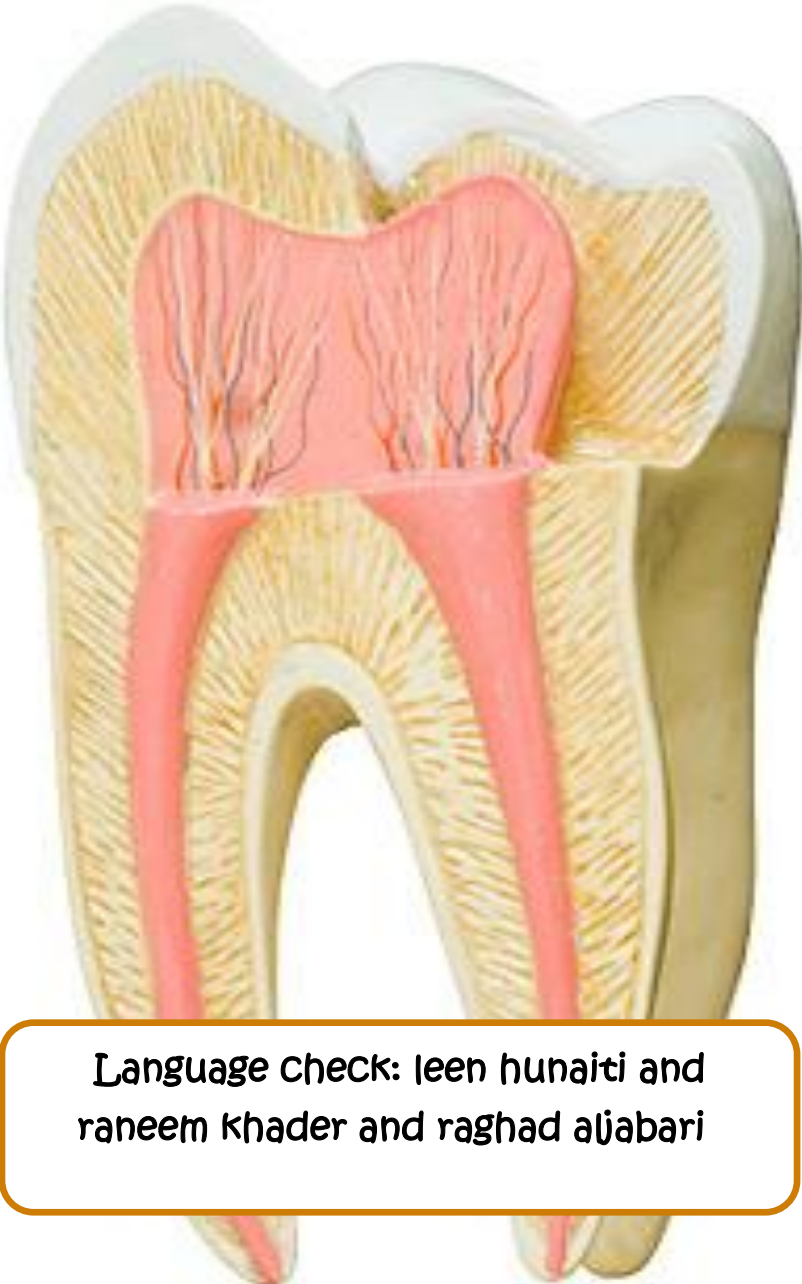


ORAL HISTOLOGY

DENTISTRY 2017 - UNIVERSITY OF JORDAN



Done by..
Rana AL-shdifat

Corrected by..
A.Al-Dabaibeh

Doctor..
Feras ALSuleihat

Sheets



Slides



Sheet # 10

Language check: leen hunaiti and
raneem khader and raghad aljabari

مكتبة تلاع العلي – مقابل بوابة كلية الزراعة عمارة رقم 235

Dental.committee2017@gmail.com

Asnan Lajneh



Oral Mucosa II

- **The Gingiva**

- **The portion of the oral mucosa that surrounds and is attached to the teeth.**

**not all the gingiva is attached to the teeth, some parts of the gingiva are attached to teeth, and some parts are attached to the alveolar bone.

- **It has two main regions:**

- **The attached gingiva.**

Directly bound to the underlying bone and tooth.

**at its beginning, it is attached to the tooth (first attached to the enamel then to cementum then to alveolar bone because the alveolar bone is below CEJ).

*اول شي يتصل بالايامل بعدها بالسيمنتوم وبس يجي الالفولار بون يتصل معو .

- **The free gingiva**

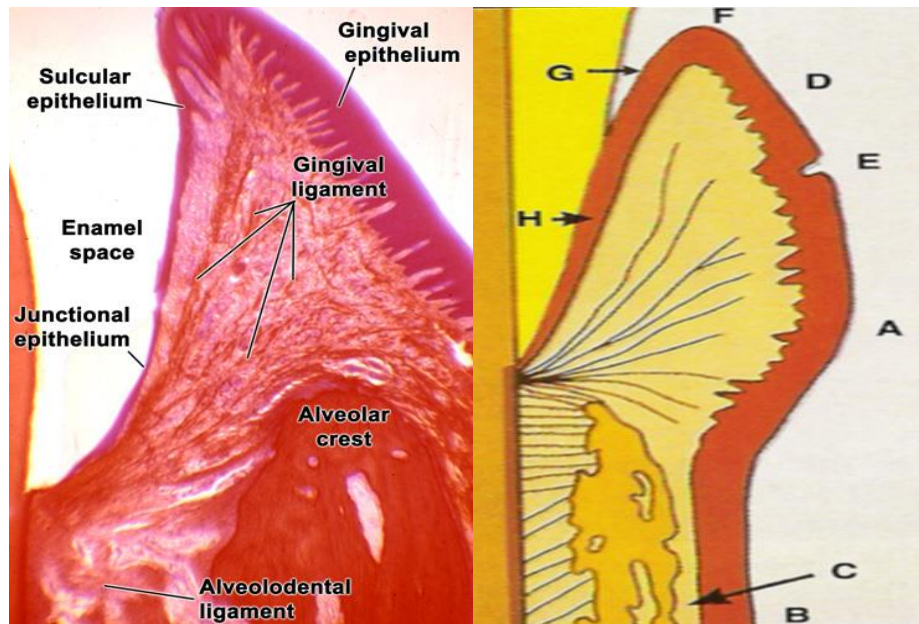
**it is always the beginning (not attached.)

Narrow, not bound to any bone or tooth.

