Doctor 022

Histology

Sheet no. 3

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Psudostratified columnar epithelium:

1.shape:

👉Tall irregular cells all attached to the basement membrane.

👉 nuclei are at different levels.

👉 not all cells extend to the surface.

2.where can you find it?

👉lining the upper Respiratory tract.

👉male reproductive system (epididymis).

3.Accessory structures:

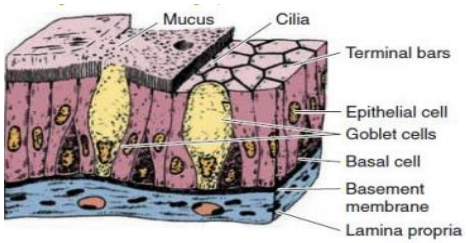
👉cilia

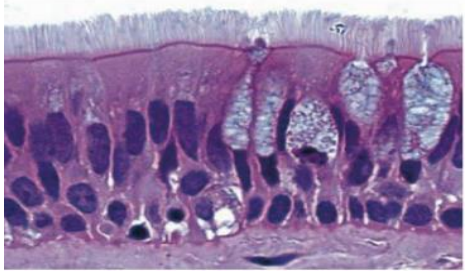
👉stereocilia

👉goblet cells

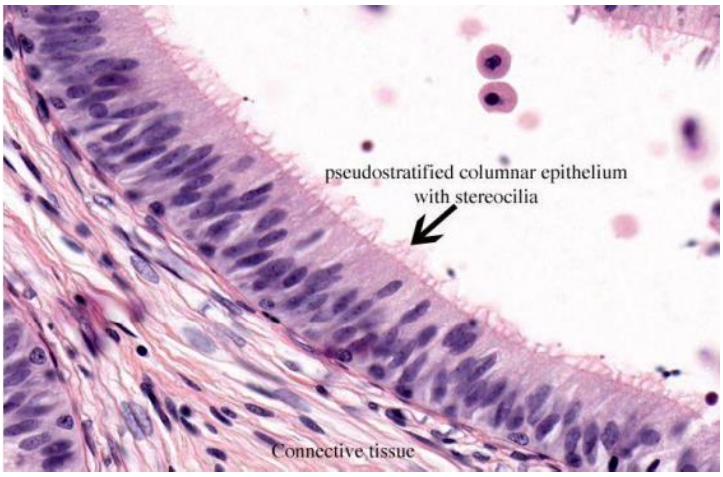
-what do we call a psudostratified columnar epithelium with cilia and goblet cells? Ciliated psudostratified columnar epithelium with goblet cells .

-where can you find it? Respiratory tract (trachea and bronchi) so we call it Respiratory epithelium.





Important notes about the pic:



* How can we know this is stereocilia , not microvilli nor cilia?

-you can see a space between them + they are not perfectly organised + some of them are distally branched.

-Microvilli is perfectly organised, cilia is more packed and not branched.

*Function of stereocilia:

-Stereocilia makes **absorption** and **hearing** (because they exist in the inner ear so they detect the motion).

*sometimes nuclei in the microscope don't appear/you can't tract them easily , why?

- This depends on the section taken…The best way is to get a section as thin as possible + exactly perpendicular to the cells.

Stratified Epithelia

*Contain two or more layers of cells.

*Regenerate from below (mitosis is limited to the basal layer) nuclear is small and the cells are tightly packed.

*why do they need to regenerate?

They have good regeneration capacity because they are under the stress and they must be renewed.

👉Regeneration mechanism:

-When the stratified epithelia divide it makes a new layer above it and remains on the basal lamina… so the original epithelium is always the one resting on the basal lamina.

*Major role is protection.

*Are named according to the shape of cells at apical layer.

Stratified Squamous Epithelium

Specific types

Keratinized – contain the protective protein keratin.

Surface cells are dead and full of keratin.

Non-keratinized – forms moist lining of body openings.

Function

Protects underlying tissues in areas subject to abrasion.

Location

Keratinized – forms epidermis

Non-keratinized – forms lining of oral cavity (mouth), oesophagus, and vagina.

