

Tissues

1

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(2021)

أصل الجنيني

(مشتق)

A tissue is a collection of cells with a common embryologic origin that work together to perform specialized activity. In addition to the cells, a tissue contains the extracellular matrix (ECM) which's found between the cells.

نشاأ عتصه
بالتخل بالة الحاصه

- Body tissues can be generally divided into 4 main types according to the type of cells and the amount and content of the ECM they possess.

انواع

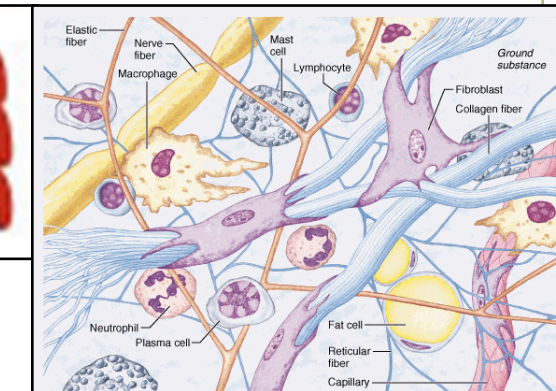
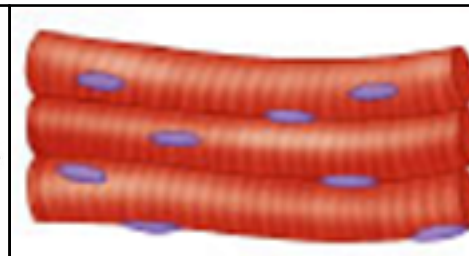
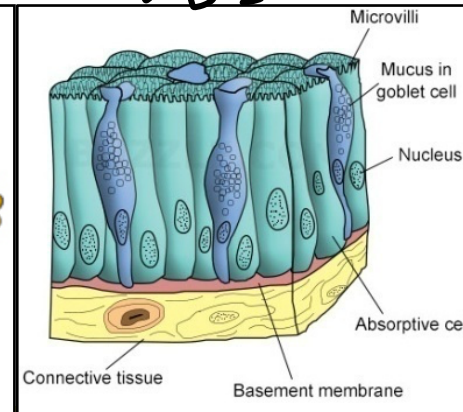
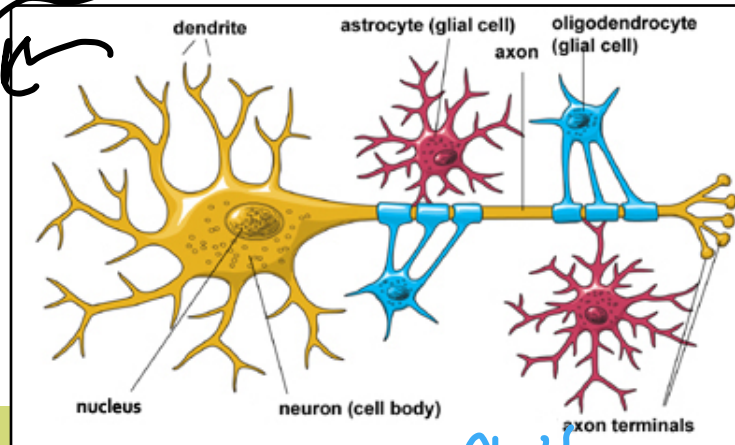
- The main types of body tissues are:

1. Epithelial tissue ⇒ نسيج طلائي
2. Connective tissue ⇒ نسيج ضام
3. Muscular tissue ⇒ نسيج عضلي
4. Nervous tissue ⇒ نسيج عصبى