- **The free gingival groove demarcates the free from the attached gingiva (40% of teeth).**

**that means that it is not always present.

Externally away from the tooth we usually have a groove, this groove is present between the free gingiva and the attached gingiva and it is called the **free gingival groove**, it is not always present (in **40%** of cases it is present and in **60%** of cases it is NOT present)



A) attached gingiva , H) junctional epithelium , G) sulcular epithelium non keratinized , F) crest of the free gingiva D) free gingiva , E) free gingival groove .

** Remember, we took in the lab that the free gingiva began from cemento-enamel junction (enamel > cementum > cemento-enamel junction) and it is called (junctional epithelium). When the gingiva is in the junctional epithelium we consider it attached gingiva.

** When the sulcular epithelium begins, (rete ridges) are usually thicker, so we consider it free gingival (NOT attached to enamel) because the tooth in the picture is not fully erupted, the alveolar bone's level is above the level of CEJ, but in case of fully erupted tooth, the alveolar bone's level is below the level of CEJ.

** When the alveolar bone level is higher than CEJ then the tooth is not fully erupted.

When the junctional epithelium is long the tooth is **Fully erupted.**

- **The gingival margin is the coronal limit of the free gingiva.**

**the highest point.

- **The gingival sulcus is the unattached region between the free gingiva and the tooth.**

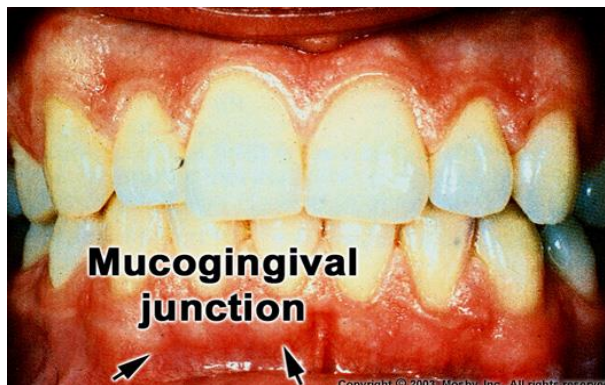
**the gap between the free gingiva and the tooth is called (free gingival sulcus) or (gingival sulcus).

- **The junctional epithelium is the area where the gingiva is bound to the tooth.**

- **The free gingival groove follows the contour of the cemento-enamel junction.**

**the free gingival groove is not a straight line, it is going with the morphology of CEJ (the cemento enamel junction has curvature labially, mesially & distally going beneath and returns to the lingual side like the labial side). Look at the picture to understand.

**free gingival groove is going parallel to the cervical line.



- **Principal fibres run from the cementum to the gingiva.**

**we have principal fibers of the gingiva (we took before about the principal fibers of periodontal ligament which is between cementum and alveolar bone).

The principal fibers of the gingiva do not achieve the case of binding cementum to the alveolar bone, they maybe:

cementum but not linked to the alveolar bone, and if they link to alveolar bone they don't link internally they link externally, they have many types, maybe from cementum to cementum.

* المهم انو يخالفو قاعدة (cementum to alveolar bone)

If it is cementum to alveolar bone in the internal side, then it will be periodontal ligament fiber.

If it opposes this rule it will be gingival fiber.

- **Heavy epithelial ridges.**
- **Healthy gingiva shows stippling, corresponding to epithelial ridges.**

** Healthy attached gingiva has heavy epithelial ridges, and the rete ridges will be deep, and the opposite side of it is a depressed area on the surface is called (gingival stippling).

- **Inter-dental papilla fills the space between the teeth.**

**the term Inter-dental papilla means the gingiva between the teeth below the contact point, and it has free part and attached part.

- **The external surface of the attached gingiva is masticatory mucosa.**

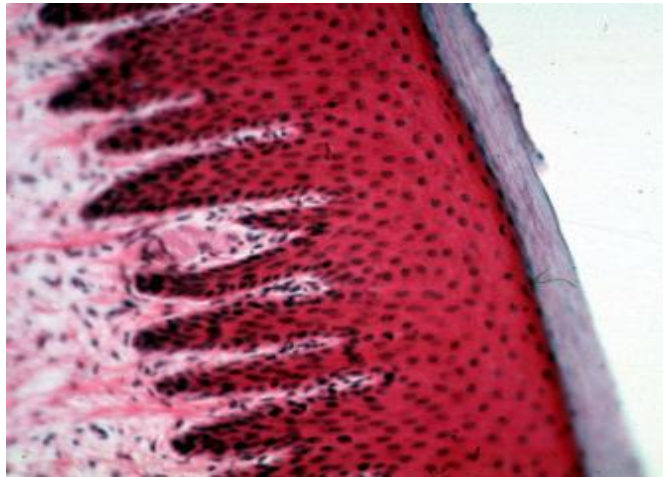
the outer epithelium of gingiva (the gingiva has two parts, one of them is away from the tooth and the other one is near to the tooth and alveolar bone**). The part that is near to the tooth is sulcular epithelium, then junctional epithelium and they are not masticatory. The junctional specialized and the sulcular lining.

But the far side (external) is keratinized and it is conceded in masticatory mucosa. It has keratinized epithelium with variations (it can be ortho keratinized or parakeratinized)**usually it's para keratinized

- **75% of the surface maybe Para keratinised.**

**the picture below is ortho keratinized but most of the time it is para keratinized.

It has retained nuclei in the keratin layer.



- **The rete ridges show variation.**

** This means that they may be long or short, but all of them are finger like projections (pointed).

One of the features of gingiva is that (it has pointed rete ridges)

- **Mucoperiosteium.**

**this term is used when there is no submucosa and the supporter is bone (periosteum).

- ✓ Mucoperiosteium > mucosa that means (epithelium + lamina propria).
- ✓ Periosteum > the cover of the bone that means there is no submucosa.

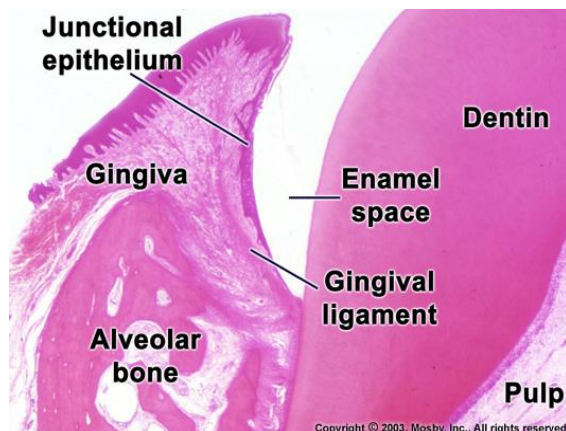
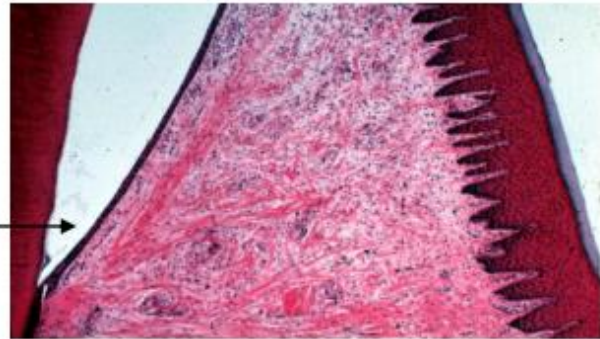
In case of the gingiva , the mucoperiosteium is applied on the part of the attached gingiva which is linked to alveolar bone because the gingiva is submucosa.

