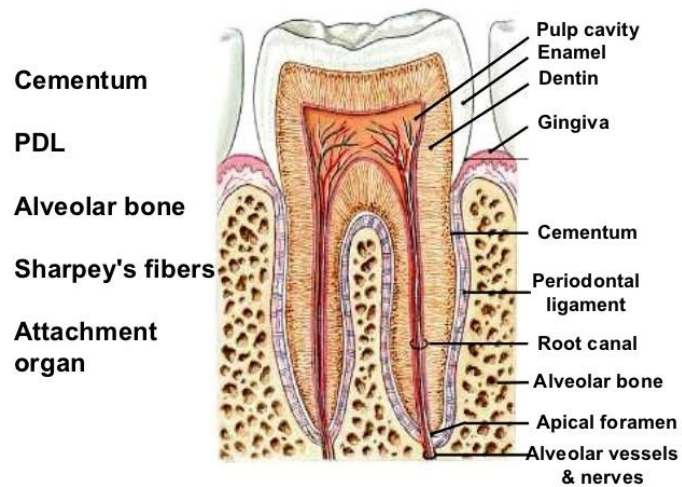




THE NORMAL PERIODONTIUM

PERIODONTIUM



- The **Periodontium** is a complex structure composed of the gingiva, periodontal ligament (PDL), cementum, and alveolar bone. The term periodontium arises from a Greek word “peri” meaning around and odont meaning tooth. In simple words it means – “Tissues investing & supporting the teeth”.
- **Periodontology** : The clinical science which deals with the periodontium in health and disease
- **Periodontics / Periodontia** : The Branch of dentistry concerned with prevention and treatment of periodontal diseases.



EXTERNAL ANATOMIC FEATURES OF PERIODONTIUM

- Histologically, the oral mucosa is classified into three categories, lining, masticatory, and specialized.
- The epithelium of the lining mucosa is nonkeratinized stratified squamous, whereas that of the masticatory mucosa is ortho- or Para keratinized, to protect it from the shearing forces of mastication.
- **Masticatory Mucosa** : The attached gingiva and tissue covering the hard palate are masticatory mucosa. These tissues are Para keratinized or keratinized to withstand the forces of mastication.
- **Specialized Mucosa** : Covers the dorsum of the tongue. ∪ Occupies 15% of the oral cavity. Although it is masticatory mucosa by function but due to its high extensibility and lingual papillae, it is classified as “specialized mucosa”.
- **Lining Mucosa** : It includes the buccal mucosa, labial mucosa, alveolar mucosa, as well as the mucosa lining the ventral surface of the tongue, floor of the mouth, and soft palate. Histologically, lining mucosa is a type that is associated with nonkeratinized stratified squamous epithelium
- **Mucogingival Junction / Mucogingival Line** : The junction between the attached gingiva & alveolar mucosa .
- **Free gingival groove** : The border or groove between marginal & attached gingiva .





THE GINGIVA



- Gingiva is the part of oral mucosa (masticatory mucosa) that covers the alveolar process of the jaw & surrounds the neck of the teeth
- It is divided into 3 parts :
 1. Marginal
 2. Attached
 3. Interdental Gingiva
- **Marginal Gingiva** :
 1. It is the terminal edge / border of the gingiva
 2. Usually 1mm wide
 3. Forms soft tissue wall of the gingival sulcus
- **Attached Gingiva** :
 1. It is firm , resilient and bounded by underlying periosteum of the alveolar bone.
 2. It is continuous with the marginal gingiva extending upto the mucogingival sulcus

Attached gingiva is important because it is bound very tightly to the underlying alveolar bone and provides protection to the mucosa during functional use of the structures of the oral cavity during function, such as chewing.



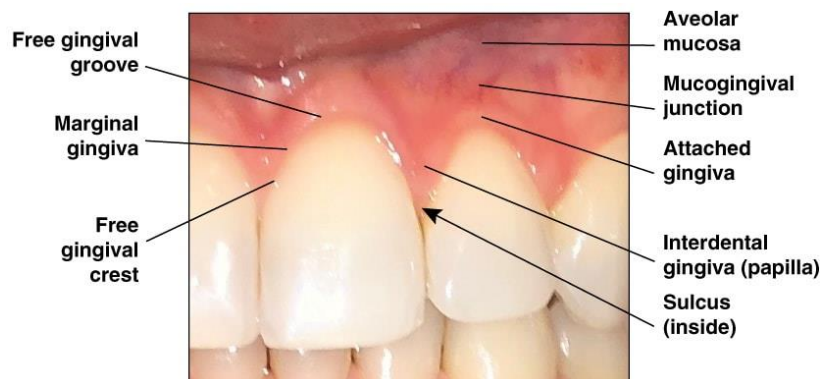
WIDTH OF ATTACHED GINGIVA : It is the distance between the mucogingival junction and the projection on the external surface of the bottom of the gingival sulcus or the periodontal pocket .

