

Epithelial Tissue

Objectives:

By the end of this lecture, you should be able to:

- Describe general characteristics of epithelial tissue.
- Discuss microscopic structure and distribution of different types of epithelial membranes.
- Classify glandular epithelium according to different parameters.
- Enumerate the functions of epithelial tissue.
- Understand the following clinical applications:
 - Immotile cilia syndrome (Kartagener's syndrome).
 - Metaplasia.

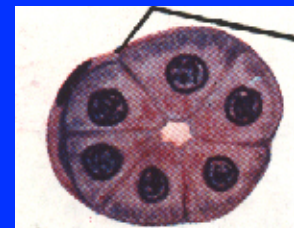
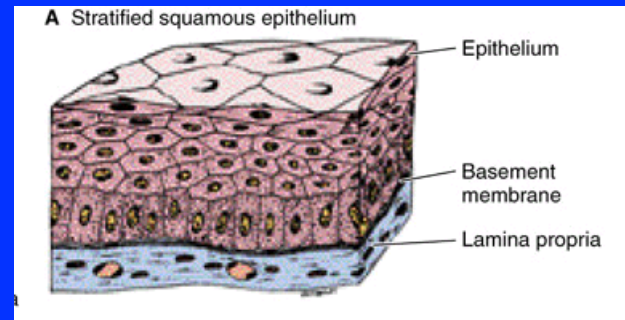
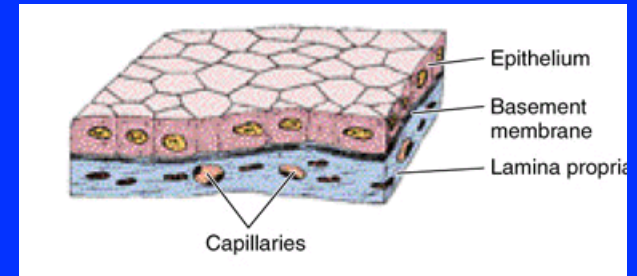
EPITHELIAL TISSUE

General characteristics:

- Cells are **tightly joined** with **little intercellular space**.
- Rest on a **basement membrane**.
- **Avascular**.
- High power of **regeneration**.

Classification:

- **Epithelial membranes:**
 - Simple epithelium: one layer.
 - Stratified epithelium: more than one layer.
- **Glands (Glandular Epithelium).**



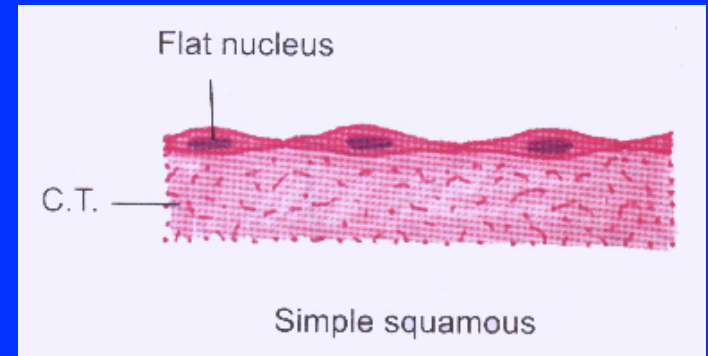
I. Simple Epithelium

1- Simple Squamous Epithelium:

One layer of flat cells with flat nuclei. Provides smooth thin surface.

Examples of sites:

- Endothelium (lining the CVS “cardiovascular system”).
- Alveoli “air sacs” of lung.