This part is junctional epithelium
so it is attached gingiva .

It attached to enamel

Then it will be attached to
cementum

Then it will be attached to alveolar
bone.



This tooth is not fully
erupted that is why the
level of the alveolar
bone is higher.

- **The free gingival mucosa is identical to the attached gingiva.**

**Externally, all the gingiva has the same epithelium (free or attached) stratified squamous epithelium is keratinized and the rete ridges are the same. (They are finger like projections).

- **The gingival sulcus**(the space between free gingiva and enamel) **is 0.5-2.0mm deep in healthy gingiva.**
- **Sulci deeper than 3.0mm are considered periodontal pockets** (and it is one of the signs of chronic periodontitis).
-إذا كان 2-3 يكون بداية تشكل بوكيت ولكن لا يعتبر بوكيت.

• **The Sulcular Epithelium**

- **Sulcular and junctional epithelia form the gingival cuff.**

junctional epithelium + sulcular epithelium are called **gingival cuff.

- **Sulcular epithelium has a more folded interface with the lamina propria.**

**This means that there are rete ridges.

- **Tags of enamel cuticle between the 2 epithelia.**

- **Different CK profiles.**

**cytokeratin which is present in sulcular epithelium is different from cytokeratin which is present in junctional epithelium. This is a variation from the original

- **Sulcular epithelium is thin and non-keratinized.**

**Junctional epithelium is also thin and non-keratinized but also thinner than Sulcular epithelium.

- **The base of the sulcus is at the same level as the free gingival groove.**

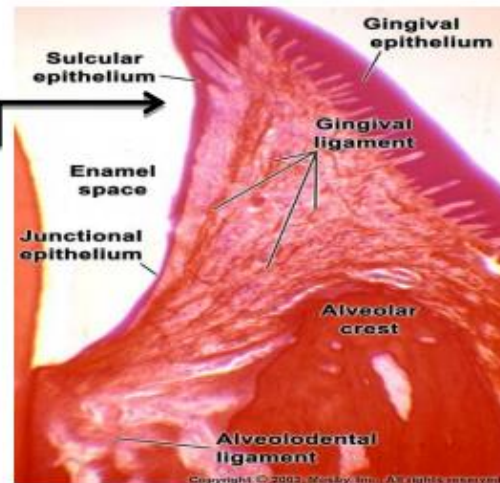
**when we have a free gingival groove externally, the most inner point in sulcus is present on the level of gingival groove.

- **The Junctional Epithelium**

- **Junctional epithelium extends from CEJ to the sulcus base.**

**Keeps going to the beginning of the Sulcular epithelium.

In this point we beginning see the rete ridges so it is the end of the junctional and beginning of Sulcular this is a sulcus base, and if we have a free gingival groove it would be in the same level .



- **2mm.**

**The normal length of the Junctional Epithelium is 2mm in case of full eruption.

** in this case (the picture), it is not fully erupted, so it is higher than 2mm.

- **Thinner apically.**

At the beginning of CEJ it is **thinner**. Then it increases gradually when we move upward.

- **2 layers:**

- **Stratum Basale**
- **Stratum spinosum**

**it does not have all the layers, while the sulcular has all the layers(Stratumbasale,Stratum prickle, intermediate, superficiales) all layers of the non-keratinized.

- **5-6 days turnover rate.**

**Renewed quickly

- **Junctional epithelium is originally derived from the reduced enamel epithelium (same CK profile).**

**there is a layer of epithelium covering the enamel before eruption to protect it, the part that got erupted will lose the protective layer, so it will lose its importance.

**When the tooth is fully erupted the part of the enamel will be covered by reduced epithelium and it will become junctional epithelium. So it is originated from reduced enamel epithelium.

- **Smooth connective tissue interface.**

**no rete ridges in Junctional epithelium, in contrast to sulcular epithelium.

- **2 basal laminae: internal and external.**

**the internal is always inside of tooth and the external is away from the tooth.

**the external basal laminae are located between epithelium and lamina propria, BUT the internal basal lamina is different (it has special specifications).

The Special specifications like:

- **Lamina densa in the internal lamina is not clearly delineated. It lacks type IV collagen and laminin.**

(type IV collagen and laminin are normally present in normal basal lamina)

- **Smaller number of desmosomes result in spaces making up to 5% of the tissue volume.**

**one of the features of the junctional epithelium is that it has more spaces because of the small number of desmosomes that link the cells together.

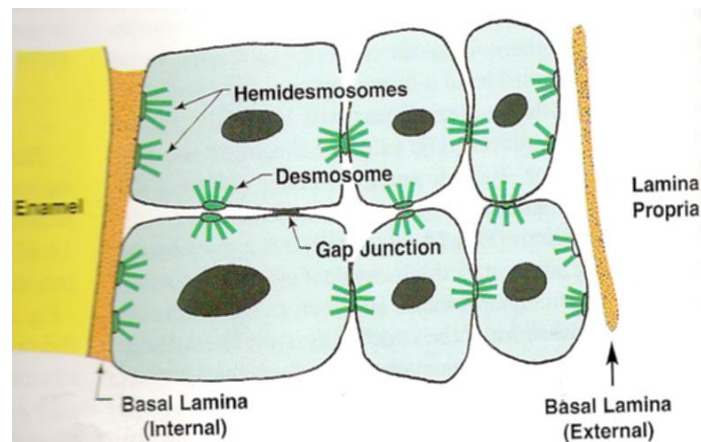
**Nearly 5% of the tissue volume is space and that makes the movement of sulcular fluid easier.

