

#Helper-team

Oral Mucous Membrane

Function of oral mucous membrane

- 1) **protection** : it main function of the oral mucous membrane. It protects the deeper tissue of the oral cavity during normal activity such as chewing
- 2) **Secretion**: secretion of saliva by minor salivary glands within the oral mucosa provide lubrication and buffering as well as secretion of some antibodies
- 3) **Sensory**: the oral mucosa is richly innervated providing input for different sensation (touch, temperature, taste)
- 4) **Thermal regulation**: in animal (as dog) considerable body heat is dissipated through oral mucous by panting (التهنث)

classification of the oral mucous membrane:

a) Keratinized areas:

- **Masticatory mucosa**: areas subjected to pressure and friction during mastication.

- a) gingiva
- b) hard plate

) **Vermilion border of lip** الحته اللى بيتحط فيها الروج

b) Non keratinized areas (lining mucosa)

a) **loosely attached** (movable)

- (i) Alveolar mucosa
- (ii) Floor of the mouth
- (iii) Oral vestibule (vestibular fornix)

b)Fixed and immovable attached

- (i) lip and cheek
- (ii) Inferior surface of tongue
- (iii) mucosa of the soft palate and uvula

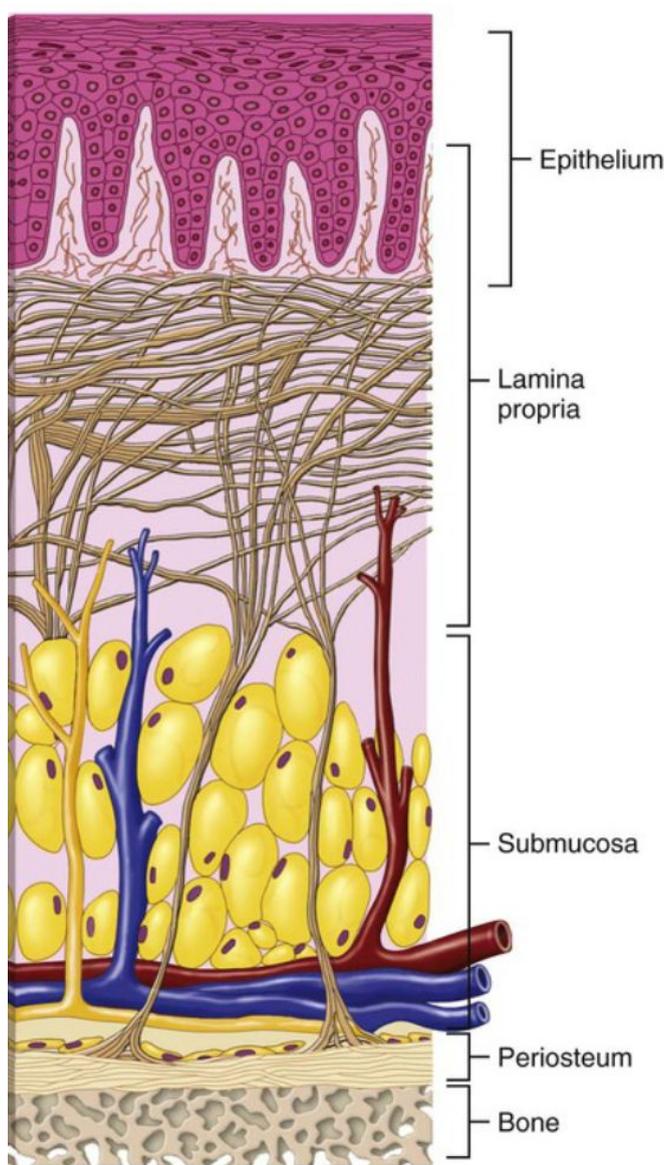
C)Specialized mucosa

- (i) The dorsal surface of the tongue

Structure of the Oral mucous membrane:

a)Surface epithelium

b)Lamina propria (deeper layer of connective tissue)
and basement membrane separated them



- The two layers form an interface that is folded that into corrugation

papillae of connective tissue of connective tissue protrude toward the epithelium carrying blood vessels and nerve.

Epithelial ridge (Rete Pegs) The epithelium in tern is formed into ridges that lamina propria (C.T)

Although some of the nerves actually pass into the epithelium,it doesn't contain blood vessels

Basement membrane is combination of **Reticular lamina** and **Basal lamina** which is visible by light microscope

- it is evident as zone of 1-4um with relatively cell free
- it appear black in silver preparation and stains after PAS

Basal lamina: the surface of the epithelium and lamina propria are separate from each other when viewed at the electron microscopic level by the basal lamina

- it is product of the **epithelial cell**

-consist of : (1)**Lamina dense** :

- it dense zone of thick 20-120 Å
- adjacent to the connective tissue

(2)**Lamina lucida**

- lucent zone of thick 20-40 um (الأكبر من الlamina dense)
- close to basal cell
- formed of :

non fibrillar collagen type IV(4)

proteoglycans, glycosaminoglycans

,Heparin, sulphate, fibronectin and laminin(glycoproteins)

Reticular lamina: is a much thicker layer of meshwork of collagenous fibres(Type VII) which reinforces the basal lamina and embedded in a similar glycosaminoglycan matrix

-is product of the **connective tissue**.