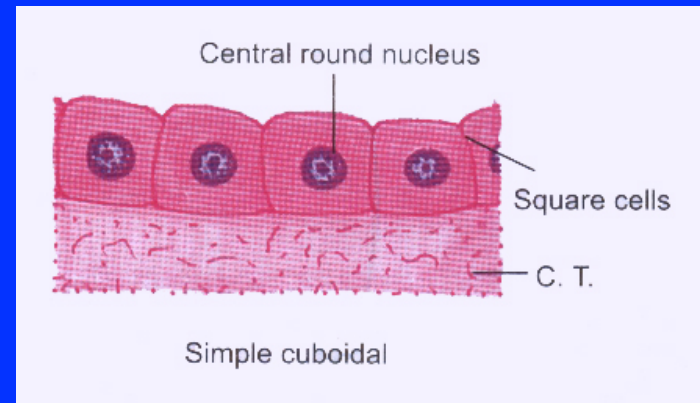
I. Simple Epithelium

2- Simple Cuboidal Epithelium:

One layer of cuboidal cells with central rounded nuclei.

Example of sites:

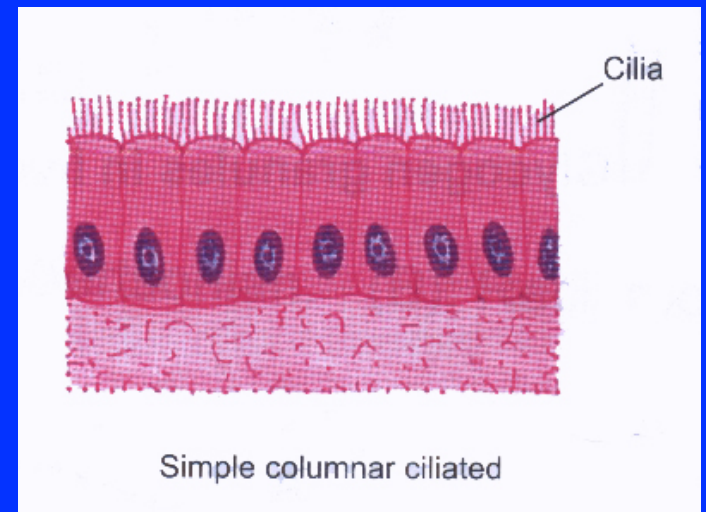
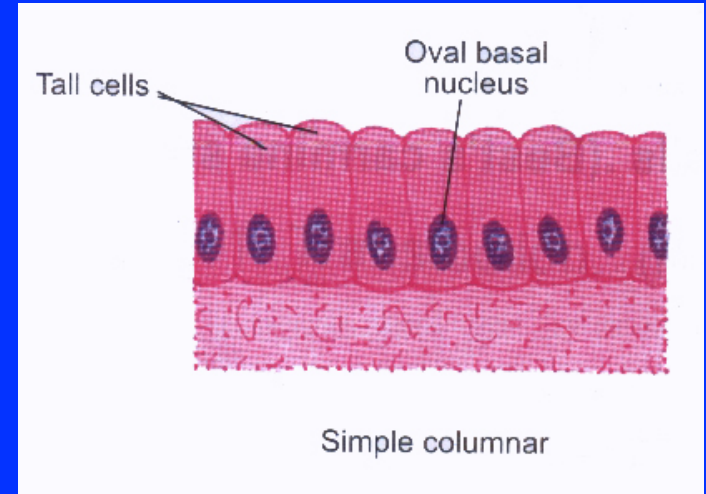
- Thyroid follicles.



I. Simple Epithelium

3- Simple Columnar Epithelium:

- One layer of columnar cells with basal oval nuclei.
- Types:
 - » Non-ciliated:
Example of sites: Lining of stomach, gall bladder, and intestines (with goblet cells).
 - » Ciliated: with cilia on free surface.
Example of sites: Fallopian tubes.



I. Simple Epithelium

4- Pseudo-Stratified Columnar:

- One layer of columnar cells.
- Some cells are tall.
- Others are short and don't reach the surface.
- All cells rest on the basement membrane.
- Nuclei appear at different levels.

