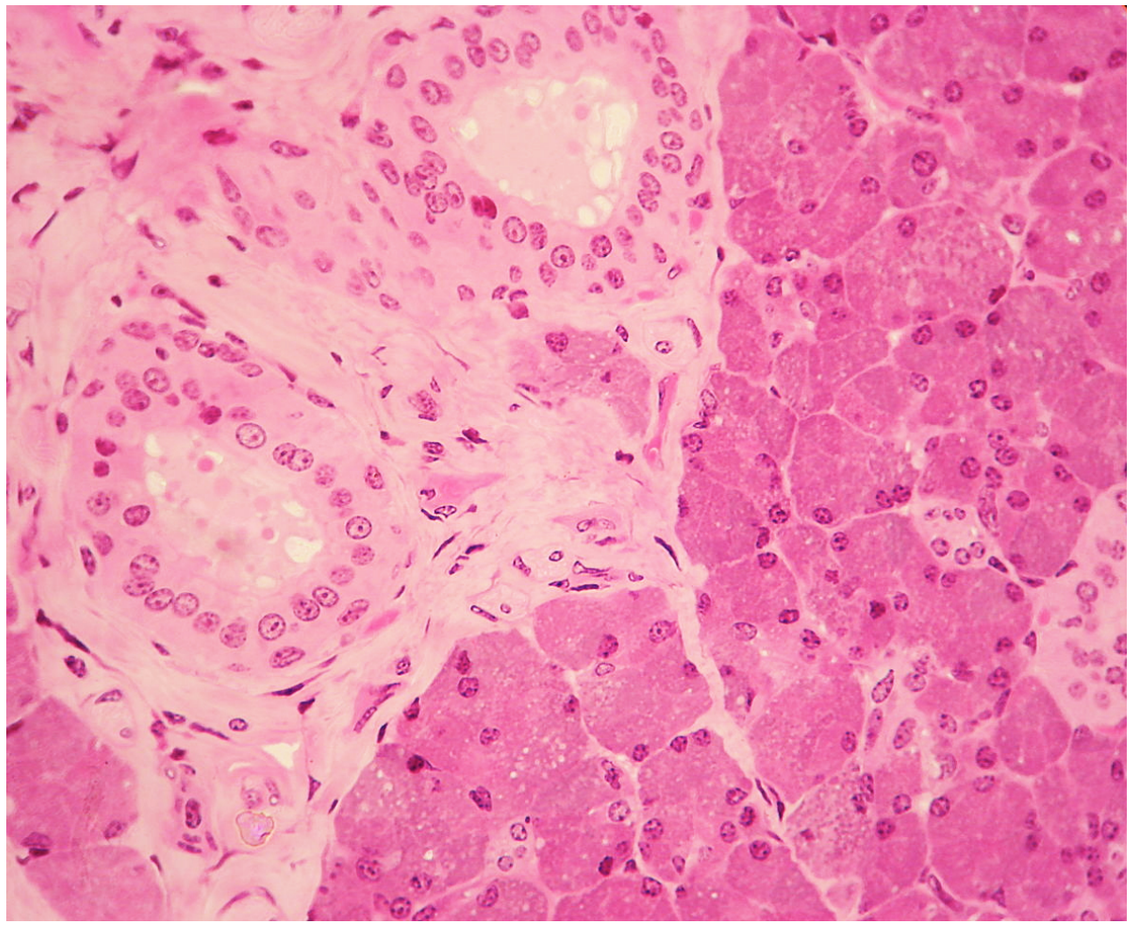


3-Stratified Columnar Epithelium

Definition:

- Rare epithelial tissue
- Composed of multiple layers of cells
- Top layer: Columnar cells
- Basal layer: Usually cuboidal cells

Structure:

- Usually consists of 2–3 layers
- Surface cells are tall and column-shaped
- Basal cells are cuboidal, supporting the upper layer

Location (limited distribution):