**sulcular fluid: fluid that comes from lamina propria that's under the epithelium and it passes through cells of Junctional epithelium to reach the sulcus (the sulcus maybe infected or inflamed by bacteria and so it must contain liquid for flushing (the fluid contains antibodies and neutrophils to defend the bacteria)

**This fluid is called Sulcular fluid or Crevicular fluid

- **Crevicular fluid and immune cells pass through these spaces.**

**To go to the sulcus



- **The length of the junctional epithelium varies with the stage of eruption.**

**When it is not fully erupted it will be long.

- **When the tooth first erupts, most of the enamel is covered with junctional epithelium.**
- **1/4 of the enamel is covered by the time the tooth reaches occlusion.**
- **Later on, the junctional epithelium will lie close to the CEJ.**

- **Gum recession leads to apical migration and contact with the cementum.**

**Gum recession >exposure in the root of the tooth, the gingiva is receding, and when the gingiva is receding the junctional epithelium would start from the lower part of the tooth (from the root)

- **The Crevicular Fluid**

- **The dentogingival junction seals the lamina propria from the oral environment.**
- **The gingival crevicular fluid is the fluid within the sulcus. It results from the permeability of the junctional epithelium.**
- **Material pass from the lamina propria into the sulcus.**
- **polymorphonucleocytes.**

**they are neutrophils.

- **Important in the defence mechanism.**

**from the foreign material

- **❖ The Interdental Papilla**

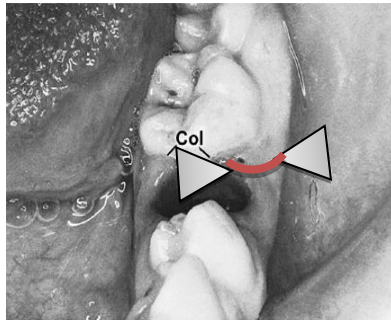
- **The interdental gingiva occupies the area between adjacent teeth.**

**Interdental gingiva=Interdental Papilla

- **Its shape and size depend on the shape and contact between teeth.**
- **Wedge shaped appearance on the buccal and lingual sides.**
- **Pointed between anterior teeth.**
- **The interdental col a curved depression across the buccolingual plane.**

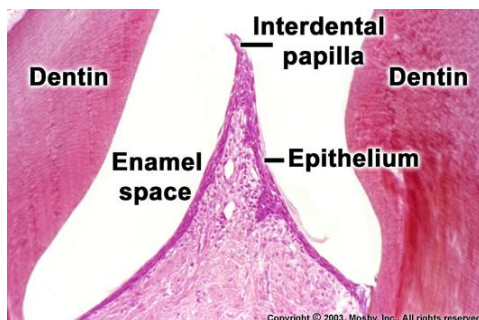
**this is specially in the posterior teeth because they are broad buccolingually, so there is a depression area between the two triangles

(there is a triangle buccally and a triangle lingually, and between them there is a depression).



- **It fills the contour around the contact point.**

** This area (depression) interdental col is located below the contact point.



**Interdental Papilla is pointed between the anterior teeth (does not have depression)

**in the posterior teeth it has a two-pointed region and between them there is a depression.

❖ **The Col**

- **The epithelium of the col is continuous with the junctional epithelium.**

**The epithelium that covered col region is continuous with the junctional epithelium and it has the same feature of junctional epithelium (thin, smooth interface *no rete ridges*, the origin of it is

reduced enamel epithelium and the cytokeratin profile is the same as the junctional epithelium)

**all features of the col epithelium have the same features of junctional epithelium.

- **Non-keratinized, initially derived from the reduced enamel epithelium.**

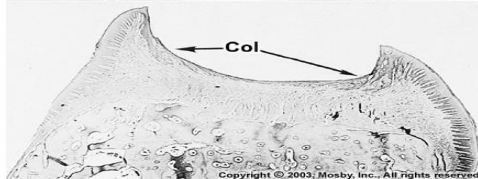
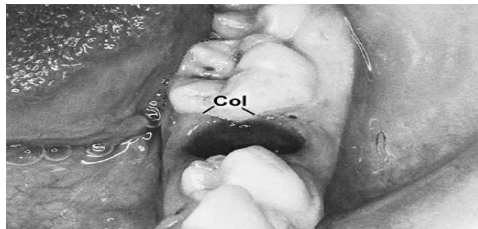
**same as the junctional epithelium

- **Spaced teeth have no col, they have a thin keratinized gingiva instead.**

** (thin keratinized) يعني مكان السن المخلوع يصير في طبقة من

In this case it will be exposed to food friction and the interdental col won't exist.

**When the two teeth are contacting there will be a depression, and when the two teeth are away from each other there will be no depression.



❖ The Gingival Lamina Propria

**Lamina propria of the gingiva is thick and dense

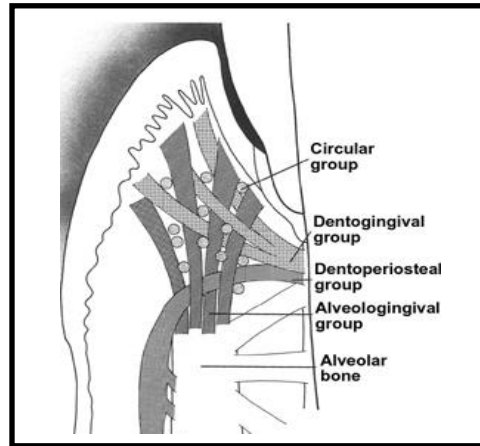
- **Dense collagen bundles:**
 - **Support the free gingiva.**

وظائف
gingival
lamina
propria

- Bind the attached gingiva to the alveolar bone and the tooth.
- Linkage of teeth to each other.
- Principal fibres are divided into groups according to their location.

**there are many types of fibers that are located in gingiva and they are named according to their direction and their origin and insertion.

- Dentogingival fibres.
- Longitudinal fibres.
- Circular fibres.
- Alveologingival fibres.
- Dentoperiosteal fibres.
- Transseptal fibres.
- Semicircular fibres.
- Transgingival fibres.
- Interdental fibres.
- Vertical fibres.

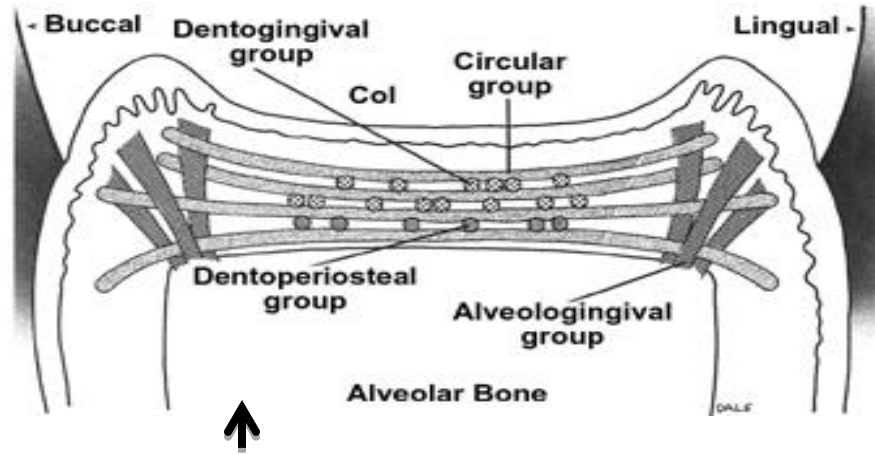


**Dentogingival fibres are originated from cementum and inserted into the lamina propria of the gingiva

**Alveologingival fibres are originated from crest of the alveolar bone and inserted into lamina propria of the gingiva

** Dentoperiosteal fibres are originated from cementum and inserted into alveolar bone in the external side wherefore is not conceded in the periodontal ligament

