Lec. 2

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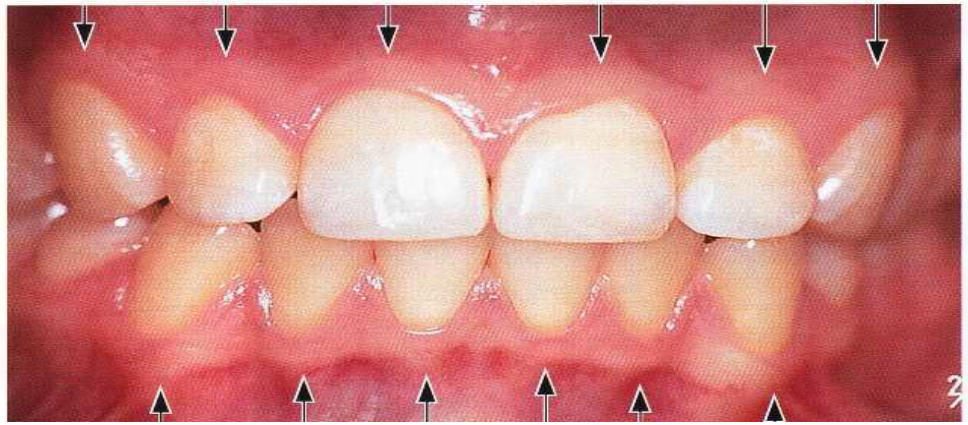
Histology of the oral mucosa

Oral mucosa: includes the tissue which lining the mouth. It consists of:

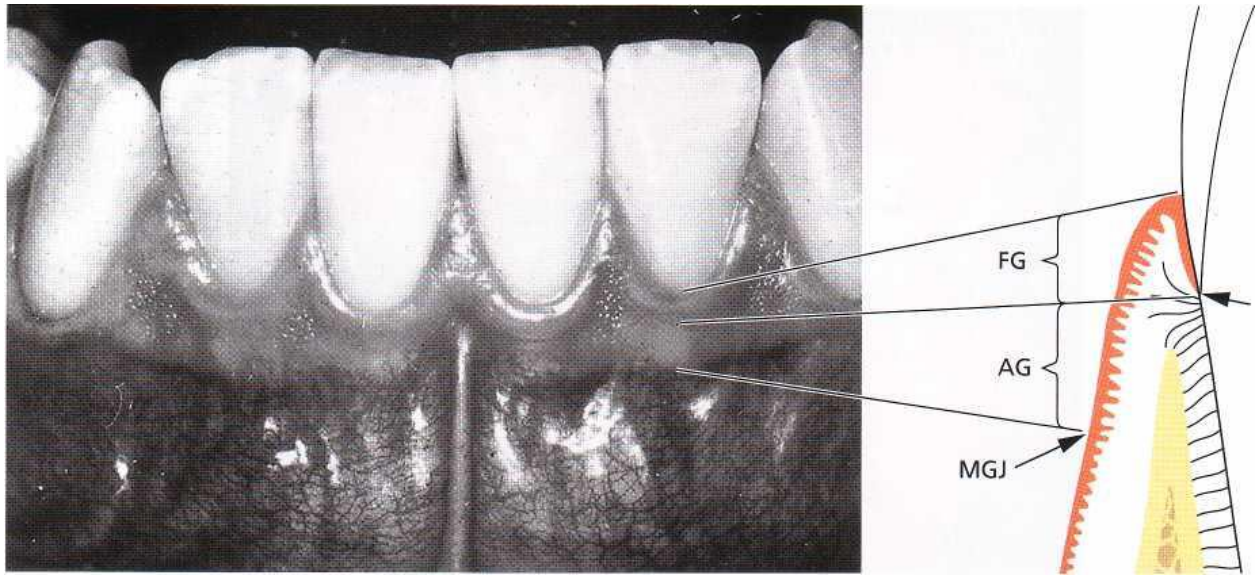
1- Masticatory mucosa: encompassing the attached gingiva in addition the one that cover the hard palate. Its boundaries are from the free gingival margin to the mucogingival junction (MGJ) on facial and lingual surfaces. This tissue is firmly attached to the underlying bone and covered with keratinized epithelium to withstand the frictional forces of food during mastication.



2- Specialised mucosa: covers the dorsum side of the tongue.