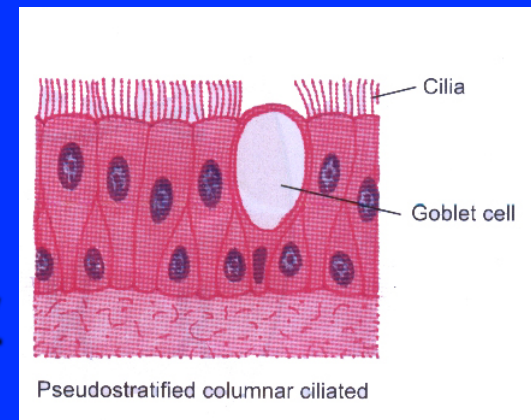
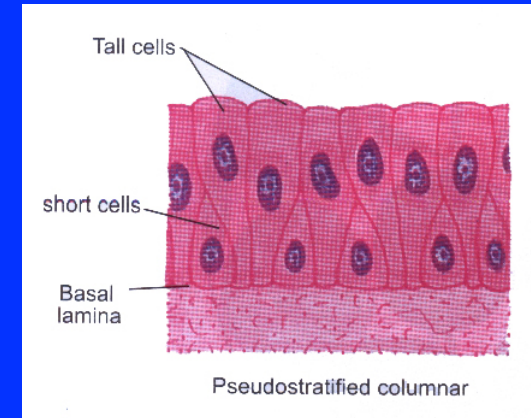
■ Types:

» Non-ciliated:

Example of sites: vas deferens.

» Ciliated with Goblet Cells “respiratory epithelium”:

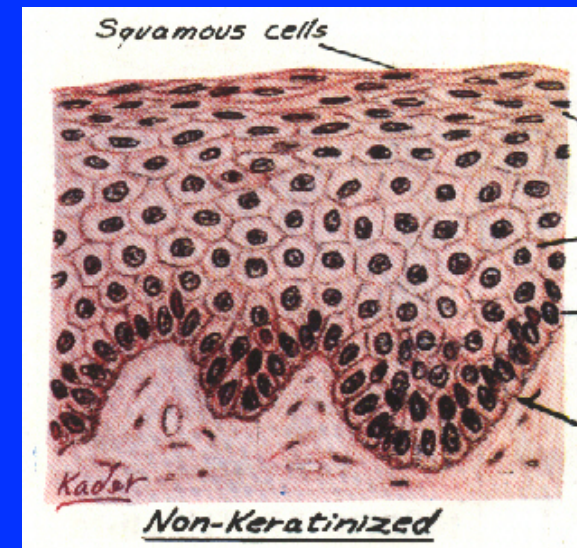
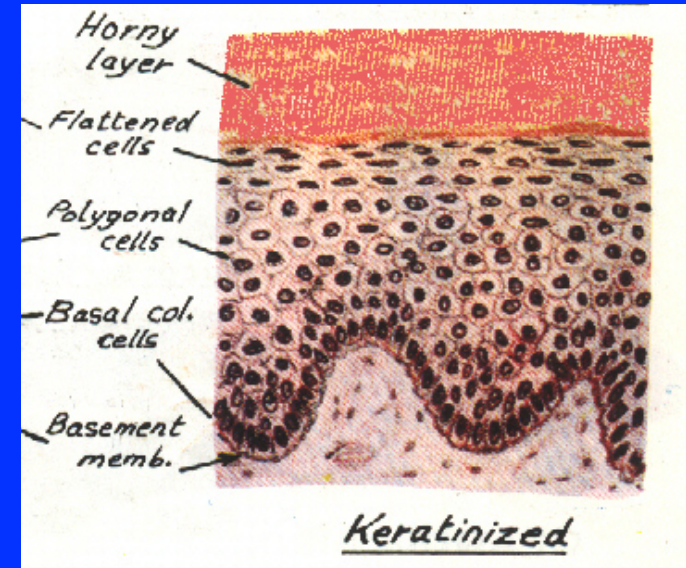
Example of sites: trachea & bronchi.



