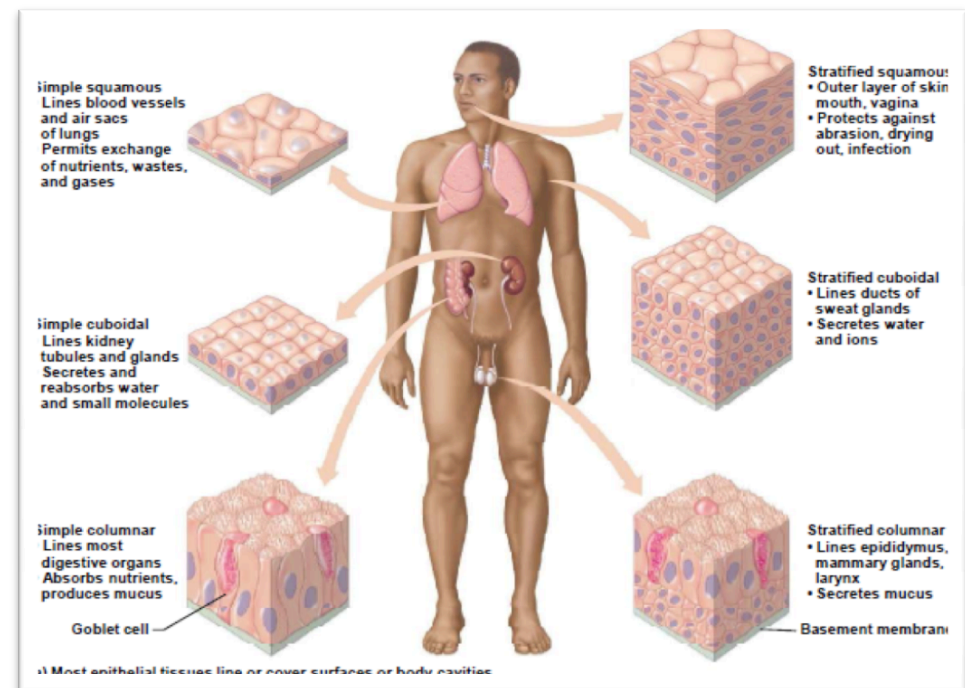


Epithelial Tissue

OBJECTIVES:

- 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.



Color Index:

Red = Important Notes Orange = Further Explanation Purple = Additional Notes

Characteristics & Functions of Epithelial Tissue:

Characteristics

Tightly joined with small cellular space **to protect underlying structures**

Rest on basement membrane, **glue like material to stick it together**

Avascular **“no blood vessels”**

High power of regeneration = renewing

Functions

Protection
As in Epidermis of skin

Secretion
As in glands like Thyroid

Absorption
As in Small Intestine

Excretion
As in Kidney

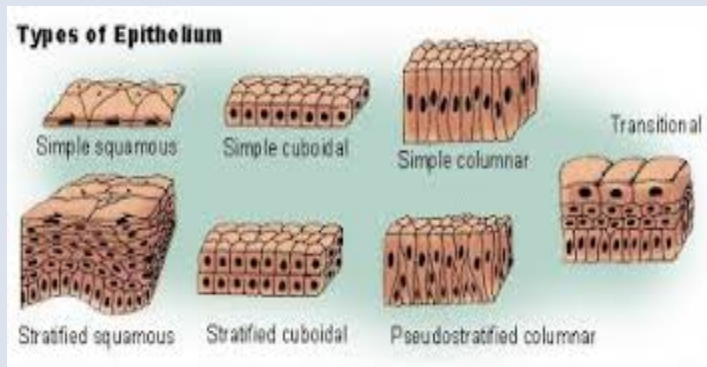
Reproduction
As in Gonads

Smooth lining **“most important feature”**
As in Blood Vessel

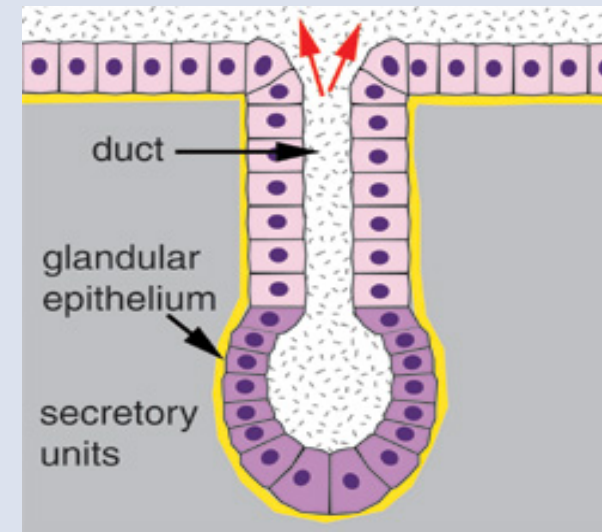
Classifications of Epithelium

Epithelial Membranes

- Simple Epithelium.
- Stratified Epithelium.