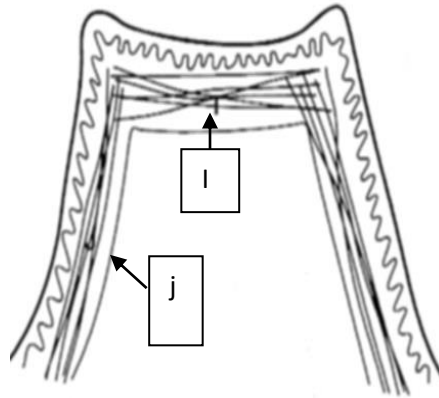
**Circular fibres around the tooth



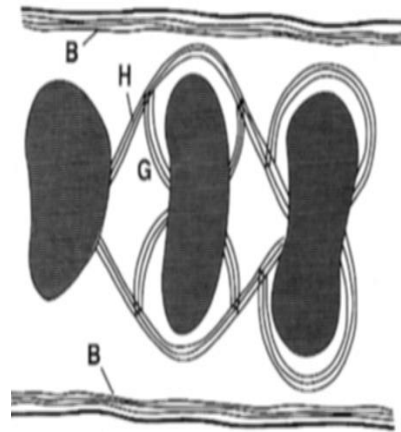
Dentogingival fibres and Dentoperiosteal fibres are cross sectional in this picture

<p>f) Transseptal *cementum-cementum between neighboring teeth.</p>	
<p>a) Dentogingival b) Longitudinal fibres. على طول الفك c) Circular fibres. d) Alveologingival fibres. e) Dentoperiosteal fibres.</p>	

i) Interdental
j) Vertical



g) Semi circular
h) Trans gingival root to root
but not adjacent



Compared to periodontal ligament :

- **The fibroblasts lack alkaline phosphatase.**
- **They have less contractile proteins.**
- **They can release more prostaglandin in response to histamine.**
- **Less ground substance in the lamina propria of the gingiva.**
- **Less type III collagen.**
- **Lower turnover rate.**
- **Rich vasculature, 2 plexi beneath the oral sulcular epithelium and beneath the oral gingival epithelium.**

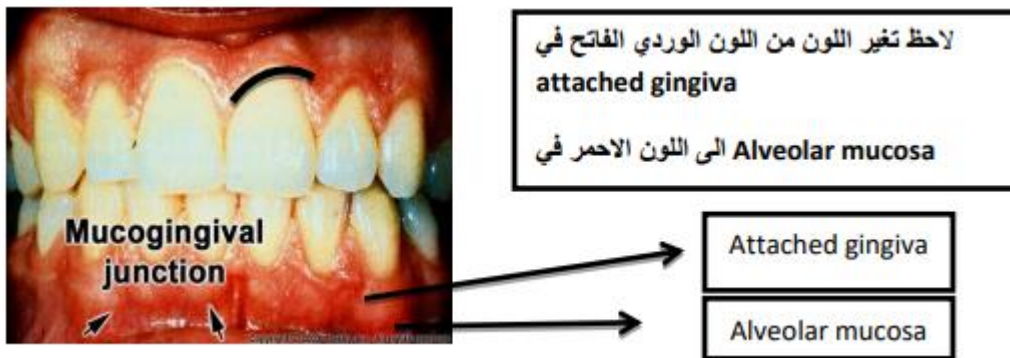
❖ **The gingiva (masticatory)**

- **The attached gingiva is demarcated from the alveolar mucosa by the mucogingival junction.**

**Between free gingiva and attached gingiva, there is gingival groove

**When the attached gingiva is finished, the alveolar mucosa is started

**The alveolar mucosa is more reddish in color because it has more blood supply and its epithelium is non-keratinized so it looks more reddish in color than the gingiva, the gingiva is pale pink in color because it is keratinized and it has thick epithelium.



**the line goes back to free gingiva (usually it has groove) and in this point you can insert the probe and as we said earlier if the probe gets in the free gingiva from 0.5 to 2.00 mm, the gingiva is normal and if it 2.00-3.00, there is a beginning of periodontal pocket and if it 3.00 or more there is periodontal pocket. (chronic periodontitis بصير مكان لتجمع البكتيريا والتهاب مزمن)

- **3-5mm below the alveolar crest.**

**the alveolar crest level is nearly below the CEJ

So the mucogingival junction is below the alveolar crest which separates the free gingiva from alveolar mucosa

❖ **The Alveolar Mucosa**

- **It lines the lower part of the alveolus**

** it is covered part of the alveolar bone therefore naming is alveolar mucosa

** part of the alveolar bone is covered by attached gingiva and the other part is covered by Alveolar Mucosa.

- **Absent on the palatal side.**

there is no alveolar mucosa in the palate region (root of the mouth) .

- **Has a loose submucosa, elastic.**

*** بسبب وجود الـ elastin رح تكون مرنة

- **The submucosa is attached to the periosteum.**

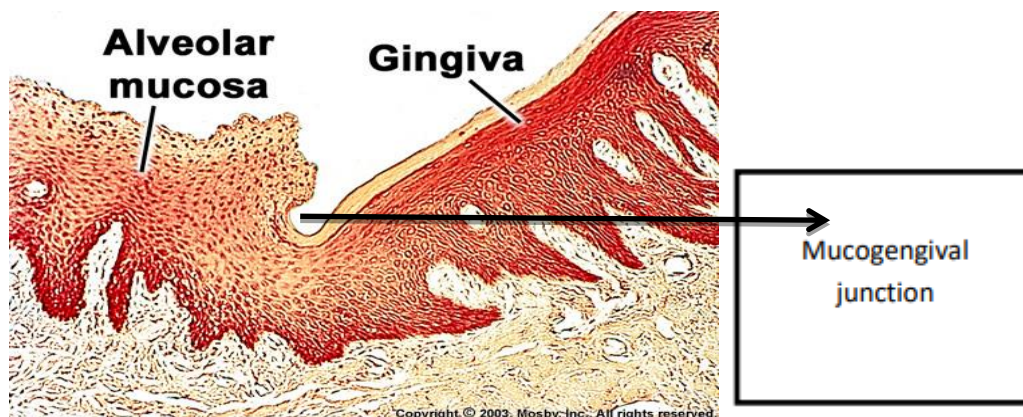
**because it covered part of the alveolar bone.