II. Stratified Epithelium

1- Stratified Squamous Epithelium:

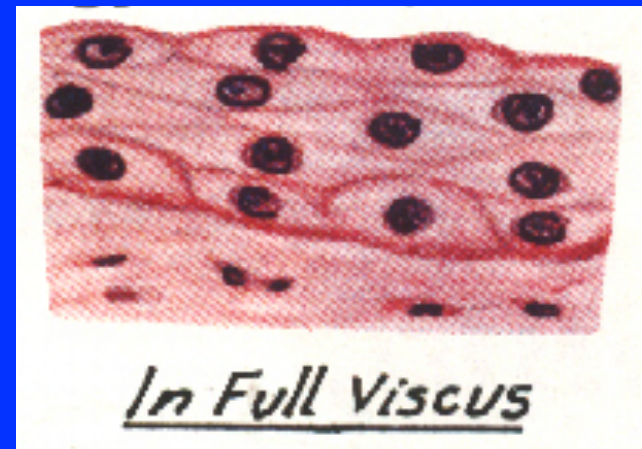
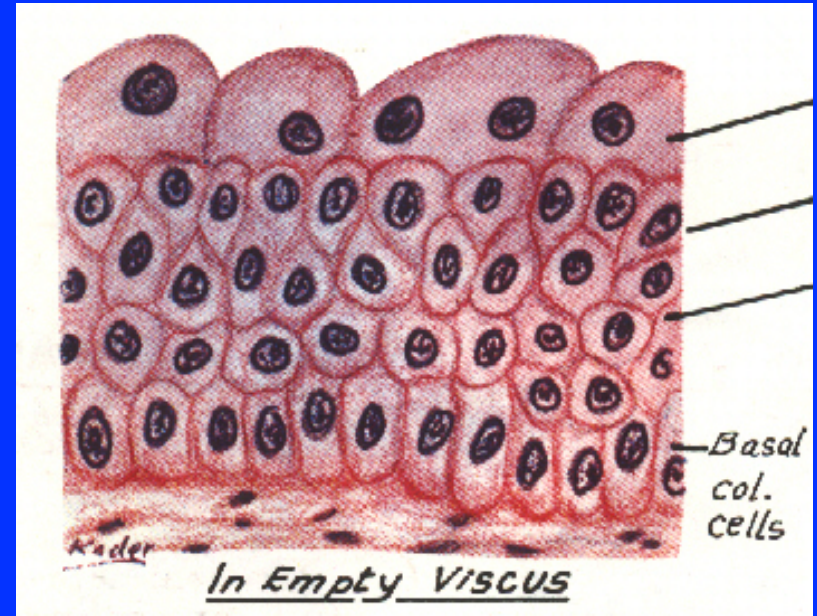
- Multiple layers of cells.
- Basal cells are columnar with basal oval nuclei.
- Intermediate cells are polygonal with central rounded nuclei.
- Surface cells are flat with flattened nuclei.
- Types:
 - » Keratinized: with a layer of keratin on the surface.
Example of sites: epidermis of skin.
 - » Non-keratinized: without a layer of keratin on the surface.
Example of sites: esophagus.



II. Stratified Epithelium

2- Transitional Epithelium:

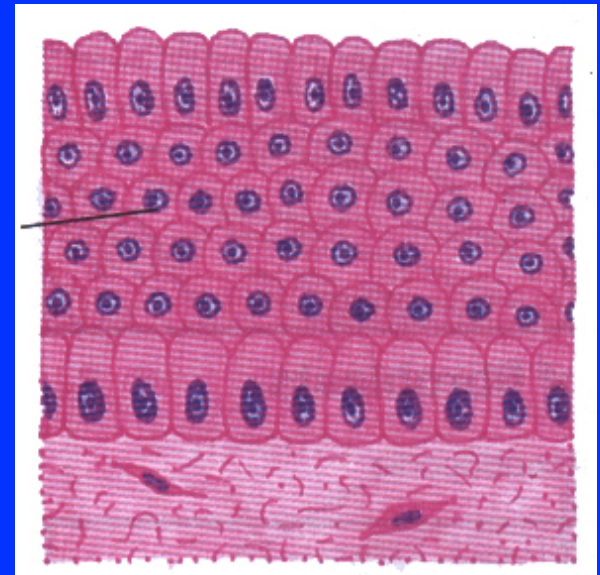
- Multiple layers of cells.
- Basal cells are columnar.
- Intermediate cells are polygonal.
- Surface cells large cuboidal with convex free surface and may be binucleated.
- Example of sites: Urinary bladder.