3- Lining mucosa: It is loosely attached to the underlying bone and covered by non- keratinised epithelium. The tissues that cover Lips, cheeks, floor of the mouth, inferior surface of the tongue, soft palate and alveolar mucosa (located apical to the attached gingiva, extending to the mouth vestibule) are examples of the lining mucosa.

- Alveolar mucosa is darker red and moveable due to containing high number of elastic fibres



Gingiva

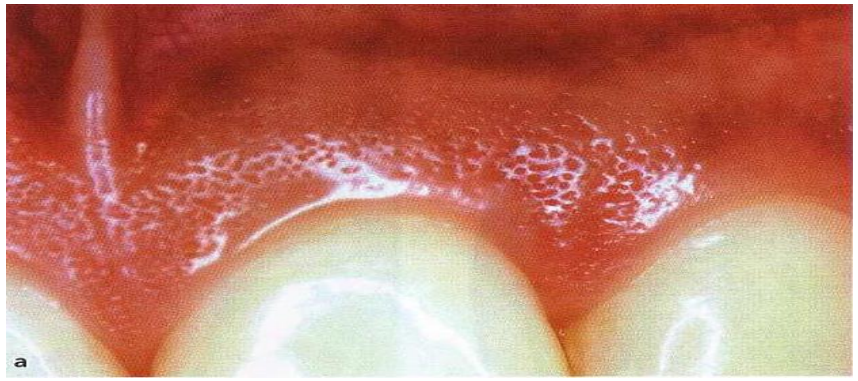
Is the part of the masticatory mucosa, covering the alveolar process and surrounding the cervical portion of the teeth. It is divided into 3 parts:

1- Marginal gingiva (free or unattached gingiva)
2- Attached gingiva
3-Interdental gingiva

1- Marginal gingiva

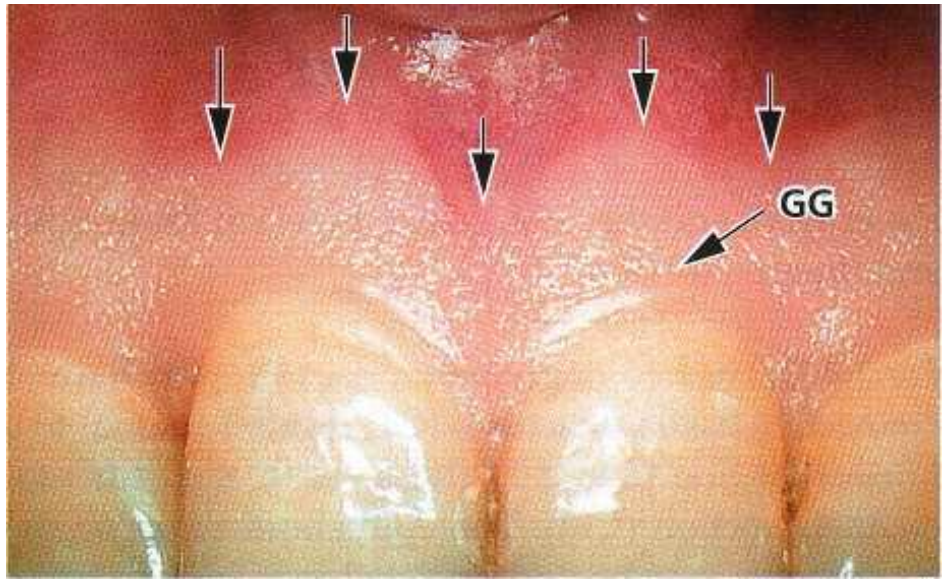
Is the most coronal portion of the gingiva, surrounding the teeth in a collar like fashion but not attached to them. It is demarcated apically from the attached gingiva by the free gingival groove.

- Free gingival groove: a shallow linear depression of about 1mm width and is positioned at a level corresponding to the cemento-enamel junction, it is present only in about 30-40% of adults.
- Free gingiva forms the soft tissue wall of the gingival sulcus.
- Gingival sulcus: is the space bounded by the free gingival margin, the tooth and the most coronal attachment of the junctional epithelium. Its range of healthy measurement is 1-3mm, however more than this measurement is considered as a pathological pocket.