- **Thin translucent epithelium, non-keratinised.**
- **Blood vessels near the surface.**

**that is why it is red in color.

- **Minor salivary glands.**

**present in submucosa which follow the alveolar mucosa.

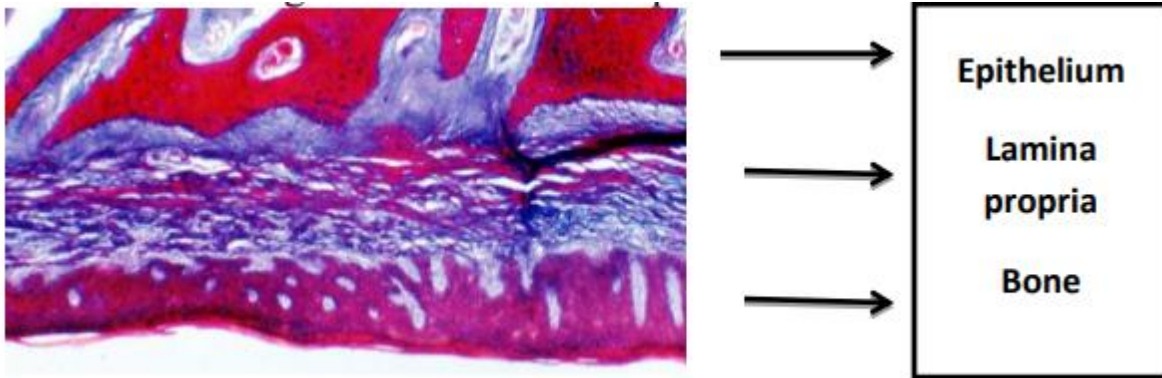


❖ The Palate

- The palate is divided into 2 main areas:

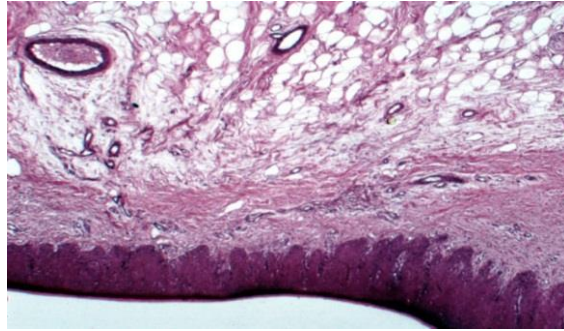
1) The Hard Palate :(Supported by bone)

- Masticatory mucosa.
- Keratinised epithelium.
- No submucosa in the central region.
- A submucosa exists where the palate meets the alveolus. It contains the main neurovascular bundle.
- Minor salivary glands posteriorly.
- Adipose tissue anteriorly.



This figure shows :The central region called med line palatal there is no submucosa

- ✓ In the anterior lateral region>fat submucosa
- ✓ posterior lateral region>glandular submucosa minor slavery glands completely mucus,
- ✓ palatal robe area >general submucosa little pit
- ✓ Interdental Papilla>(the most anterior part of the midline) contains neurovascular submucosa (submucosa it contain large blood vessel and large nerve bundles) and there is nasopalatine nerve , nasopalatine artery and nasopalatine vein



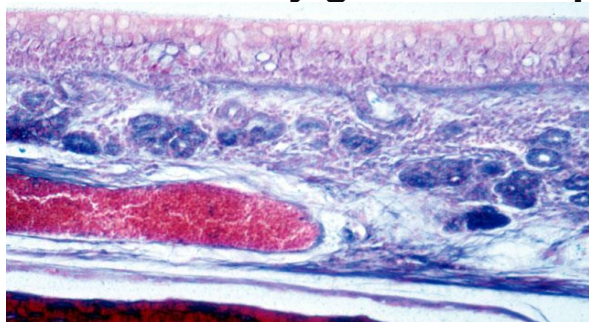
The figure shows :anterior lateral region>fat submucosa

***note:** The rete ridges of the hard palate is square ,unlike the gingiva that is finger like projection.

*The hard palate separates oral and nasal cavities ,from the nasal side the nasal surface of the hard palate will be lining by respiratory epithelium (Ciliated columnar epithelium with goblet cells) ,and it has a lamina propria that contain mucus gland, under lamina propria there is submucosa that has large veins to warm the inhaled air .

- **Vascular submucosa with minor mucus glands.**

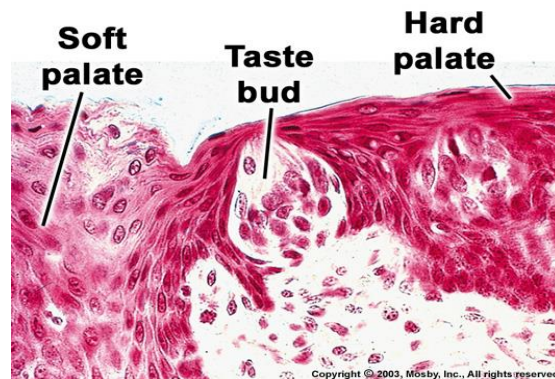
***minor salivary glands are specific in the oral mucosa region**



2)The Soft Palate :(Supported by muscle more posteriorly)

- **Non-keratinized lining mucosa.**

- **Short broad connective tissue papillae.**
- **Submucosa with many salivary glands**(completely mucus).
the posterior region contains minor salivary glands completely mucus and the anterior region is mixed but mainly mucus .



❖ The Floor of the Mouth

- **Both the floor of the mouth and the ventral surface of the tongue have a typical lining mucosa**(non-keratinized).
- **A need for mobility.**(The floor of the mouth and the ventral surface of the tongue move against each other, so they are lined by non-keratinized epithelium to make their movement easier)
- **Thin, non-keratinized epithelium with short papillae.**
- **Submucosa considerable**(large amount) for the floor of the mouth, but almost absent for the ventral surface of the tongue.
- **Submucosa in the floor of the mouth contains major salivary glands that called sublingual glands and these gland are mixed but mainly mucus**
**under the ventral surface of the tongue there is no submucosa , directly under the lamina propria of the ventral surface there is a muscle ,within the substance of the muscle there is a gland which called anterior lingual gland and it's a minor salivary gland (mixed but mainly mucus).