Table 1: Types of tissues and their characteristics

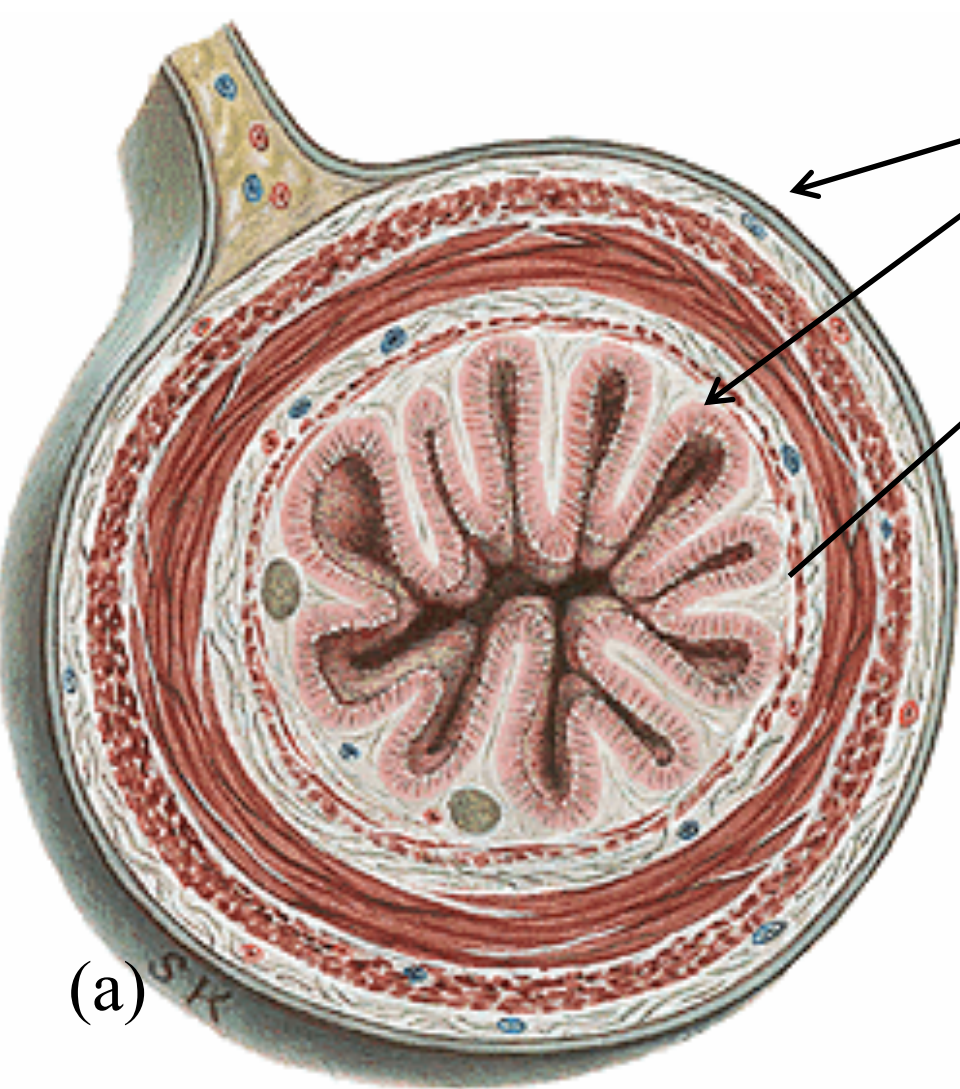
<i>Tissue</i>	<i>Nervous</i>	<i>Epithelial</i>	<i>Muscular</i>	<i>Connective</i>
<i>Cells</i>	عربي: خلايا متشابكة Have intertwining elongated processes شجيرة	مجموعة Aggregated polyhedral cells مجموعة من الخلايا	يتكون طويلة Elongated contractile cells و نبتة خلية	Several types of fixed and wandering cells
<i>Amount of ECM</i>	<u>Very small</u>	<u>Small</u>	<u>Moderate</u>	<u>Abundant</u>
<i>Main Function</i>	Transmission of nerve impulse	تغليف أو بطانة Lining, Secretion إفراز	<u>Movement</u>	Support, protection

نقل
الرسالة
العصبية



Nervous < Epithelial < Muscular < Connective

من ناحية (كمية) (amount)



Epithelium

Lamina propria
(connective tissue)

Fig.1: Characteristics of Epithelial tissue. (a) Cross section of small intestine. (b) Section through the skin.

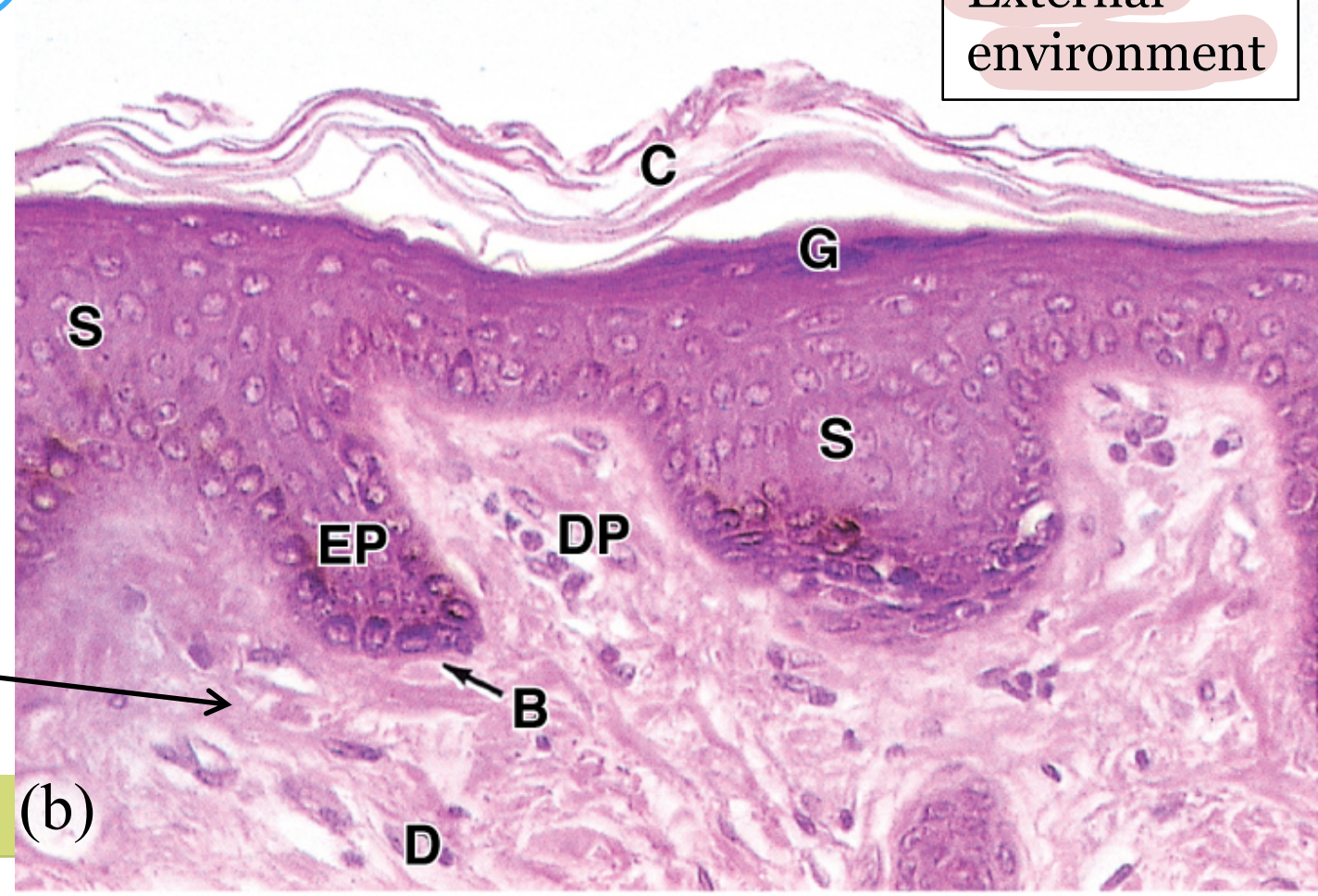
(a)