يعنى ال basement membrane يتكون من جزئين جزء جى مع ال epithelium والى هو ال basal وجزء من ال c.t والى هو ال reticular

Function of basement membrane:

- promote differentiation

- Promote peripheral nerve regeneration and growth
- Tend to prevent metastese

The Epithelium:

-the epithelium is derived from the embryonic ectoderm
 -it may be **Keratinized** , **parakeratinized** ,**non Keratinized** depending on the location in an apparent adaptation to function

- Tonofilament** and **desmosomes** are characteristics structure that distinguish the epithelial cell from other cell

Tonofilament in **Keratinized epithelium** are **Gathered together** to form bundles tonofibrils

Tonofilament in **non Keratinized epithelium** they **Remain dispersed** ,**less conspicuous**

الTonofilament في الKeratinized يبقى مجمع مع بعضه لكن في الnon
 Keratinized يبقى متوزع و اقل وضوح (هتيجي فامتحان)

The Keratinized stratified squamous epithelium:

Show 4 cell layer :

- 1) basal cell layer (stratum basale) facing the C.T
- 2)prickle cell layer (stratum spinosum) superficial to the basal layer
- 3)granular cell layer (stratum granulosum) superficial to the stratum spinosum
- 4)cornified cell layer (stratum corneum) or Keratinized layer the most superficial layer

1)The Basal cell layer

- Shape:** single row of cuboid or less columnar cells resting on the basement membrane

- Nucleus: large oval , rich in chromatin and finely granular, somewhat basophilic cytoplasm
- Cytoplasm: contain Tonofilament and abundant organelles that characteristics the protein synthetic activity (

Basal cell show Hemidesmosomes and Desmosomes

Hemidesmosome which abut on the basal Lamina toward the connective tissue

Consist of:

- Single attachment plaque and intercellular Tonofilament
- Single plasma membrane
- Extracellular structure, that attach the epithelium with basal Lamina and contain fine collagen

Desmosome attachment are observed connecting the basal cell with each other and with prickle cell

Consist of:

- pair attachment plaque and Tonofilament
- pair plasma membrane

Intervening extra cellular structure

ال basement membrane وال basal layer ده بين ال Hemidesmosome ال
 (basal lamina) فيبيكون hemi عشان بين حاجه epithelium (ال basal) وحاجه مش
 epithelium و (basement ال C.T) single layer فيبيكون
 لكن ال desmosome بيكون بين طبقتين من ال epithelium (ال basal) و ال prickle
 (فيبيكون pair layer)

FUNCTION OF BASAL CELL

synthesis of protein: which form filament of the basal cells and protein of the basal lamina

Synthesis of DNA undergo mitosis ,providing new cell that gives the origin to more superficial cell (Keratinized)

The basal cell is made up of two populations **Serrated** and **non Serrated**

Serrated : •heavily packed with tonofilament

•Adapted for attachment

•have protoplasmic process projecting from the basal surface toward the connective tissue

Non serrated; composed of cycling stem cells which gives a population of cells amplified cell division

2-The prikle cell layer (stratum spinosum):

- *Num. of rows: **several**
- * Shape of cells: **irregular (polyhedral)**
- Cells are separated by spaces called intercellular spaces.

N.B. The cells of prikle cell layer in non-keratinized epithelium is larger than them in keratinized one , so that the intercellular spaces are smaller.

-The cells are connected with each other by intercellular bridges or processes.

-The cells contain small "membrane-coating granules" or "odland bodies" or "keratinodomes".

-They are originated from golgi apparatus and rich in phospholipids.

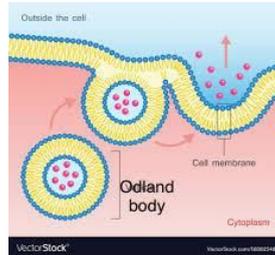
-In Keratinized epithelium, they are oval and lamellated , while in non-Keratinized epithelium they are spherical and amorphous.

-The differences of prikle cell layer between keratinized and non-keratinaized epithelium;

	keratinized epithelium	non-keratinized epithelium
size of cells	smaller	larger
size of intercellular spaces	larger	smaller
shape of odland bodies	oval	spherical

*Functions of Odland bodies:

1- Odland bodies get closer to the plasma membrane in the superficial layer of prickle cell layer and when they fuse , They cause thickening and elongation of the cell membrane.



2- Fusion of Odland bodies with plasma membrane discharges its content of phospholipids the thing that act as permeability barrier.

الفوسفوليبيد الذي يبطلع بر ادا بيكون عائق امام اي عامل ضار خارجي ، وبالتالي يتقوم بوظيفة الحماية.

*Functions of stratum spinosum:

1- The most protein secreting layer among epithelium layers.

2- Like the stratum basalis , the first 2 layers of the prickle cell layer have the ability to divide. that's why it's called "parabasal cell".