Stratified Squamous Keratinized Epithelium

*The very thin surface cells of stratified squamous epithelia can be “keratinized” (packed with keratin filaments) or “nonkeratinized” (with relatively sparse keratin).

***Stratified squamous keratinized epithelium** is found mainly in the epidermis of skin, where it helps prevent dehydration from the tissue.

our skin has two principal layers epidermis and dermis, the epidermis is composed of epithelial tissue, and the dermis is connective tissue.

*Its cells form many layers, with the less differentiated cuboidal cells near the basement membrane.

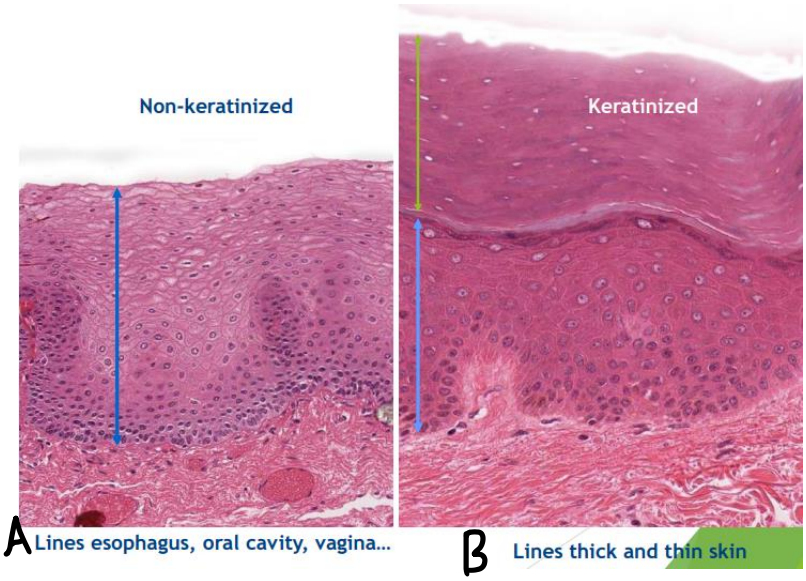
*These cells have many desmosomes and become more irregular in shape and then flatten as they accumulate keratin in the process of **keratinization** and are moved progressively toward the skin surface, where they become thin, metabolically inactive packets (squames) of keratin lacking nuclei. (so the keratin layer = dead cells)

*This surface layer of cells helps protect against water loss across this epithelium.

Stratified Squamous Non-Keratinized Epithelium

Stratified squamous nonkeratinized epithelium lines moist internal cavities (eg, mouth, esophagus, and vagina) where water loss is not a problem. (so we don't need a keratin layer to prevent dehydration... cells are hydrated all the time👌)

Here the flattened cells of the surface layer retain their nuclei and most metabolic functions.



Is there a difference between the two pictures?

Yes and There is also a similarity because it's the same type +

There are two types of tissue, the epithelium and connective.

What is the interface between epithelium and connective tissue ? basal layer.

In picture A: The amount of blue (Basophilia)is large because it comes from nucleoli and little cytoplasm.

The cell is arranged from oldest to youngest, with the outer layer being the oldest layer (exception: the original layer is the actual oldest layer…and it lays on the basal lamina).

In A: What is the difference between young cells and cells in the middle?

The older the cell, the smaller its size and the genetic material condense

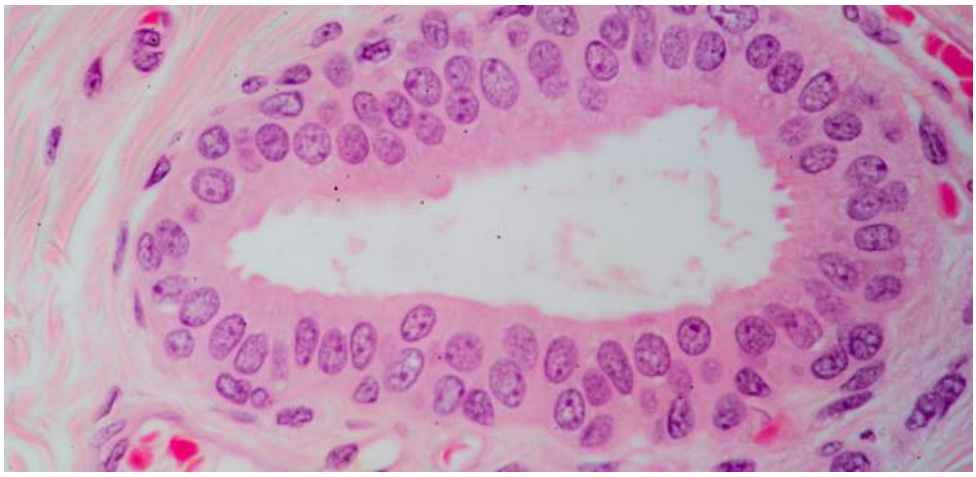
IN B:The cell becomes mutated by killing the cells and storing their insides, many layers of dead cells all make Keratin Layer.