سود Epithelium یا تہ حجاب
قاعدہ
basement membrane

External environment

Epithelium = epidermis

Dermis (connective tissue)



(b)

Epithelial Tissue

نصفه الخلية

• Epithelial tissues have the following characteristics:

سريعة التجدد

تجاويف

تغلف داخلها وخارجها

منه ما يتأثر حتى حولها

1) Cover surfaces or line cavities.

2) Rapid turn-over (time from the birth of a cell till its death), because it's exposed to the external environment.

سبب؟ غفلة
معدله توفيقه

3) Formed of sheets of closely packed cells.

صفائح مترابطة

4) The cells are polar.

سبب أن لكل خلية توجية
مكان معينة

5) The epithelium rests upon a sheet of extracellular matrix called the *Basal Lamina*. The epithelium, also, have a connective tissue layer under it.

سريع جدا وكيفية دورية

6) *Epithelial tissues lack blood vessels*. They receive their nutrients from the underlying vascular connective tissue.

لا تتغذى بالدم، بل بالمواد التي يوصلها

Basement Membrane ⇒

ساده

- Basement membrane is formed of the basal lamina and the reticular lamina. The reticular lamina is the upper part of the connective tissue that's usually located under the epithelium which is rich in reticular fibers.

- It supports the epithelium.