2- Attached gingiva

It extends coronally from the free gingiva by the free gingival groove to the mucogingival junction in an apical direction. It is firm, resilient and tightly bound to the underlying teeth and periosteum of the alveolar bone. The stippling surface of gingiva, which is similar to the orange surface found in 40% of adults.



The width of the attached gingiva varies in different area of the mouth.

On the facial surface of the mouth it is:

- Widest on the maxillary lateral incisor
- Narrowest on the mandibular canines and first premolar

However on the lingual surface it is:

- Widest near the first and second molars
- Narrowest adjacent to the incisors and canines

3- Interdental gingiva:

It is located in the interproximal space beneath the area of teeth contact. It is triangular in shape regarding the mesio-distal aspect

The shape of the interdental papilla is determined by:

1- The contact relationships between teeth
2- The width of the approximal tooth surfaces
3- The course of the cement-enamel junction

Generally there are 2 shapes of the interdental papilla:

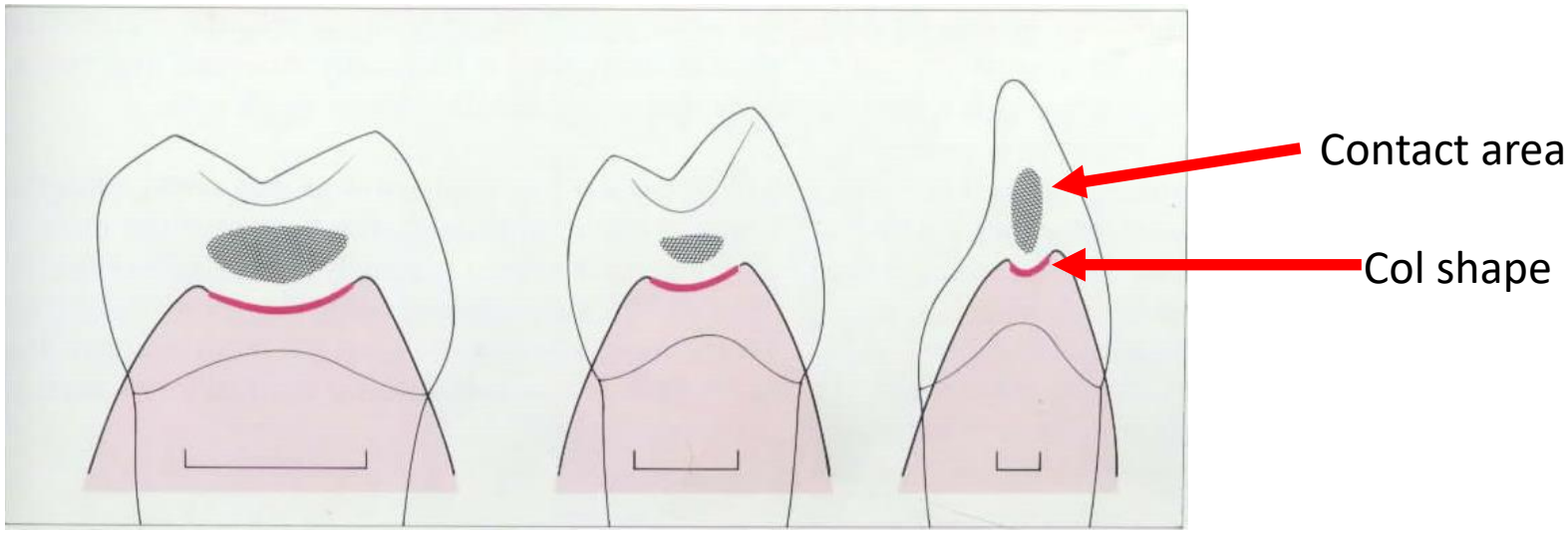
1- Pyramidal shape:

Occur in the anterior region of the dentition where there is approximal contact point between 2 neighbouring teeth and one papilla with its tip immediately beneath the contact point

2-Col shape

The interdental papilla between the posterior teeth are more flattened, having a concave depression that connects the buccal (facial) and lingual papilla, taking the shape of the interproximal contact surface.

- In case of gingival recession, no Col shape will be seen
- Col area covered by non-keratinised epithelium, which is most susceptible for periodontal disease process



Clinical descriptive criteria of health and inflamed gingiva

1- Gingival colour:

Coral pink is the normal colour of the gingiva, with some variations depending on the amount of melanin pigment in the tissues (dark skinned people often exhibit dark blue or brown colour), thickness of the epithelium, the degree of keratinisation and the vascularity of the connective tissue.
However, the inflamed gingiva may appear red to bluish red as a result of vasodilation, which may lead to bleeding tendency.