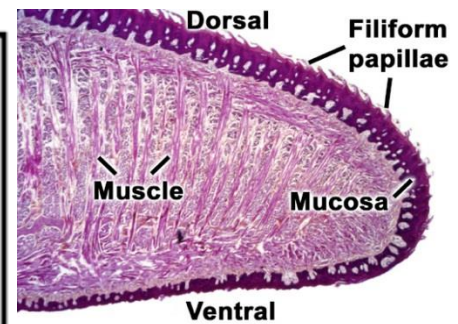
- The lamina propria in floor of the mouth is Highly vascularized. (drug route administration).

Example : nitric glycerin which is taken when there is a heart attack –vasodilators- (تكون سريعة الامتصاص بسبب وجود الكثير من الأوعية الدموية(حبة تحت اللسان

The tongue

there is a papilla on the dorsal surface of the tongue

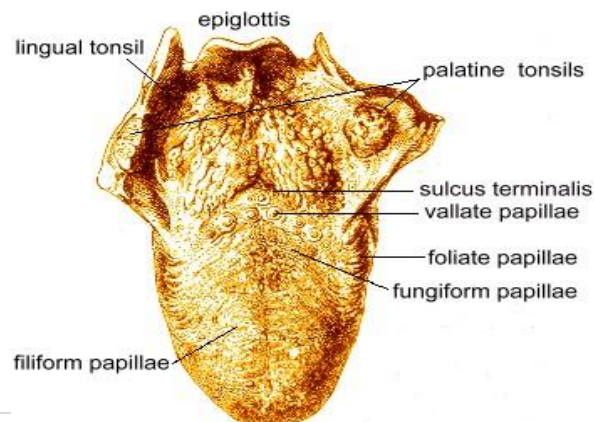
while there is not a papilla on the ventral surface of the tongue



Copyright © 2003, Mosby, Inc., All rights reserved.

- ✓ Ventral surface of the tongue is lining (non-keratinize) ,,
- ✓ Anterior 2/3 of the dorsal surface of the tongue is keratinize (specialized)
- ✓ Posterior 1/3 of the dorsal surface of the tongue is non-keratinize and classified as lining EXCEPT lingual tonsil area classified as specialized.

- The anterior 2/3 are divided from the posterior 1/3 by the sulcus terminalis(V-shaped).

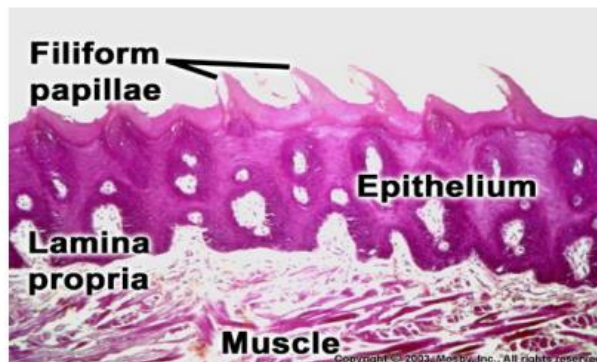


- The anterior 2/3 of the tongue is covered with papillae.
- The posterior 1/3 has lots of lymphatic nodules. {posterior 1/3 classified as lining except lymphatic nodules(lingual tonsil) specialized.}
- Main types of papillae:
 - 1) Filiform papillae.

- Filiform papillae largely covers the anterior 2/3 of the dorsum of the tongue.
- Keratinized (ortho or para).
- Central core of lamina propria with secondary papillae branching from it.
- They have a mechanical function as they are highly abrasive.
- There is no relationship between filiform papillae and taste.
- They are heavily keratinized and related to mastication (highly abrasive)

Lamina propria
then muscle

*no submucosa
in the anterior
2/3 of the dorsal



2) Filiform papillae.

- Fungiform papillae are found as isolated elevated mushroom shaped papillae scattered between filiform papillae.
- 150-400µm in diameter.
- Covered by Thin epithelium, keratinized (thin layer) or non-keratinized.

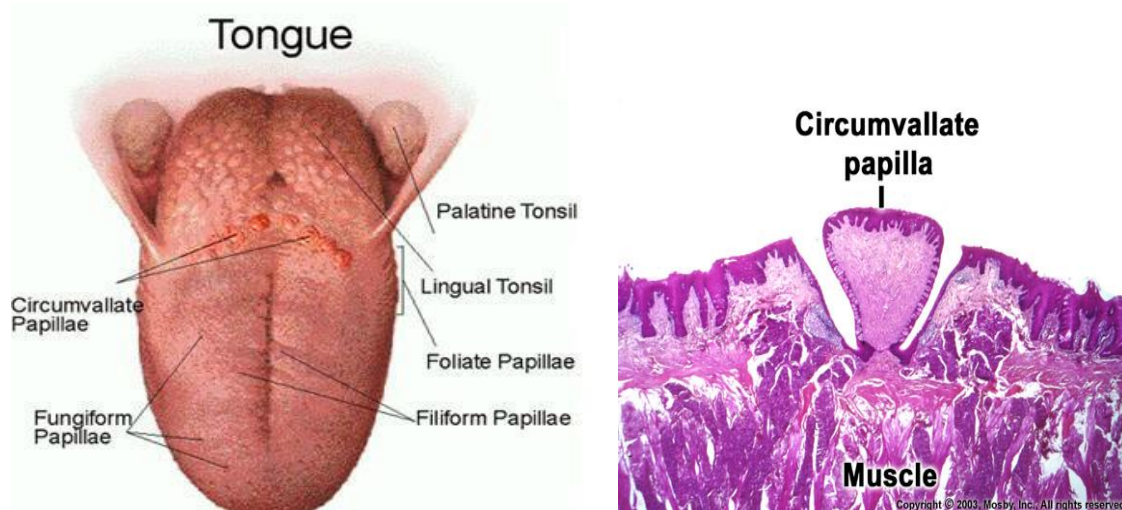
- Vascular lamina propria core. { lamina propria core is big and highly Vascular so it appears reddish in color }.
- Taste buds could be found on the surface of Fungiform papillae

3) Folate papillae.

- Folate papillae may be found as 1-2 longitudinal clefts at the side of the posterior part of the tongue (vertical ridges and groove)
- Covered by Non-keratinized epithelium.
- Taste buds maybe found on the sides of the groove within their epithelium.

4) Circumvallate papillae.

- Circumvallate papillae are large and rounded.
- It's located just anteriorly to sulcus terminalis
- They are approximately 12 in number (largest and contain the highest number of taste buds)
- Surrounded by a trench like structure.
- Around them there is deep groove called trench.
- They are not projected beyond the surface of the tongue (on the surface level).
- Covered by Non-keratinized epithelium.
- Taste buds on the internal wall of trenches.