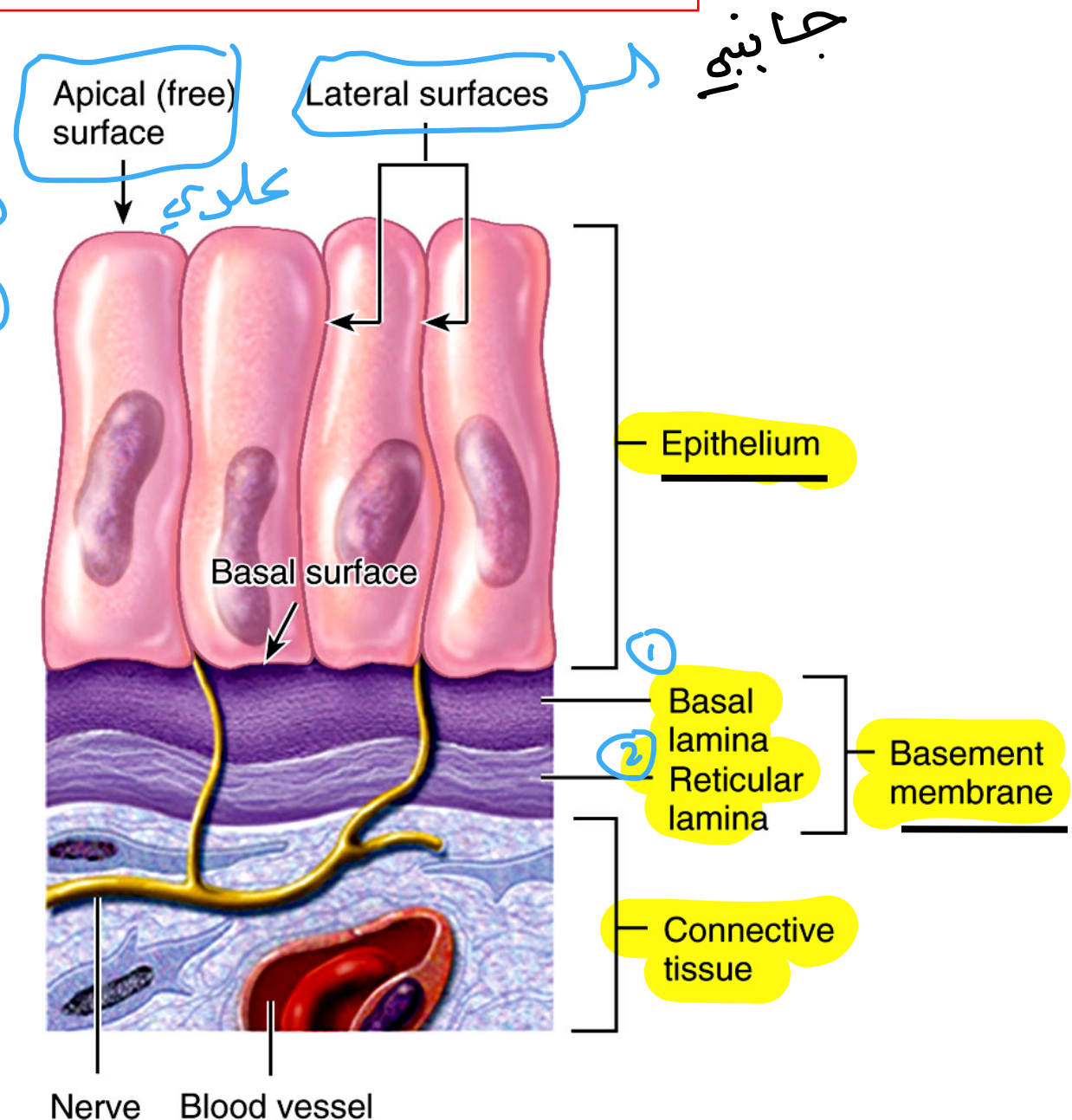


Fig.2: Difference between basal lamina and basement membrane.

Types of Epithelium

- Epithelium can be divided into two general groups:

تَظْلِيقٌ وَتَخْلِيقٌ

1) Lining or covering epithelium

مُطْلِقة - انْخِزَازٌ

2) Glandular epithelium → Main function is secretion

- However, some lining epithelial cells secrete (like those in the stomach) and some glandular cells are present between lining cells (like goblet cells of small intestine)

الأنسجة الليفية

Lining or covering epithelium

According to number of layers

* Simple
(1 layer)

According to shape of cell

Squamous

Cuboidal

Columnar

Stratified
(≥ 2 layers)

According to shape of cell in upper layer

Squamous

Cuboidal

Columnar

Transitional

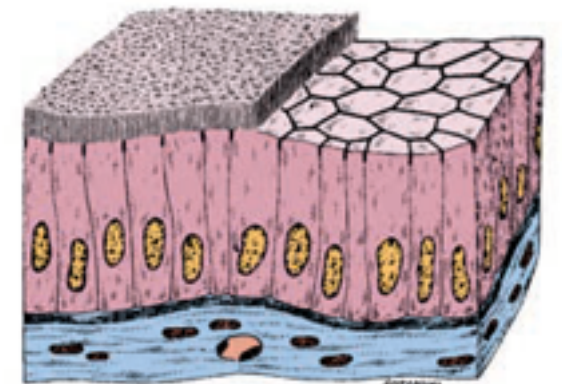
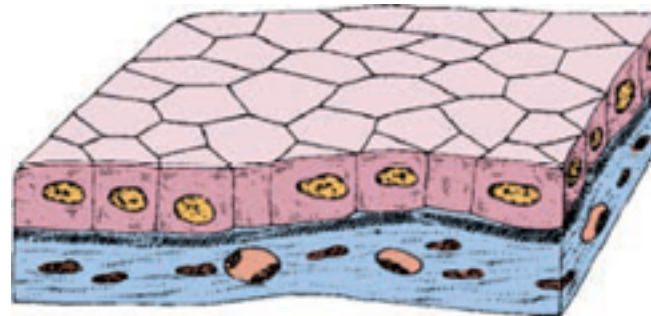
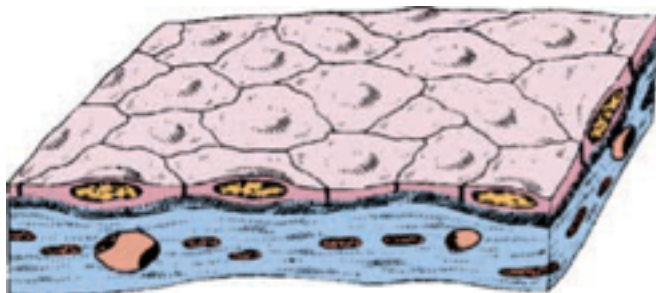
Pseudostratified
epithelium

Keratinized

Non-
keratinized

Simple Epithelium

	Simple Squamous	Simple Cuboidal	Simple Columnar
Number of Layers	Single	Single	Single
Cells	محدودة؟ وسهلة Flattened squamous	Cuboidal	Tall columnar
Location	- Line <u>blood vessel</u> - Line <u>body cavities</u> تجاويف	- Line renal <u>tubules</u> - Cover <u>ovaries</u> تغطيتها بحبا رقيقة	<i>Ciliated:</i> كالمربو Uterine tube <i>Non-ciliated:</i> Stomach
Function	<u>Easy passage</u> of <u>substances</u> <u>Secretion</u>	<u>Active transport</u> - Cover <u>organs</u>	<u>Secretion</u> <u>Absorption</u>