2. Gingival contour

The gingiva usually ends coronally in a knife edged margins and scalloped in contour.
Inflamed gingiva shows rounded and enlarged contours due to vascular stagnation and increases formation of collagen fibres.

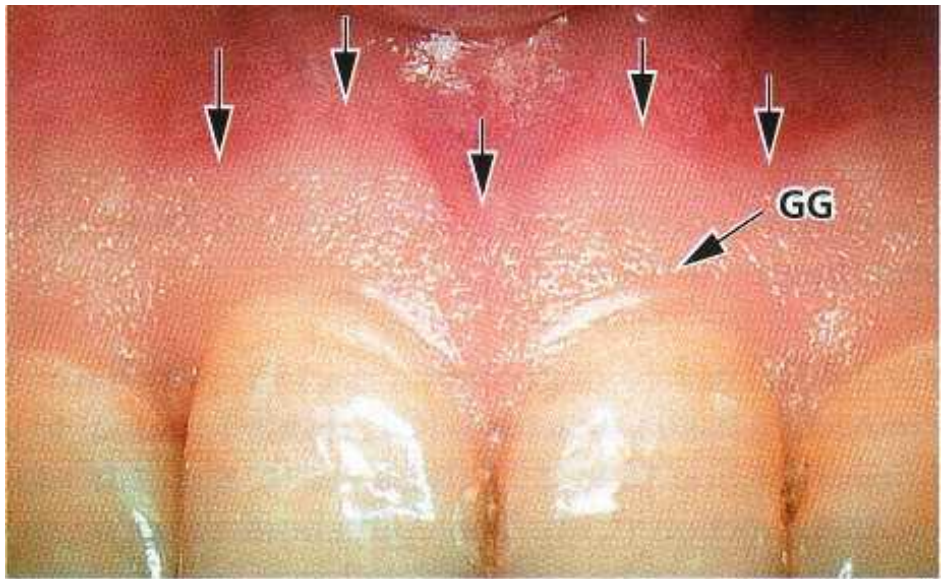
3- Gingival consistency

The gingiva is usually resilient, firm and bound to the underlying bone by the dense collagenous nature of the gingival connective tissue.

On the contrary, in inflamed gingiva, the consistency may be soft owing to the vascular stagnation and decrease in the amount of gingival collagen fibers or extremely firm due to excessive formation of collagen (fibrosis) as in chronic inflammation.

4- Gingival surface texture

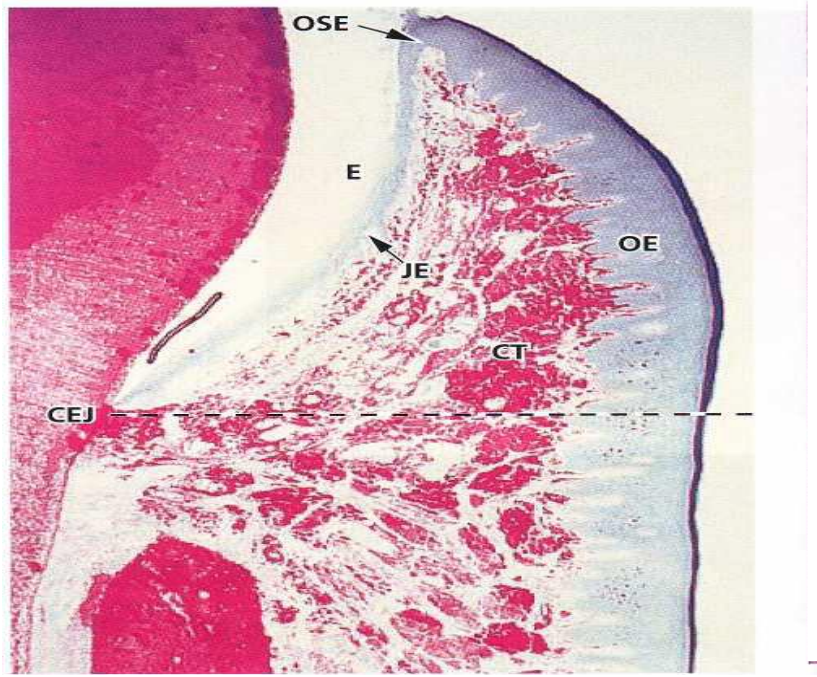
The attached gingiva has usually stippled surface, whereas, the free gingiva is smooth.



