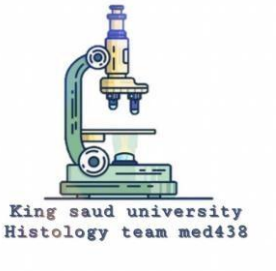
جامعة الملك سعود
King Saud University

MED438
KING SAUD UNIVERSITY

Lecture 2 :

Epithelial Tissue



- Colour index :
Red : important
Grey : doctors notes

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.**

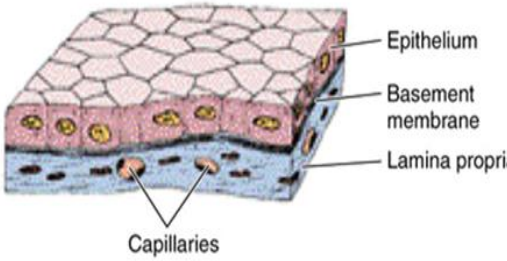
Epithelial tissue

General characteristics:

- Cells are tightly joined with little intercellular space.
- Rest on a basement membrane.
- Avascular. (no blood vessels)
- High power of regeneration.

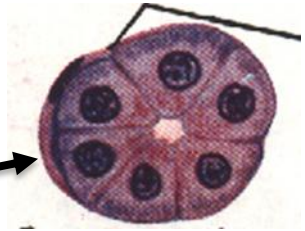
* Intercellular: (between the cells)

Simple epithelium

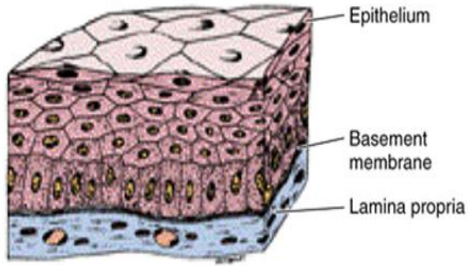


Classification:

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



A Stratified squamous epithelium



* Epithelial tissue is surrounded by connective tissue so they can get what they need from the blood vessels of the connective tissue.

Function 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.

*The different between secretion and excretion.
Secretion: used in the body
E.g. hormones
Excretion: waste products
E.g. : urine

A) Simple Epithelium

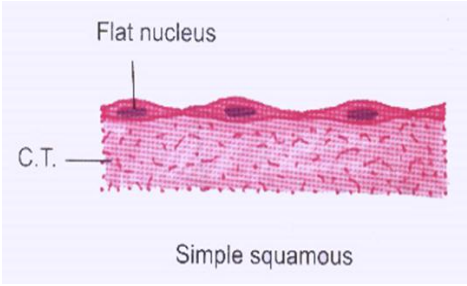
1- Simple Squamous Epithelium:

- 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 .(95% is covered by simple squamous epithelium)

* The shape of the nucleus follows the shape of the cell (often).

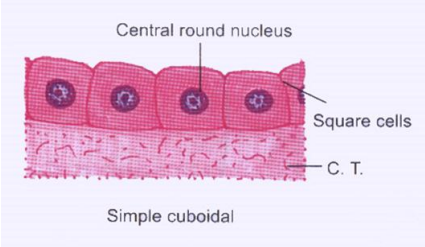


2- Simple Cuboidal Epithelium:

One layer of cuboidal cells with central rounded nuclei.

Example of sites:

Thyroid follicles



3- Simple Columnar Epithelium:

One layer of columnar cells with basal oval nuclei.

Types:

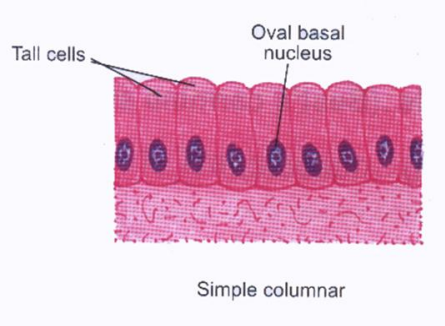
- **Non-ciliated:**

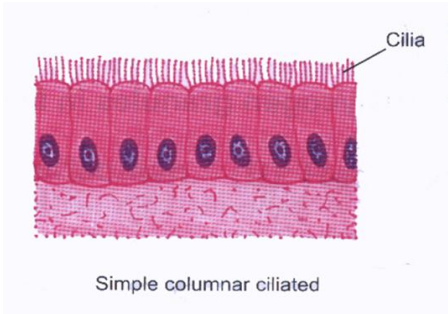
Example of sites: Lining of stomach , gall bladder , and intestines (with goblet cells). *goblet cell secretes the main component of mucus.