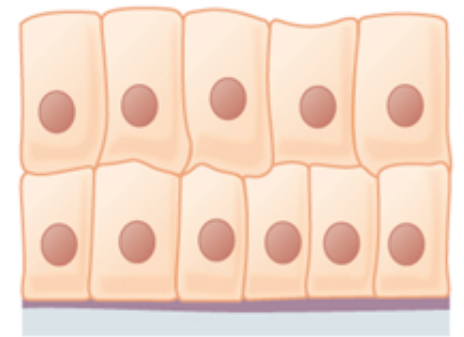
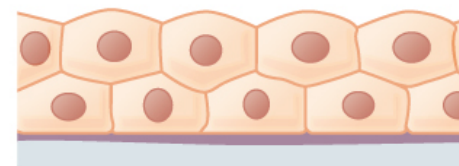
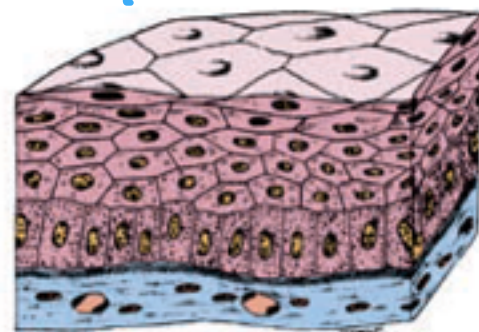
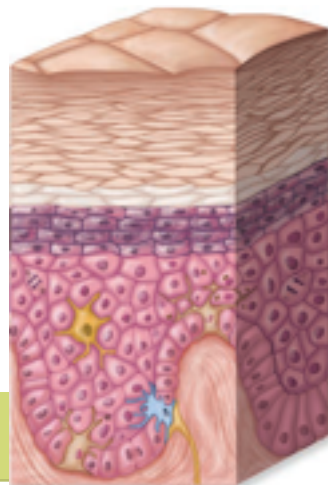


Stratified Epithelium

⇒ بنفريه اعلی طبقة اعم جرد النوع

	Stratified Squamous		Stratified Cuboidal	Stratified Columnar
	<u>Keratinized</u>	<u>Non-keratinized</u>	<u>Cuboidal</u>	<u>Columnar</u>
Number of layers	Multiple	Multiple	Multiple	Multiple
Top-most layer	Squamous cells covered by keratin layer	Squamous cells <u>not</u> covered by <u>keratin layer</u>	Cuboidal خرد اللعابية	Columnar فلحجة
Location	Skin	Esophagus الخري	Large ducts of salivary glands	Conjunctiva طبقات العين
Function	- Protection - Prevent water loss	Protection فوق حامية	- Protection - Secretion	- Protection - Secretion

حامية و صفيح



Transitional epithelium (Urothelium):

- ❖ The topmost cells of this stratified epithelium are dome-like (called ***Umbrella Cells***).

❖ Location:

- Urinary bladder and ureters.

That's why it's also called

Urothelium

- ❖ The umbrella cells are dome-shaped when the bladder is empty. Once it's full, these cells will become flattened (hence the name transitional).

- ❖ Functions: Protection against the adverse effects of urine.

② Allows the bladder to change size.

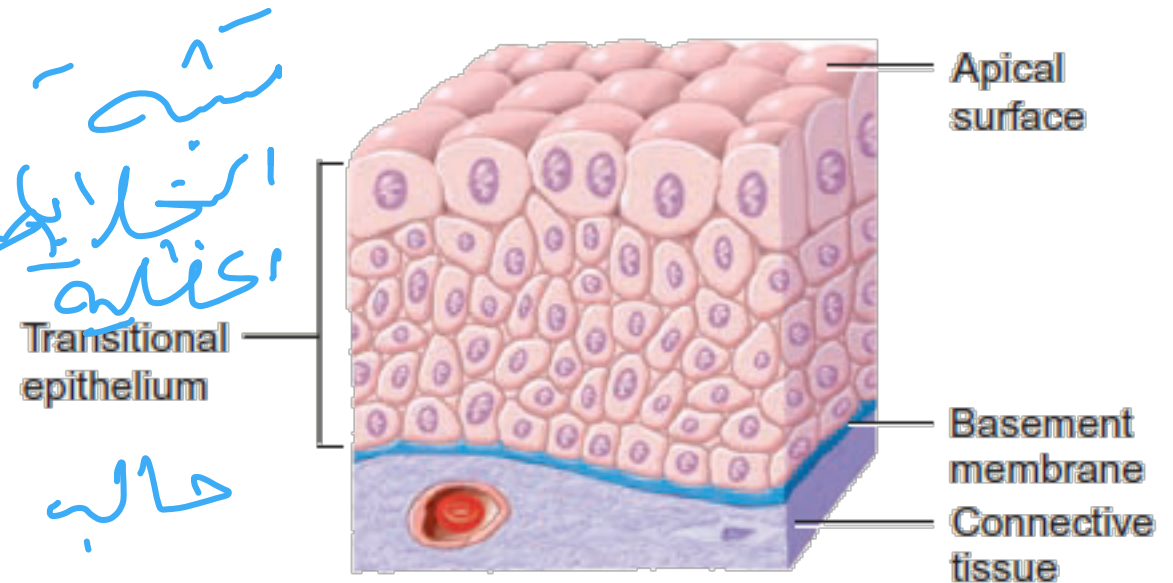


Fig.3: Relaxed transitional epithelium.