Glands Glandular Epithelium

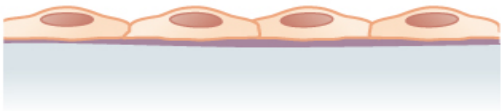
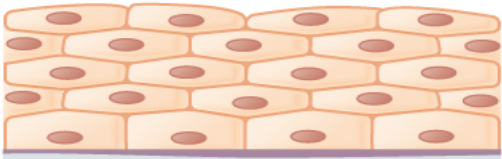


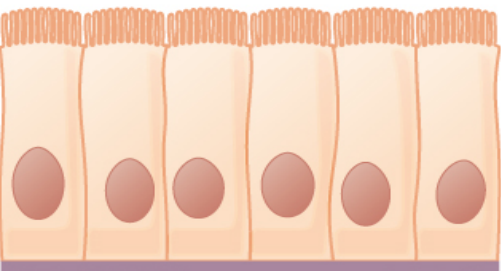
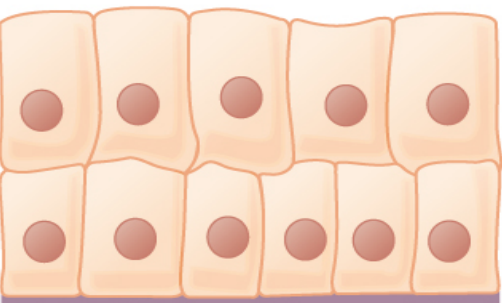


Simple Epithelium

Type "According to cell shape"	Description "Cell & Nucleus Shape"	Distribution "Present In"	Extra Notes
Simple Squamous	One layer in all type flat cell, with flat nuclei. Function: Provides smooth lining	- Endothelium "Cardiovascular lining" - Alveoli of lungs	This type comes in contact with blood & air. Rich in nerve endings
Simple Cuboidal	<u>Cuboidal</u> cells with <u>central rounded</u> nuclei	- Thyroid Follicles	
Simple Columnar 1- Ciliated with cilia on free surface	<u>Columnar</u> cells with <u>Basal oval</u> nuclei	- Fallopian Tube , in females	Function of <u>Cilia</u> is helping the movement of ovum in uterine tube
2- Non-Ciliated with goblet cell with goblet cells in between		- Lining of Stomach, Gal Bladder and Intestine	Function of <u>Goblet Cell</u> is secretion of mucus
Pseudo-Stratified Columnar 1- Ciliated with goblet cell	<u>Columnar</u> cells, nuclei on <u>different levels</u> Some cells are short and others are tall. All Cells rest on basement membrane.	- Trachea & Bronchi	Function of <u>Cilia</u> is preventing micro-organisms to get in respiratory track
2- Non-Ciliated		- Vas deferens , in males	