Normal microscopic features
Gingiva consists of fibrous connective tissue known as lamina propria, covered by stratified squamous epithelium.

Gingival epithelium is described as follows:

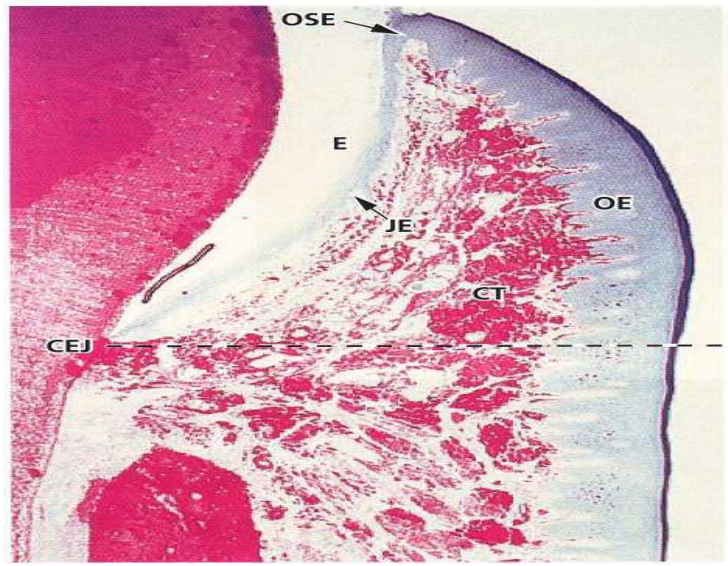
1- Oral epithelium faces the oral cavity
2- Sulcular epithelium faces the tooth in the gingival sulcus only
3- Junctional epithelium provides the contact between the gingiva and the tooth

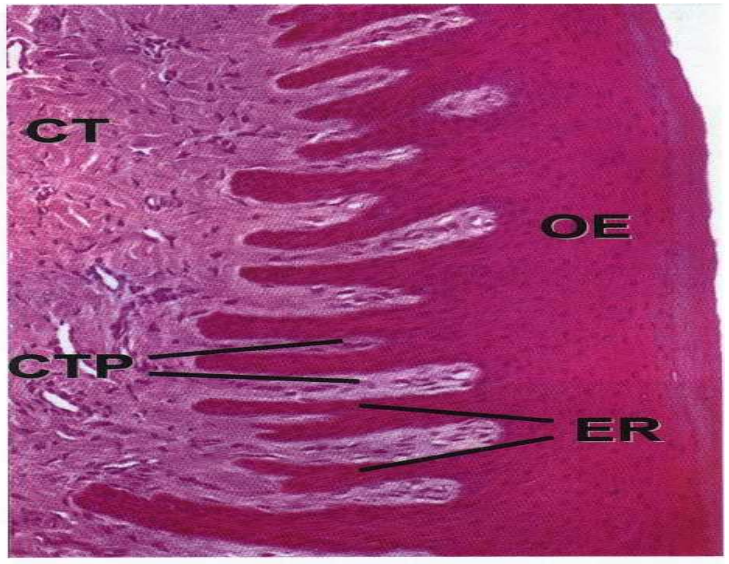


Oral epithelium

It covers the crest and the outer surface of the marginal and attached gingiva. It is either keratinised (without nuclei) or parakeratinised (retained nuclei).