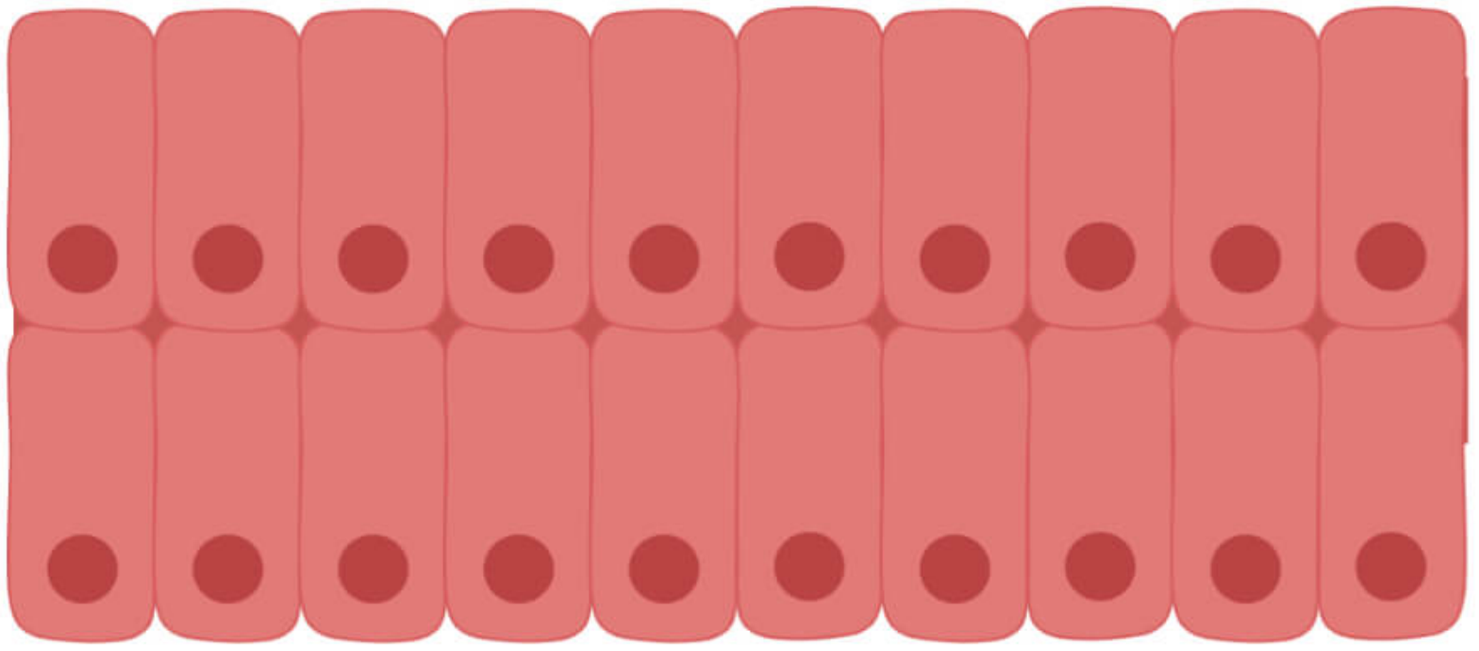
Found in selected areas, including:

- Larger ducts of some exocrine glands
- Ocular conjunctiva (eye)
- Parts of the pharynx and anus
- Female uterus
- Male urethra and vas deferens
- Intralobular ducts of salivary glands

Functions:

- Secretion
- Protection

Stratified Columnar Epithelium



4-Transitional Epithelium (Urothelium)

Definition:

- Specialized stratified epithelium
- Found exclusively in the urinary system
- Named “transitional” because its cells change shape depending on bladder distention

Location:

- Urinary bladder
- Ureters
- Major calyces of the kidney

Structure:

- In the relaxed state (when bladder is empty):
  - Contains 4 to 6 cell layers
  - Surface cells are dome-shaped
  - Surface cells may be binucleate (often called umbrella cells)
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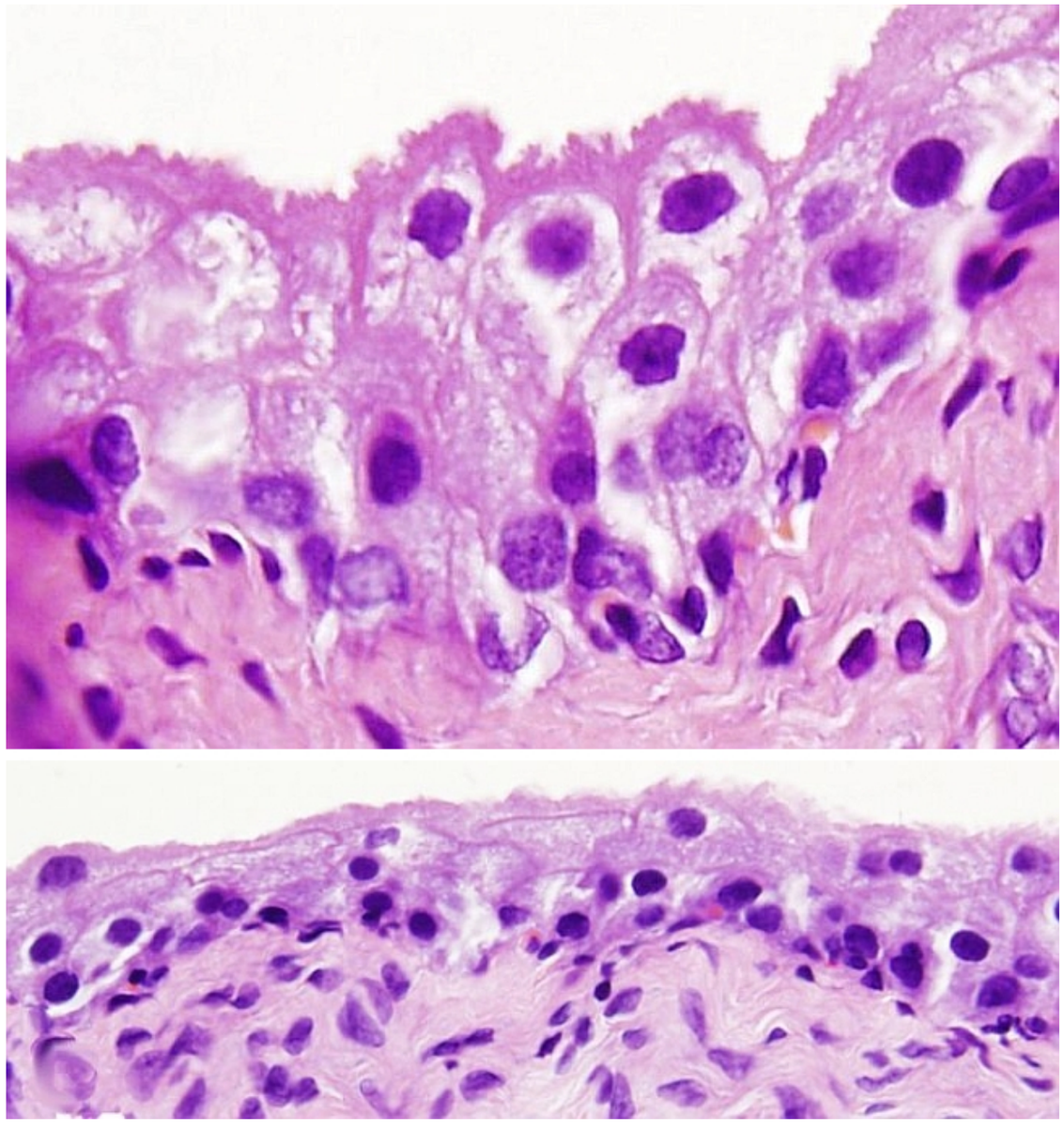
- In the stretched state (when bladder is full):
  - Surface cells flatten and resemble squamous cells
  - The epithelium becomes thinner

Function:

- Allows expansion and contraction of the urinary organs
- Provides protection against:
  - Hypertonic urine
  - Cytotoxic effects of urine




Transitional Epithelium

Epithelia: Some Clinical Considerations

Regeneration: epithelial cells have a capacity for regeneration (e.g. in skin wound healing, in the replacement of surface cells of the skin and cells lining the gastro-intestinal tract and the renewal of uterine lining cells following menstruation.

Metaplasia: some epithelia have the capacity to change from one type to another (e.g. in heavy smoker ,the pseudostratified columnar epithelium of the respiratory tract may become stratified squamous in type)

Neoplasia: in disease (e.g. in cancer) changes may occur in epithelia giving rise to a tumor (neoplasm)which is termed a carcinoma . The cells in benign tumors resemble those of their tissue of origin but those in malignant tumors have altered or abnormal cell structure and also invade adjacent tissues


Thank
you!