تغيير الحجم / امتلاء

① لحماية البولي (toxicity)

Pseudostratified columnar ciliated epithelium:

طبقة كاذبة

- In this epithelium, the cells have different heights. All cells rest on the same basal lamina, but not all of them reach the surface. This makes the nuclei occupy different levels giving the epithelium a false stratified appearance, but this epithelium is, actually, simple.

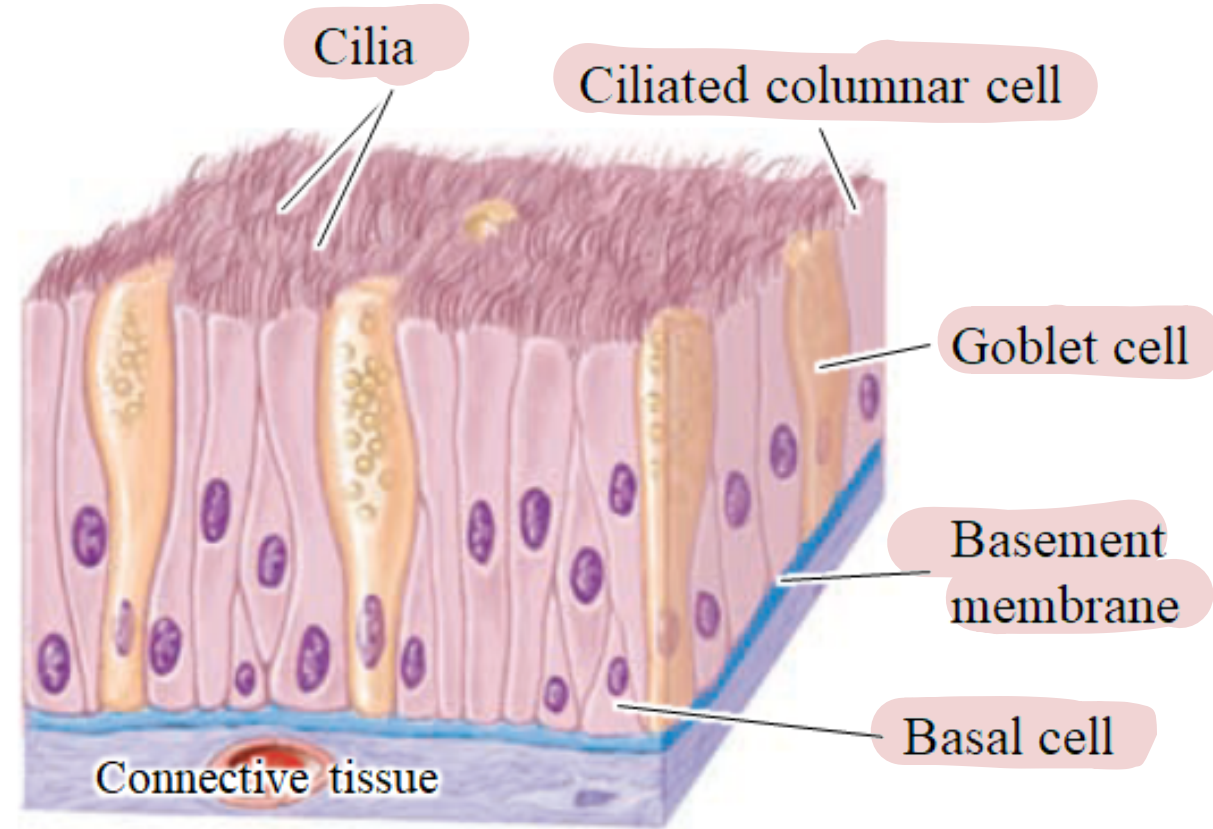


Fig.4: Pseudostratified columnar ciliated epithelium.

➤ Location:

- Trachea, bronchi, and nasal cavity (that's why it's also called Respiratory Epithelium).

- Functions: Protection, secretion. Ciliary movement removes particles from the airway passages.

حركة المصباح تنظير الخبار الذي يدخل
من مجرى التنفس

Glandular Epithelium

نسيج طلائي متخصص في إفراز

- Is an epithelium specialized for secretion.

Classification of glandular epithelium:

1) According to number of cells:

- [?] Unicellular** glands: formed of a single cell, like Goblet cells of digestive and respiratory tracts.
- [?] Multicellular** glands: formed of clusters of cells, like: salivary and sweat glands.