There are two types of skin: thin cover our body and thick cover soles (The largest part of the body is thick).👉thicker skin means thicker Keratin Layer.

Stratified cuboidal

-Two layers only.

-Found lining larger ducts of glands.



Stratified cuboidal and stratified columnar epithelia

*__Stratified cuboidal__ and __stratified columnar epithelia__ are both relatively rare(columnar is the rarest).

*Stratified cuboidal epithelium occurs in the excretory ducts of salivary and sweat glands.

*Stratified columnar epithelium is seen in the conjunctiva lining the eyelids, where it is both protective and mucus secreting.

In trees, the small veins branch out from the large veins, the same principle as the glands.

Stratified columnar epithelium

*Two layers only; basal cuboidal and apical columnar.

*Very rare type.

*Found in conjunctiva(الملتحمة) of eye (epithelium covering all eye except colored part).

👉you can find it in plants as well.

*what do you expect the structure in the circle is?

Capillary

Extra info:

*Cornea covers the colored part. The external part covered by epithelium and the inner is connective tissue .

What is the epithelium cover of the cornea?

a thin layer of Squamous non Keratinized.

You don't expect to see all the large size Stratified Squamous.

Transitional epithelium (Urothelium)

*Unique **transitional epithelium** or **urothelium** lines much of the urinary tract, extending from the kidneys to the proximal part of the

urethra, and is characterized by a superficial layer of large, dome-like cells sometimes called umbrella cells.

*These cells are specialized to protect underlying tissues from the hypertonic and potentially cytotoxic effects of urine.

*Importantly, unique morphological features of the cells allow distension of transitional epithelium as the urinary bladder fills.

Transitional epithelium (Urothelium)

*Description

-Basal cells usually cuboidal or columnar

-Superficial cells dome-shaped (**un-stretched**) or flattened (**stretched**).

Some cells have two nuclei (bi-nucleated)

*Function

-Stretches to permit distension of urinary bladder

*Location.

-Lines ureters, urinary bladder and part of urethra (found in urinary system only).

Ureter: what carries urine from kidney down to the urinary bladder.

Urethra: what takes urine outside.

It has two types: If it is full it will be **streched**, And if it is empty, then it is called **un-streched.**

-How can I know this is transitional?

👉 stratified

👉apical layer looks like domes (unstreched).

👉you can find binucleation.(most important)

Medical Applications:

*In individuals with chronic vitamin A deficiency, epithelial tissues of the type found in the bronchi and urinary bladder may gradually be replaced by stratified squamous epithelium.

*In **chronic bronchitis**(التهاب مزمن), common among habitual smokers, the number of goblet cells in the lining of airways in the lungs often increases greatly. This leads to excessive mucus production in areas where there are too few ciliated cells for its rapid removal and contributes to obstruction of the airways. The ciliated pseudostratified epithelium lining the bronchi of smokers can also be transformed into stratified squamous epithelium by **metaplasia** (Cells that change shape to give us more protection).

A person who smokes coughs a lot in the morning, have you ever wondered why?

This is a result of the mucus accumulation in their Respiratory tract.

The end

"يَرْفَعِ اللَّهُ الَّذِينَ آمَنُوا مِنكُمْ وَالَّذِينَ أُوتُوا الْعِلْمَ دَرَجَاتٍ ۚ وَاللَّهُ بِمَا تَعْمَلُونَ خَبِيرٌ"