II. Stratified Epithelium

3- Stratified Columnar Epithelium:

- Multiple layers of cells.
- Basal cells are columnar.
- Intermediate cells are polygonal.
- Surface cells are columnar.
- Example of sites: large ducts of glands.



GLANDS (Glandular Epithelium)

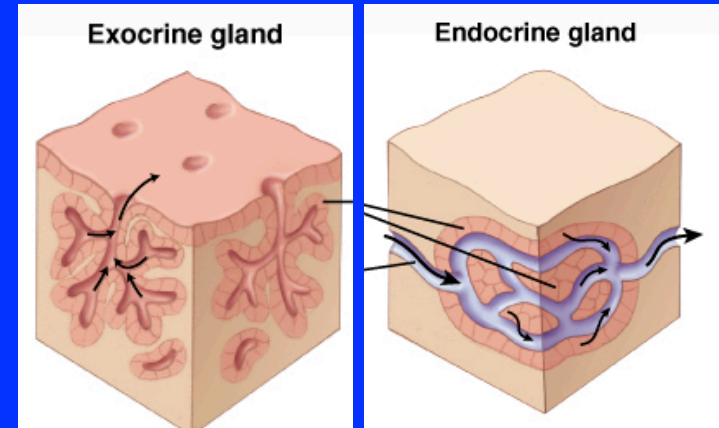
Classification:

1- According to presence or absence of ducts:

- a. Exocrine: e.g. salivary glands.
- b. Endocrine: e.g. thyroid gland.
- c. Mixed: e.g. pancreas.

2- According to number of cells:

- a. Unicellular: e.g. goblet cells.
- b. Multicellular: e.g. salivary glands.



GLANDS (Glandular Epithelium)

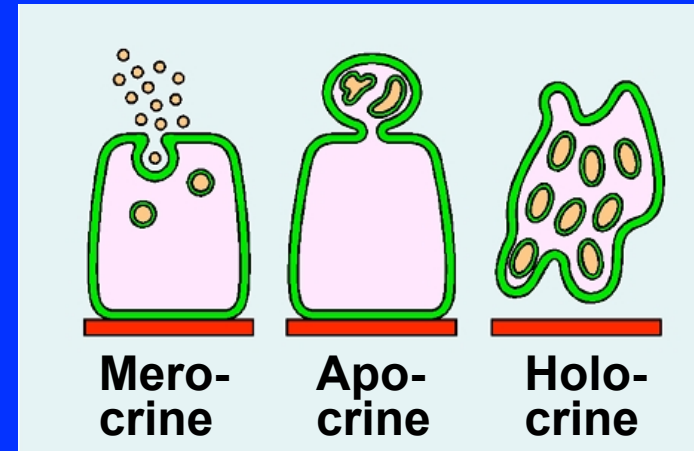
Classification:

3- According to mode of secretion:

a. Merocrine: No part of the cell is lost with the secretion, e.g. salivary glands.

b. Apocrine: The top of the cell is lost with the secretion, e.g. mammary gland.

c. Holocrine: The whole cell detaches with the secretion, e.g. sebaceous glands.