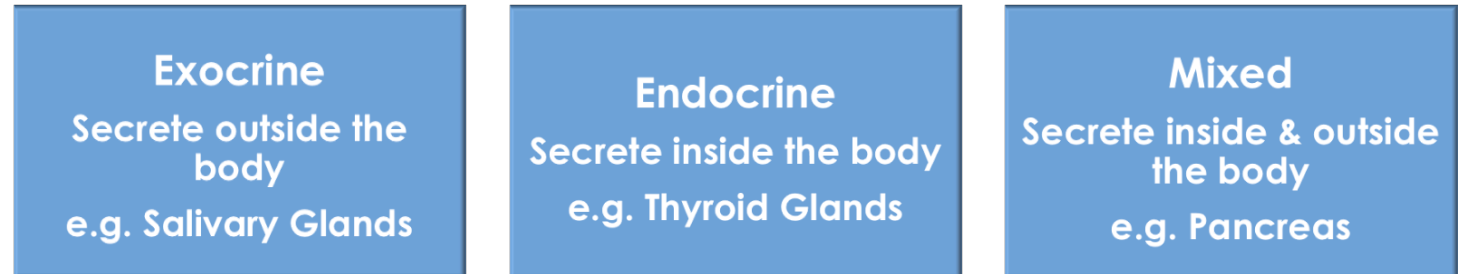
Stratified Epithelium

Type “ According to cell shape ”	Description “ Superficial Cell & Nucleus Shape “	Distribution “ Present In	Extra Notes
<p>Stratified Squamous</p> <p>1- Keratinized With a layer of Keratin on the surface</p>	<p>Multiple layers in all types</p> <ul style="list-style-type: none"> - <u>Basal Cell</u>: Columnar with oval nuclei - <u>Intermediate Cells</u>: Ploygonal with round nuclei - <u>Superficial Cells</u>: Flat Squamous 	- Epidermis of skin	Keratin layer for protection
<p>2- Non-Keratinized Without a layer of keratin</p>		- Eosaphagus	
<p>Transitional</p>	<ul style="list-style-type: none"> - <u>Basal Cell</u>: Columnar with oval nuclei - <u>Intermediate Cells</u>: Ploygonal with round nuclei - <u>Superficial Cell</u>: Cuboidal with dome shape 	- Urinary Bladder	Present in urinary tract Might be <u>Bi-nucleated</u> = 2 nuclei
<p>Stratified Columnar</p>	<ul style="list-style-type: none"> - <u>Basal Cell</u>: Columnar with oval nuclei - <u>Intermediate Cells</u>: Ploygonal with round nuclei - <u>Superficial Cell</u>: Columnar 	- Large ducts of glands	

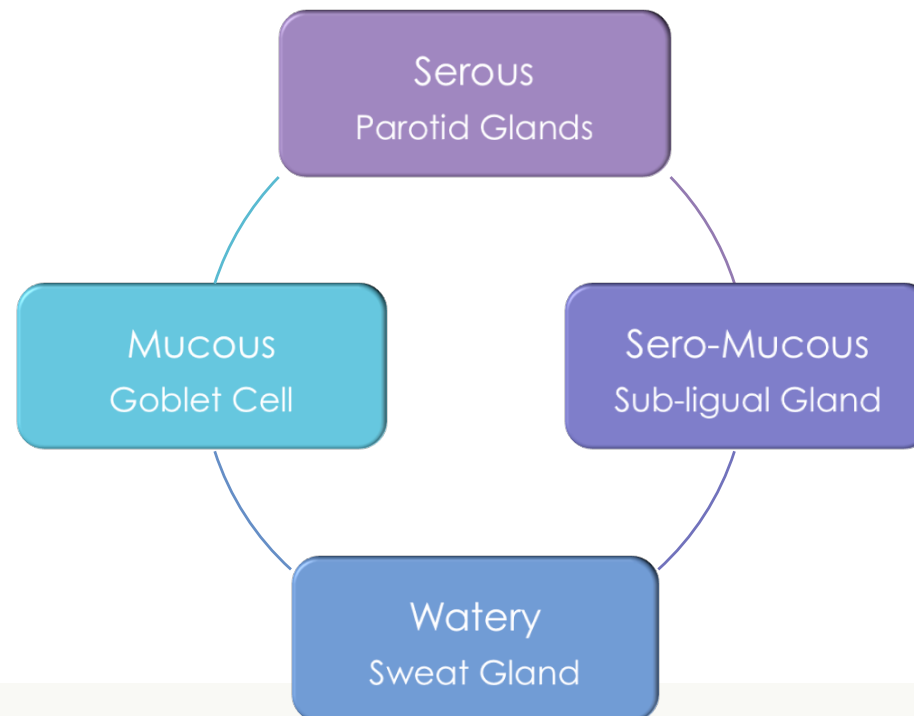
	Simple	Stratified	
Squamous	 <p>Simple squamous epithelium</p>	 <p>Stratified squamous epithelium</p>	<h1>Diagrams on types of Epithelium</h1>
Cuboidal	 <p>Simple cuboidal epithelium</p>	 <p>Stratified cuboidal epithelium</p>	
Columnar	 <p>Simple columnar epithelium</p>	 <p>Stratified columnar epithelium</p>	