- **Ciliated:**

with cilia on free surface.

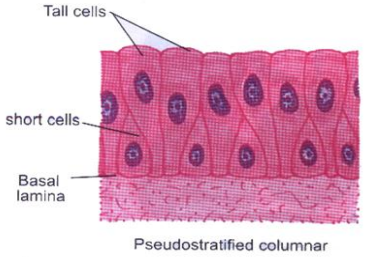
Example of sites: Fallopian tubes. * other names : uterine tube , oviduct





4- Pseudo-Stratified Columnar:

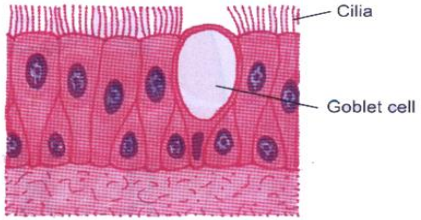
- One layer of columnar cells.
- Some cells are tall.
- Others are short and don't reach the surface.
- All cells rest on the basement membrane.
- Nuclei appear at different levels.



Pseudostratified columnar

Types:

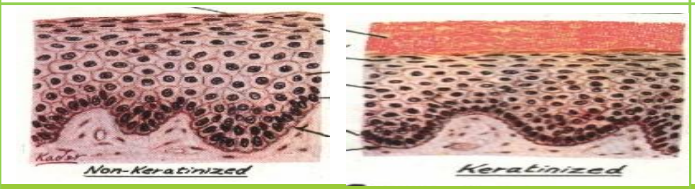
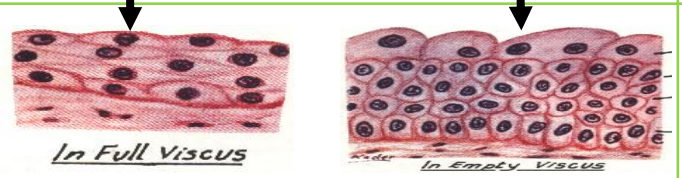
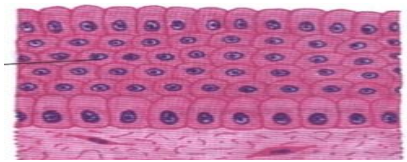
- **Non-ciliated:**
  Example of sites: vas deferens.
- **Ciliated with goblet cells "respiratory epithelium":**
  Example of sites: trachea & bronchi.



Pseudostratified columnar ciliated

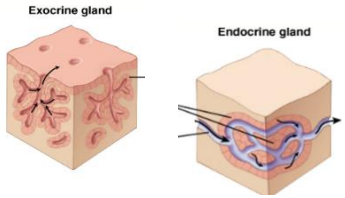
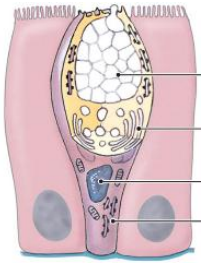
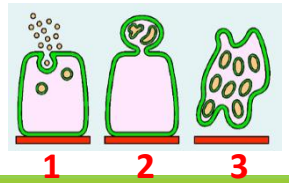
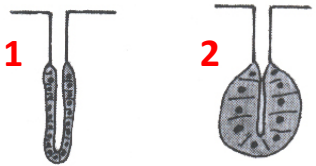
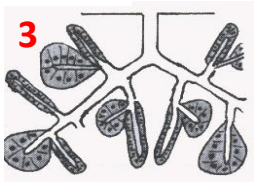
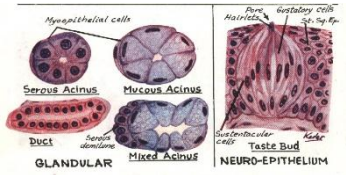
B) Stratified Epithelium