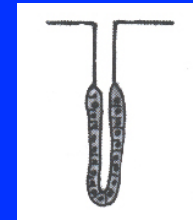


GLANDS (Glandular Epithelium)

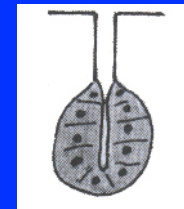
Classification:

4- According to shape of secretory part:

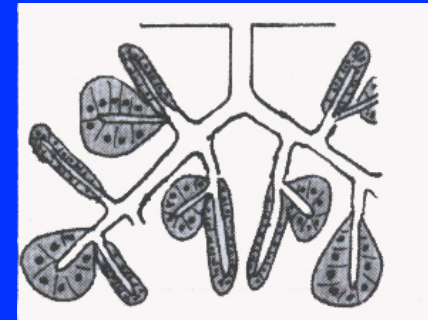
1. Tubular: e.g. intestinal gland.



2. Alveolar (acinar): e.g. mammary gland.



3. Tubulo-alveolar: e.g. pancreas.

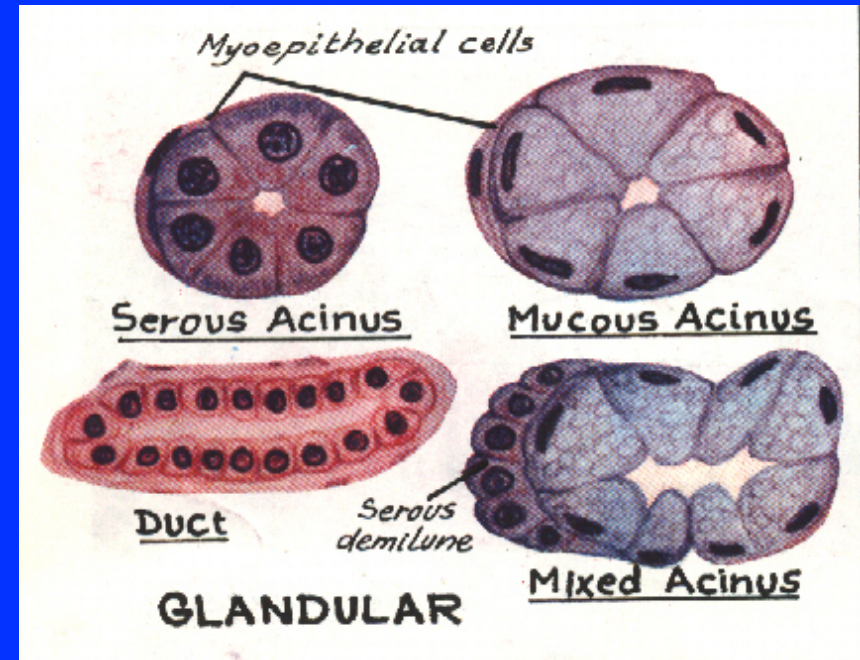


GLANDS (Glandular Epithelium)

Classification:

5- According to nature of secretion:

- a. Serous: e.g. parotid gland.
- b. Mucous: e.g. goblet cells.
- c. Muco-serous:
e.g. sublingual gland.
- d. Watery: e.g. sweat gland.



FUNCTIONS OF EPITHELIUM

- 1- Protection as in epidermis of skin.
- 2- Secretion as in glands.
- 3- Absorption as in small intestine.
- 4- Excretion as in kidney.
- 5- Reproduction as in gonads.
- 6- Smooth lining as in blood vessels.

Clinical Applications

- **Immotile cilia syndrome (Kartegener's syndrome):**
 - Disorder that causes infertility in male and chronic respiratory tract infection in both sexes.
 - It is caused by immobility of cilia and flagella induced by deficiency of dynein.
 - Dynein protein is responsible for movements of cilia and flagella.