- The boundaries between the oral epithelium and the underlying connective tissue has a wavy course, known as (Rete pegs or rete ridges).
- The intervening connective tissue portions, projecting into the epithelium are called connective tissue papilla
- This alternating pattern of depression and protuberances of the connective tissue papillae with epithelial rete pegs is supposed to give the stippled appearance





Layers of oral epithelium

Stratum basale (basal layer)

-Basal layer of cuboidal cells along the basement membrane
-Here the epithelial cell replication and differentiation begin
-Melanocytes reside in this layer

Stratum spinosum (prickle cell layer)

-The thickest layer
-Cells appear to have cytoplasmic spines
- It contains Langerhans cells

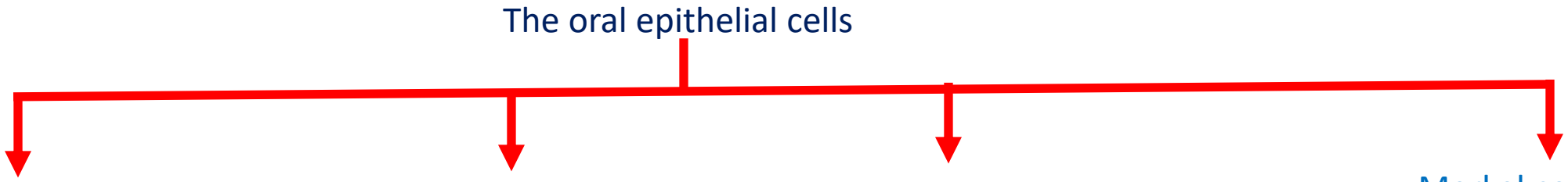
Stratum granulosum (granular cell layer)

-Cells appear to be flattened
-Keratohyalin granules may be seen here

Stratum corneum (keratinised cell layer)

-Keratinisation occur in this layer
-more superficial layer

The epithelial cells that forming the basal layer, gradually undergo keratinisation process. This process is achieved by cell proliferation and differentiation (change in their characterisations) and migrate towards the surface layer



Keratinocytes

-Keratin productive cells, comprise about 90% of the total cell population

-Undergo continuous proliferation and differentiation

-Keratin may present in the stratum corneum, contributing to protect epithelial function

Melanocytes

- Producing melanin pigment responsible for dark gingival colour

Langerhans

-Playing role in the defence mechanism of oral epithelium through immunological function

Merkel cells

-Located in the deeper layer of epithelium

-Contain nerves endings, having tactile receptors

Under normal conditions there is a homeostasis (equilibrium) between cell renewal and desquamation (cell turn over). It takes approximately 3-4 weeks for keratinocytes to migrate from basal cell layer until reach the outer epithelial surface.

- The basal cells are found immediately adjacent to the connective tissue and separated from this tissue by a basement membrane (basal lamina).

The basement membrane is consisted of:

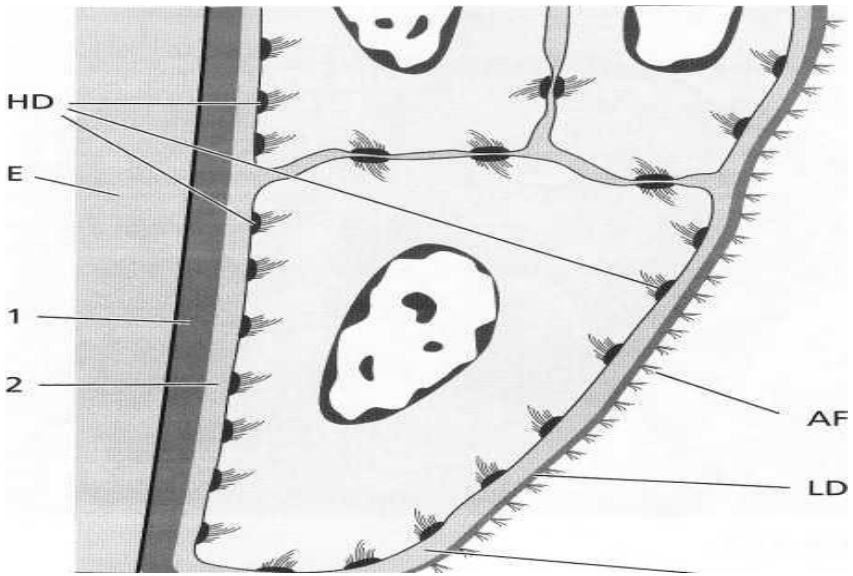
1- Lamina Lucida: is located immediately beneath the basal cell layer.