* Named stratified squamous based on the superficial layer of cells

1) Stratified squamous epithelium	2) Transitional epithelium	3)Stratified columnar 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: 1) Keratinized: with a layer of keratin on the surface. 2) Non-keratinized: without a layer of keratin on the surface.	○ Multiple layers of cells. ○ Basal cells are columnar. ○ Intermediate cells are polygonal. ○ Surface cells are large cuboidal with convex free surface and may be binculcated .	○ Multiple layers of cells. ○ Basal cells are columnar. ○ Intermediate cells are polygonal. ○ Surface cells are columnar.
Example of sites: 1) Keratinized: epidermis of skin. 2) Non-keratinized: esophagus.	Example of sites: urinary bladder.	Exampleof sites: large ducts of glands. *** Some parts of urethra**
	Full bladder Empty bladder 	

Glands (glandular epithelium)

- Classified according to:

1-Presence or absence of ducts	2-Number of cells	3-Mode of secretion	4-Shape of secretory part	5-Nature of secretion
a) Exocrine: (has ducts) e.g. salivary glands. **b) Endocrine:** (does not have ducts) e.g. thyroid gland. **c) Mixed:** e.g. pancreas 	**a) Unicellular:** e.g. goblet cells. **b) Multicellular:** e.g. salivary glands. 	**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. 	**a) Tubular:** e.g. intestinal gland. **b) Alveolar (acinar):** e.g. mammary gland. **3) Tubulo-alveolar:** e.g. pancreas.  	**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. 

Clinical Application

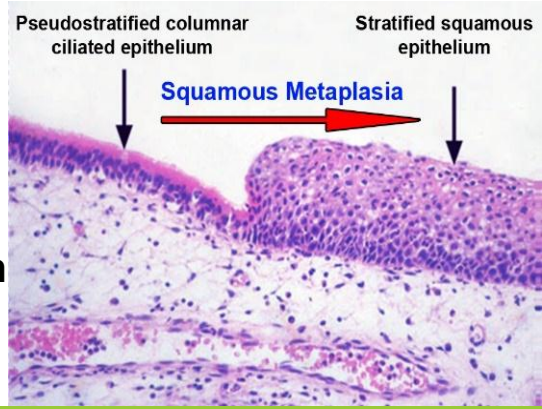
1. Immotile cilia syndrome (Kartegener's Syndrome):

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.)**

2. 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.



MCQs:

1-Fallopian tubes is example of ?
A) ciliated Pseudo-Stratified Columnar
B) ciliated Simple Columnar Epithelium
C) transitional epithelium
D) stratified columnar epithelium

***2-All epithelial tissue rest on?**
A) lamina
B) nuclei
C) basement membrane
D) basal cell

***3-What function of Dynein protein?**
A) protection the cilia & flagella
B) growth of cilia.
C) movements of cilia and flagella
D) movement of cilia only

***4-Kartegener's syndrome causes chronic respiratory tract infection in?**
A) children
B) males
C) females
D) both sexes

***5-If the injury is removed, metaplasia is usually?**
A) reversible
B) irreversible
C) chronic
D) Acute

***6-What differences between nuclei of simple squamous epithelium & simple cuboidal epithelium?**
A) **Simple squamous epithelium**: flat nuclei **Simple cuboidal epithelium**: basal oval nuclei
B) **Simple squamous epithelium**: central rounded nuclei. **Simple cuboidal epithelium**: flat nuclei
C) **Simple squamous epithelium**: basal oval nuclei **Simple cuboidal epithelium**: central rounded nuclei
D) **Simple squamous epithelium**: flat nuclei **Simple cuboidal epithelium**: central rounded nuclei

* FROM 437 TEAMWORK

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B	C	C	D	A	D

Team members :

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- Abdullah altuwaijri
- Talal jamal aldeen
- Faisal alqifari
- Alhanouf alhaluli
- Rawan alzayed
- Renad alkanaan
- Nouf albrikan
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Team leaders :

Noura alnasser

Abdullah shadid