غدد اللعابية
غدد العرق

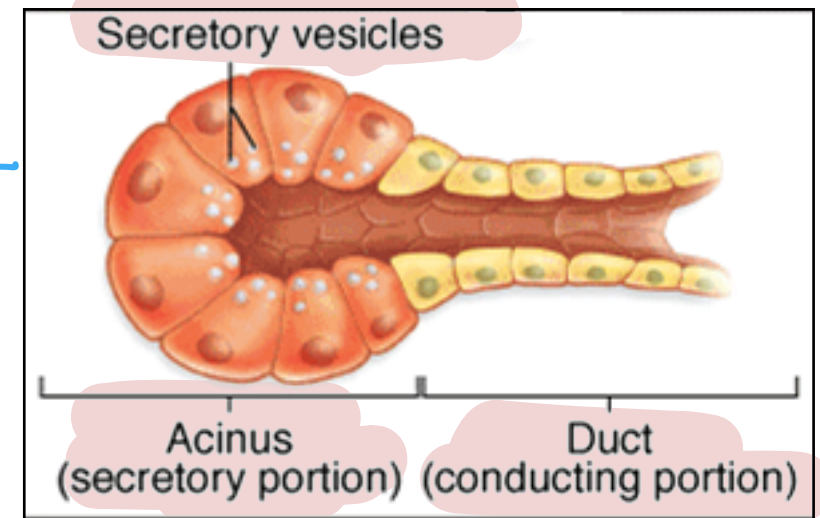
حسب وجود الغدد

2) According to presence of ducts:

- Exocrine glands: possess ducts that transfer the secretion to the outside of the body, like: salivary glands. *تفتقر للغدد*
- Endocrine glands: they lack ducts. Their secretions are transferred to the target organs, usually, by blood. Example: Pancreatic Islets, Pituitary gland. *من خلال الدم*

3) Exocrine glands classified according to morphology of duct and secretory portion:

- Each exocrine gland has a secretory portion that produces the secretion and a duct that carries this secretion.
- The duct and the secretory portion could be branched or unbranched.
- The secretory portion could acinar (ball-shaped), tubular, or coiled. *لولبي* *على شكل كرة* *دنيب*



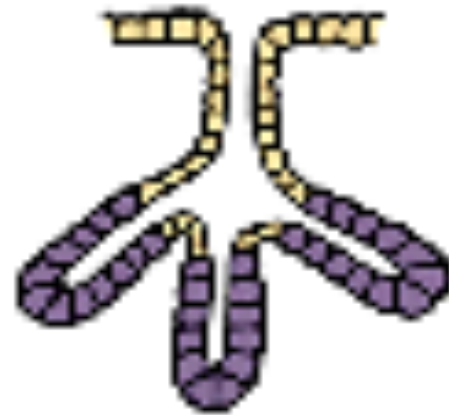
عشر حفظ
بسر للوقاية

Exocrine Gland Types

simple
types



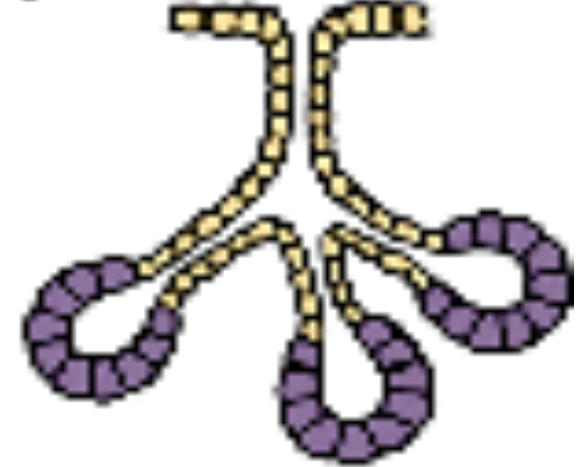
tubular



branched
tubular

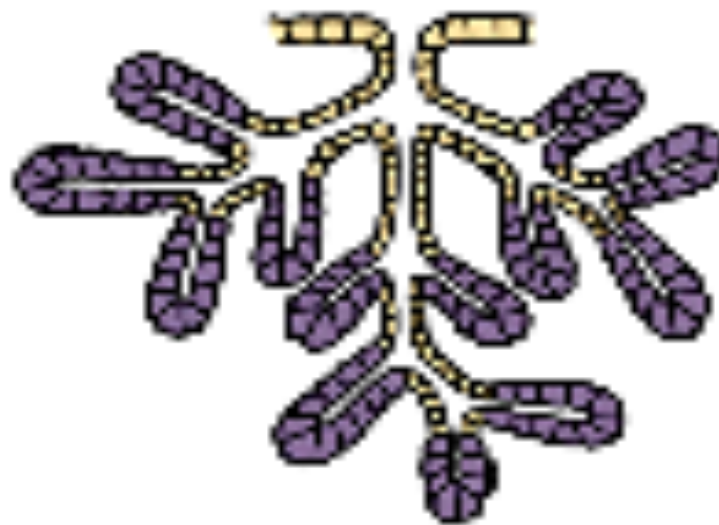


coiled
tubular

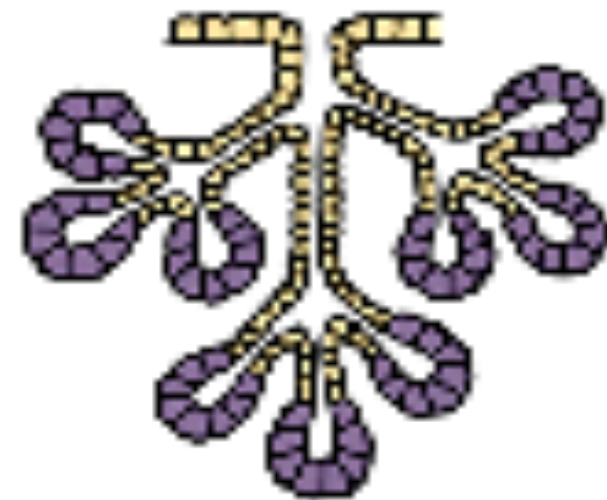


branched
alveolar

compound
types



tubular



alveolar

4) Exocrine glands classified according to method of secretion:

❑ **Merocrine:** only the product is secreted by exocytosis. As in salivary glands.