Glandular Epithelium Classification

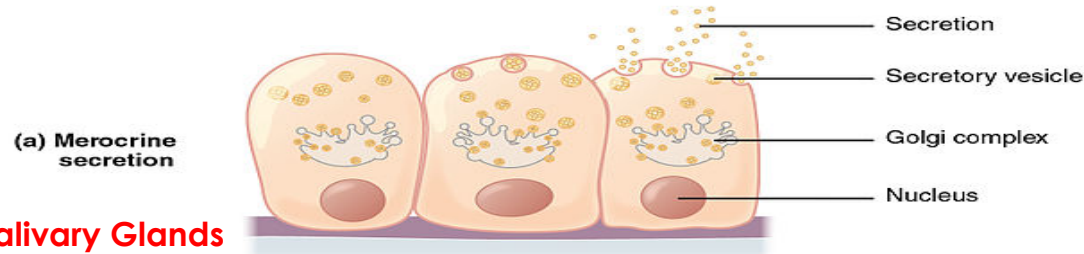
1- According to presence or absence of ducts



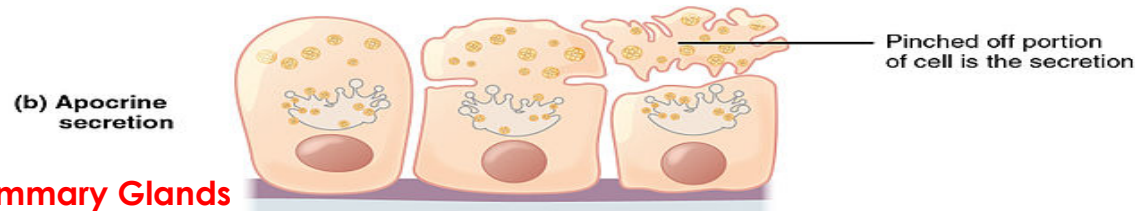
2- According to nature of secretion



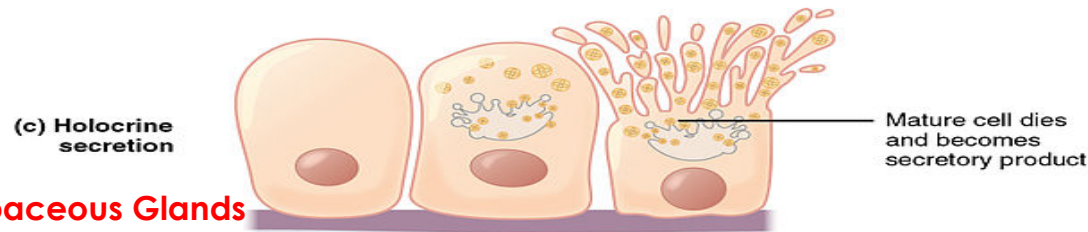
3- According to mode of secretion:



e.g: Salivary Glands



e.g: Mammary Glands



e.g: Sebaceous Glands

4- According to shape of secretory part:

- **Tubular:** in intestinal glands.
- **Alveolar:** in mammary glands.
- **Tubo-Alveolar:** in pancreas

5- According to # of Cells:

- **Uni-cellular:** e.g Goblet Cell
- **Multi-Cellular:** e.g Salivary Glands

Clinical Application

Immotile Cilia Syndrome

“Kartegener’s Syndrome”

- Causes **infertility** in male and **chronic respiratory tract infection** in both sexes.
- Caused by immobility of cilia and flagella induced by deficiency of dynein.
- Dynein protein is responsible for movements of cilia and flagella.

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.

MCQ

1. All of the following are characteristics of epithelial tissue except ?

- a) Cells are joined by intercellular space.
- b) Formed from widely separated cells.
- c) Its Avascular.
- d) Rest on a basement membrane.

2. The epithelia tissue is classified into epithelial membranes and _____ ?

- a) Simple epithelium.
- b) Stratified epithelium.
- c) Simple cuboidal epithelium.
- d) Glands.

5. Metaplasia is ?!

- a) Chronic respiratory tract infection.
- b) Contraction of the smooth muscle fibers due to histamine release.
- c) Increase of cell size up to four times.
- d) Transformation of one type of tissue to another.

3. Kartegener's syndrome is caused by?

- a) The accumulation & storage of fat.
- b) Exposure to allergen.
- c) Immobility of cilia & flagella.
- d) Increase in number of adipocytes.

4. One of the epithelial tissue functions is ?

- a) Absorption
- b) Distribution.
- c) Immune defense.
- d) Metabolism.

Answers:
1. b
2. d
3. c
4. a
5. d

Thank you for checking our work...

▣ Done by:

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قال الإمام الشافعي: ”إنما العلم علمان، علم الدين و علم الدنيا، فالعلم للدين هو الفقه و العلم للدنيا هو **الطب**“

اللهم علمنا ما ينفعنا و انفعنا بما علمتنا ..
ووزدنا علما

For any correction, suggestion or any useful information do not hesitate to contact us: Histology434@gmail.com