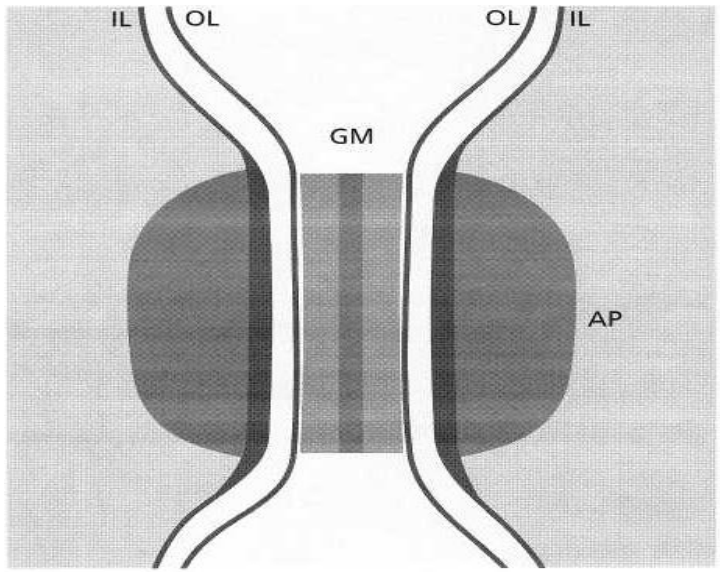
2- Lamina Densa: is located beneath the lamina lucida. The anchoring fibers project from it towards the connective tissue.

-The epithelial cells are joined together by specific structure called desmosomes, which is composed of two hemidesmosomes separated from each other by granulated material.

The hemidesmosome is composed of :

1- The outer leaflets (OL) of cell membrane of two adjoining cells.
2- The inner leaflet (IL) which is thicker leaflet of cell membrane
3- The attachment plaque which represent granular and fibrillar material in the cytoplasm

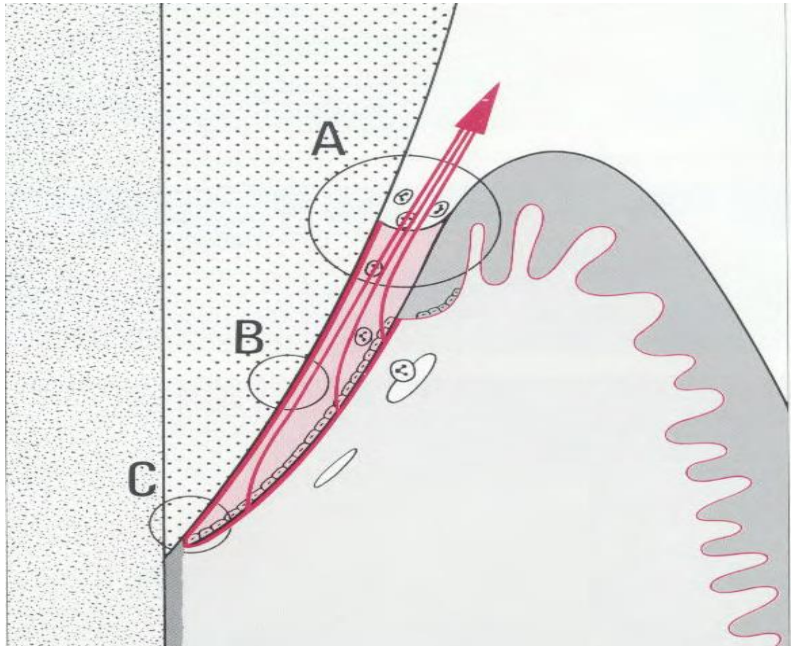




Sulcular epithelium

It lines the gingival sulcus, has a thin, non-keratinised stratified squamous epithelium without rete pegs. It extends from coronal limit of the junctional epithelium to the crest of the gingival margin.

-The importance of sulcular epithelium is coming from its thin consistency and may act as a semipermeable membrane through which the fluid can seep from the gingiva into the sulcus, make it easier for bacterial products of dental plaque to penetrate into the connective tissue, stimulating inflammation and tissue destruction
- So it is considered as a poor barrier against bacterial infection.



Biological width

-Described as combined heights of the connective tissue and junctional epithelial attachment to the tooth.
-The junctional epithelium and the connective tissue attachment have an average height of 1mm each.
-So the biological width is 2mm
-There are variations from 0.75-4mm
-The clinical significance of biological width is the relative importance to the position of restorative margins and post surgical tissue position.
- If the restorative margin is placed too deep below the tissue, it will invade the biological width and two possible outcomes might occur; gingival inflammation and bone resorption