N.B. basal cells + parabasal cells = "stratum germinativum".

3-The granular cell layer(stratum granulosum).

—>Its composed of 2-3rows of flattened cells.

——> They are characterized by granules called "the keratohyaline granules"

Keratohyaline granules: They are small basophilic granules which contain protein called filaggrin .they are secreted by ribosomes

-This filaggrin is responsible for the aggregation of the tonofilaments , which will form the keratin layer.

زي ماقولنا ان ال tonofilaments بتبقى موجودة بشكل حزمة مش مبعثرة ، بروتين ال filaggrin هو السبب ف كدا.

The cells of stratum granulosum show less organelles and pyknotic nucleus.

- بسبب ان وظيفة الخلايا دي بقت انها تصنع ال filaggrin فقط، عشان كدا النواة صغرت و العضيات قلت فيها

4-Stratum corneum.

—>Its thickness is about 20 rows.

—> Its an acidophilic layer of cells that devoid of all organelles and nuclei .

—> They contain a high amount of tonofilaments with filaggrin to form the keratin layer.

طبقة الكيراتين بتتكون من تجمع ال tonofilaments بواسطة ال filaggrin.

—>Desmosomes disappear to allow cells to replace it.

—> The stratum corneum is thickest in palms of hands and soles of feet, then in oral mucosa.

Ortho and meta-keratinized epithelium

-In Parakeratinizes epithelium , the superficial cells retain the pyknotic nucleus and show few organelles , unlike ortho-keratinized epithelium

طبقة الخلايا السطحية ف البار ا بيكون فيها شوية عضيات مع نواة بسيطة على عكس الاورثو.

Non-Keratinized Epithelium

Some primary differences :

- The corrugations(تموجات) are less in non-keratinized.

- The non-keratinized has higher rates of mitosis.

*The layers in non-keratinized epithelium are:

1-basal cell layer: the same as it in keratinized epithelium.

2-prikle cell layer or (stratum intermediate): they are the same with these differences...

	keratinized epithelium	non-keratinized epithelium
size of cells	smaller	larger
size of intercellular spaces	larger	smaller
shape of odland bodies	oval	spherical

3-superficial layer: the cells are the same as prikle cell layer , but with less keratohyaline granules. and this is the last layer, there is no stratum corneum.

Non-keratinocytes

They represent about 10% of the epithelial cells , they are:

Melanocytes: - they are originated from neural crest cells .

- They are found between basal cells
- Some of its features are:
 - 1- dendritic(ليها تفرعات خارجية)
 - 2- no tonofilaments or desmosomes .
 - 3- they contain melanin granules called “melanosomes”.

*These melanosomes can travel to inside epithelium cells forming **melanophores** , or travel to inside the connective tissue cells and form **melanophages**

- It can be stained by either Dopa reaction that stains cells containing tyrosinase enzyme only , or by silver stain any cells that contain melanin.

الصبغ عن طريق الـdopa يصبغ الخلايا اللي بتحتوي على tyrosinase بس و بالتالي بتصبغ الـ melanocytes بس، لكن الـ silver يصبغ اي خلية فيها ميلانين زي الـ melanocytes , melanophores and melanophages.

The color difference in dark and light people results from the differences of the melanocytes activity not because of the different in number.

عدد الـ melanocytes ف الناس اللي بشرتهم داكنة نفس عدد الـ melanocytes عند الناس اللي بشرتهم فاتحة، الفرق بيكون ف نشاط الخلايا دي ، و كمان ف معدل تكسير الميلانين اللي بيتصنع.

-The langerhan's cells: - They are originated from hematopoietic origin(from blood).

-They are found between prickle cell layer

-Some of their features are:

- dendritic cells

-they dont have tonofilaments or desmosomes

- it's characterized by racket shaped granules called **bir-beck granules**.

- It's function is representing the antigen

بتعرف جهاز المناعة بالجسم الغريب.

- They can be stained by : gold chloride, ATPase and immunohistochemical markers.

Merkel cells: -They are ectodermal in origin (epithelial in origin).

- They are found between basal cells

- They contain tonofilaments and desmosomes. And has no dendrites

- They show granules that contain neurotransmitters.

- It's function is touch receptors.

- They are stained by HX &E stains , or by PAS stain.

Lymphocytes: -Their site is variable(متغير)

- They are inflammatory cells that increase in number during inflammation.

Lamina propria

عاش يرجالة هنخلص الكتاب

Its the connective tissue underlying the epithelium.

- The part of lamina propria inside the epithelium is called **connective tissue papilla**.
- Basement membrane, connective tissue papilla and the invagination of lamina propria helps in attachment of connective tissue to the epithelium

*Functions of lamina propria (connective tissue):

1. **Nourishment of the avascular epithelium.**
2. **Supply the epithelium with nerves.**
3. **It contains reticular fibers for attachment.**

Submucosa ♂

It's a connective tissue, not found in all parts of mucosa.

- It can help in the attachment with a skeletal muscles or bone
- Or for the nutrition of epithelium
- They are the sites of salivary glands