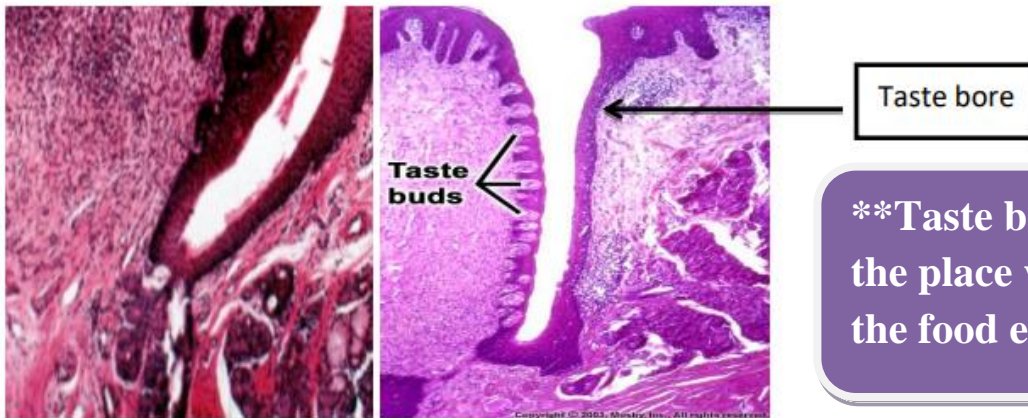
on the both sides of the tongue, there is Neural Taste buds which associated with special type of glands called **Von Ebner's gland{it is the only minor salivary gland that is completely serous) , it's main function is :

- 1) it opens on the deep spot of the trench and flushing it (to Prevent accumulation of bacteria)
- 2) it dissolution of the chemical of the food to easiest sensation of test buds to food .

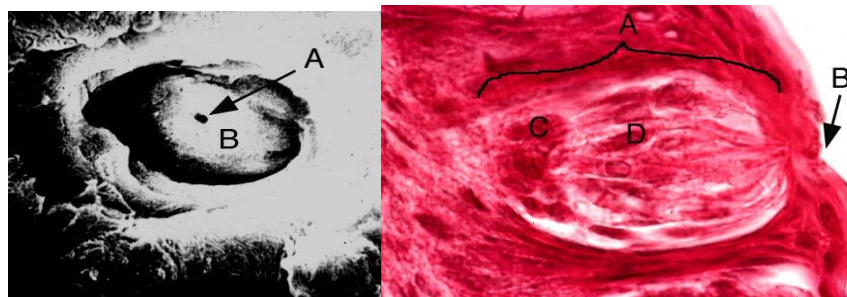
- **Von Ebner's serous glands empty into the base of the trench.**
- **Mucous glands could be seen within muscles (posterior).**{ the submucosa of the posterior 1/3 contains minor salivary glands (mucus) and the muscle fibres extended within the submucosa} .

❖ Taste Buds

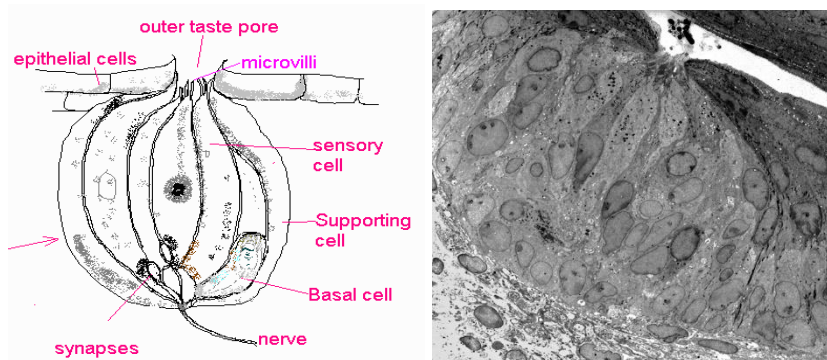
- **Chemoreceptive organ of taste.**
- **Taste buds found in Circumvallate, fungiform and foliate papillae, in addition to the palate and the epiglottis (not found in filiform papillae).**
- **A small pore opens from the surface into the bud.**
- **Two main types of cells:**
 - **Taste cells.**
 - **Supporting cells.**



****Taste bore: is the place where the food enters.**

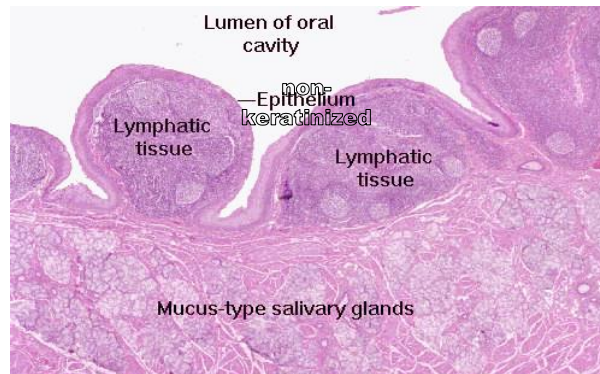


- **Four sensory cell types:**
 - a. Type I cells appear dark under EM.
 - b. Type II cells appear light. under EM
 - c. Type III cells appear light. under EM
 - d. Type IV cells are undifferentiated(stem cells /regenerative), lie basally and possess intermediate filaments
 - ✓ Types I and III form synapses with the intrageminal nerves.
 - ✓ A basal lamina separates the bud from the lamina propria.



❖ Lingual Tonsils

- Located in posterior 1/3 of the tongue dorsal.
- Masses of lymphoid tissue on the lateral border of the posterior third of the tongue.
- Part of Waldeyer's ring (lingual, palatine and pharyngeal tonsils).
- Deep crypts lined with epithelium containing masses of lymphoid tissue.
- Mucous glands could be present in submucosa.
- epithelium is non keratinized



❖ Clinical Considerations

- **Changes in CK expression due to inflammation.**
- **CK in diagnostic histopathology (poorly differentiated neoplasms).**

**When the change in CK is more than normal this Indicates that the cancer is poor.

- **Dysplastic changes revealed by CK alterations.**

**التغيرات التي تحدث للخلايا قبل السرطان

- **CK is important in determining the origins of cysts.**

**CKIndicates the origin of the epithelium.

- **Gingival wounds do not form scars upon healing, resembling by that foetal mesenchyme.**

لما اللثة تتضرر وترجع تلتئم ماتترك اثر خلفها وهذا يدل على ان اللثة highly generation ability and it can healing without leaving scar this characteristic is similar to mesenchyme.

, والله ما صعبت الا فُرجت , وما تعسرت الا تيسرت ,
وما أغلق باب الا وفُتح الف باب , وعد من الكريم
الوهاب ..

" ان مع العسر يسرا "

٨_٨