❖ Merocrine glands are either serous (excrete a watery solution) or mucous (excrete a thick solution).

❑ **Apocrine:** the product and the apical part of the cell is shed. As in mammary gland.



❑ **Holocrine:** the whole cell disintegrates and is shed with the secretion. As in sebaceous glands of the skin.



Epithelial Cell Polarity

- ❖ Polarity means that various regions of a cell have specialized structural features because they perform different functions.
- ❖ Epithelial cells can be generally divided into 3 regions: *المناطق الثلاثة*
 1. **Apical (Luminal) region:** close to the lumen of the organ.
 2. **Lateral regions:** adjacent to other cells.
 3. **Basal region:** lying on the basal lamina.

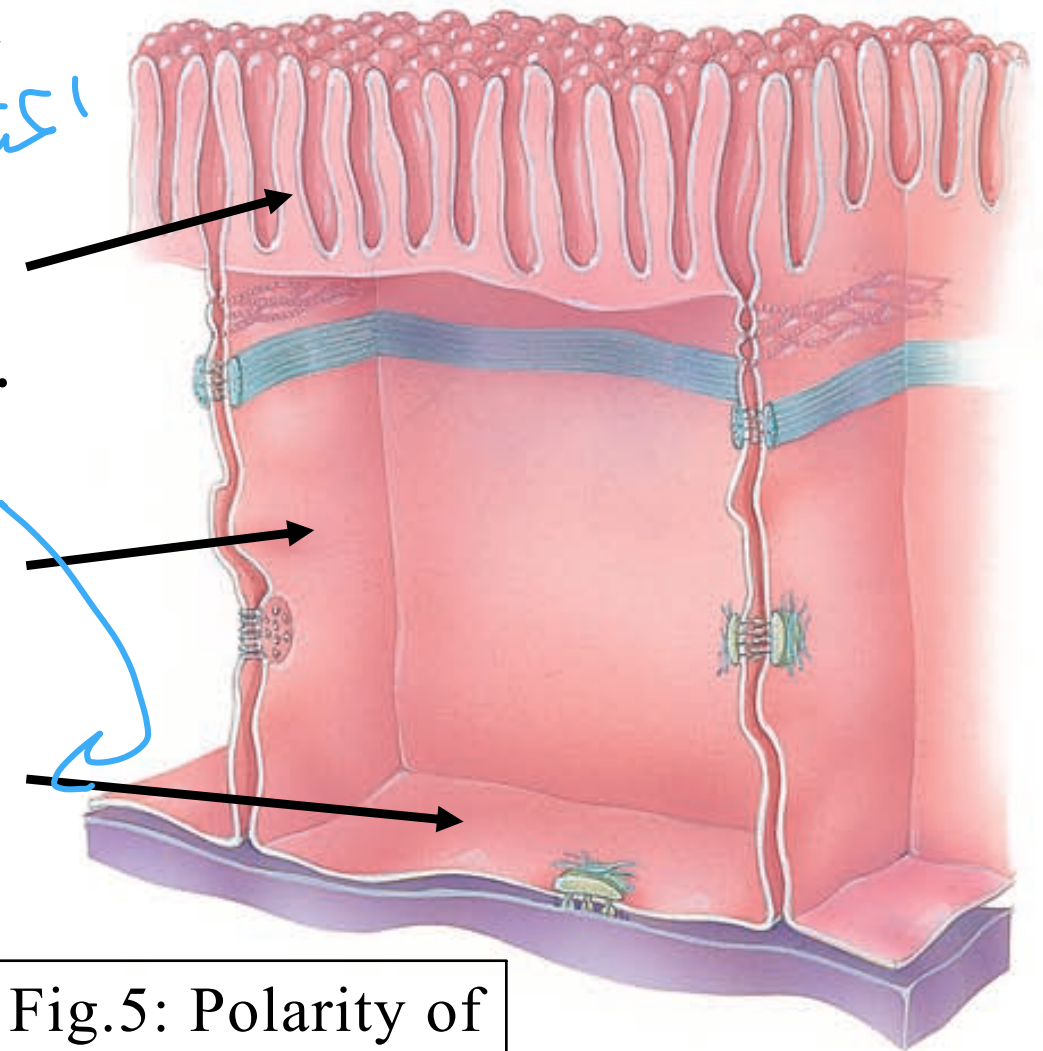


Fig.5: Polarity of epithelial cells.

الطبقة الظهارية
الطبقة تحت الظهارية
الطبقة تحت الجدارية
الطبقة تحت الجدارية