Clinical Applications

■ Metaplasia:

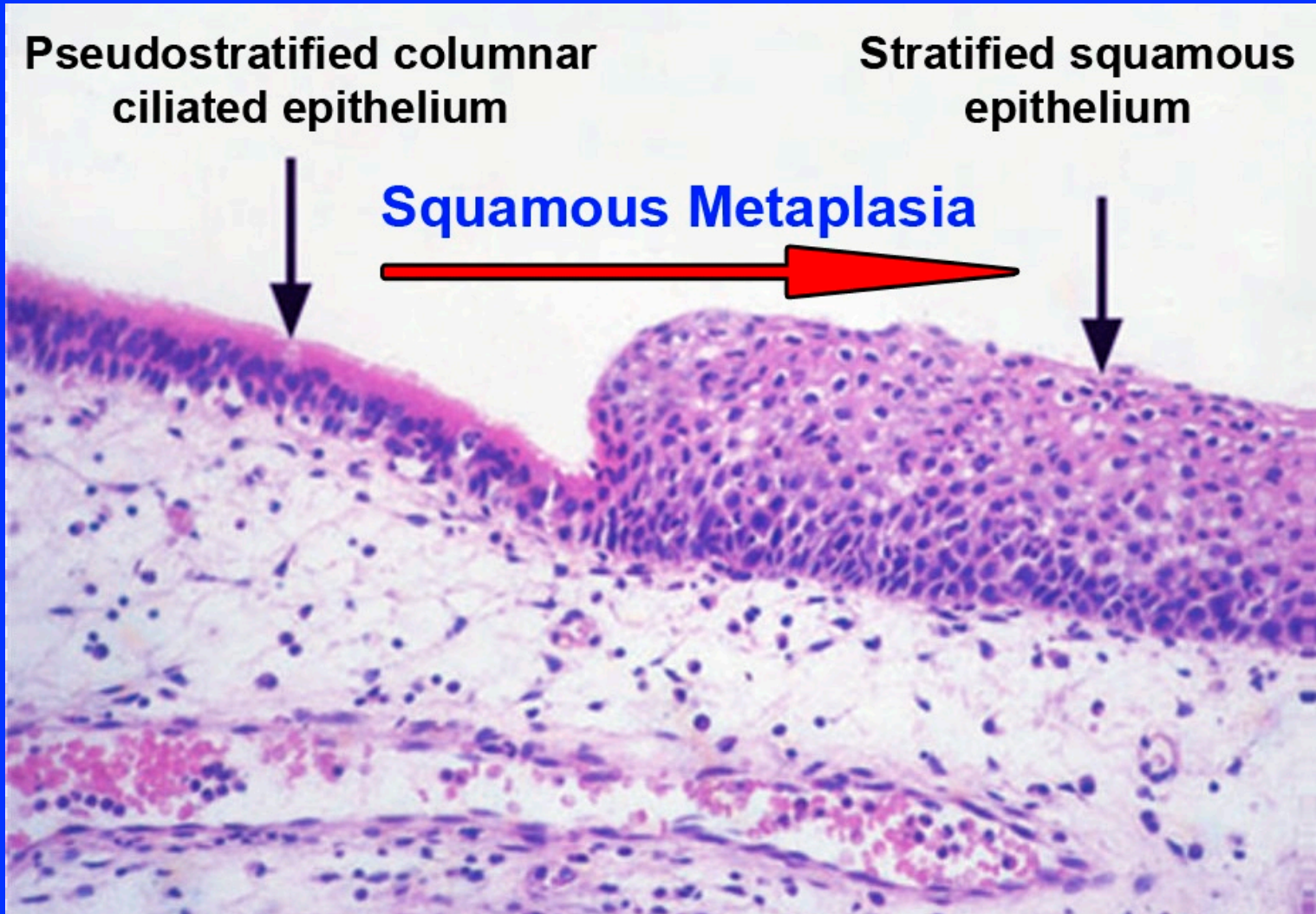
- It is the transformation of one type of tissue to another in response to injury. This condition is usually reversible if the injury is removed.
- Example: pseudostratified ciliated columnar epithelium of the respiratory passages, e.g. trachea, of heavy smokers may undergo squamous metaplasia, transforming into stratified squamous epithelium.

Squamous Metaplasia

Pseudostratified columnar
ciliated epithelium

Stratified squamous
epithelium

Squamous Metaplasia



Thank You