NOTE :

- The width is greatest in the incisor region- **Maxilla** : 3.5-4.5 mm & **Mandible** : 3.3-3.9 mm
- The width is least in the 1st Molar region – **Maxilla** : 1.9 mm & **Mandible** : 1.8 mm
- The width of the attached gingiva increases with age & in supraerupted teeth.

- **Interdental Gingiva / Papilla :**

1. It fills the interdental space between two adjacent teeth .
2. Pyramidal / Triangular from facial/ lingual aspect
3. Posteriorly it is tent shaped





MICROSCOPIC FEATURES OF GINGIVA

- The Gingiva consists of an area of connective tissue covered by stratified squamous epithelium

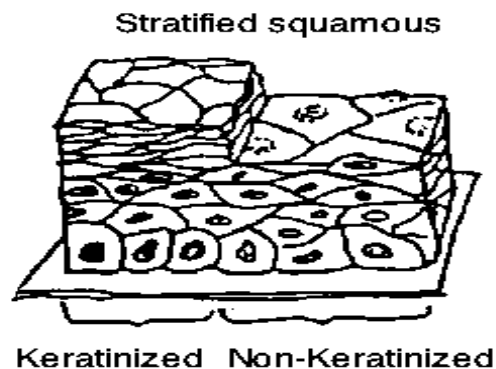
- **Outer / Oral Epithelium :**

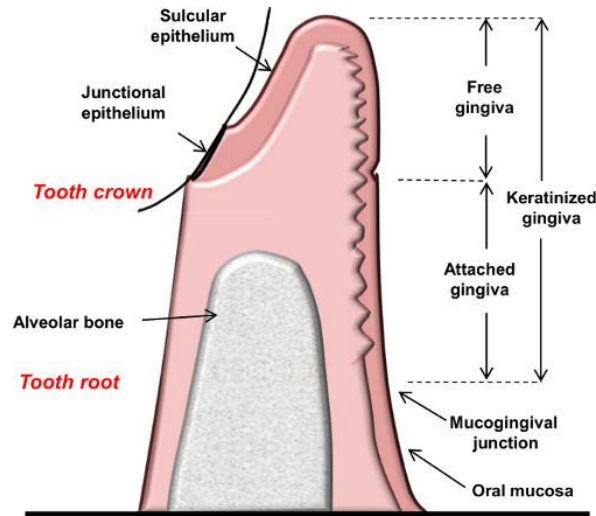
1. Covers the outer surface of the marginal gingiva
2. It is keratinized / para keratinized

- **Sulcular Epithelium :**

The **sulcular epithelium** is that epithelium which lines the gingival sulcus.

1. It is apically bounded by the junctional epithelium and meets the epithelium of the oral cavity at the height of the free gingival margin.
2. The sulcular epithelium is nonkeratinized stratified squamous epithelium
3. Thin without rete pegs
4. Devoid of Stratum Corneum & Granulosum
5. It may also act as a semi-permeable membrane through which infectious bacterial products pass into the gingiva and tissue fluid .





- **Junctional Epithelium :**

1. The junctional epithelium (JE) adjacent to the tooth is that part of the gingiva which attaches the connective tissue to the tooth surface.
2. It forms a band 2—3 mm wide around the tooth and is approximately 15—30 cells thick coronally and tapers to a single cell apically.
3. This attachment is continuously being renewed throughout life. JE turnover rate is high (4—6 days) compared with oral epithelium (6—12 days). The cells are non-keratinized and have wide intercellular spaces.
4. The JE attaches to enamel (in a patient without recession) by a basal lamina and intercellular hemidesmosomes.
5. The JE has a key role in the maintenance of periodontal health: it creates the firm attachment of the soft gingival tissue to hard tooth tissue. However, as it is permeable, it serves as a pathway for diffusion of the metabolic products of plaque bacteria such as toxins, chemotactic agents, and antigens.
6. Length of the JE ranges from 0.25 to 1.35 mm

PRINCIPLE CELLS OF THE GINGIVAL EPITHELIUM

↙
Keratinocytes

↓
Langerhans Cells

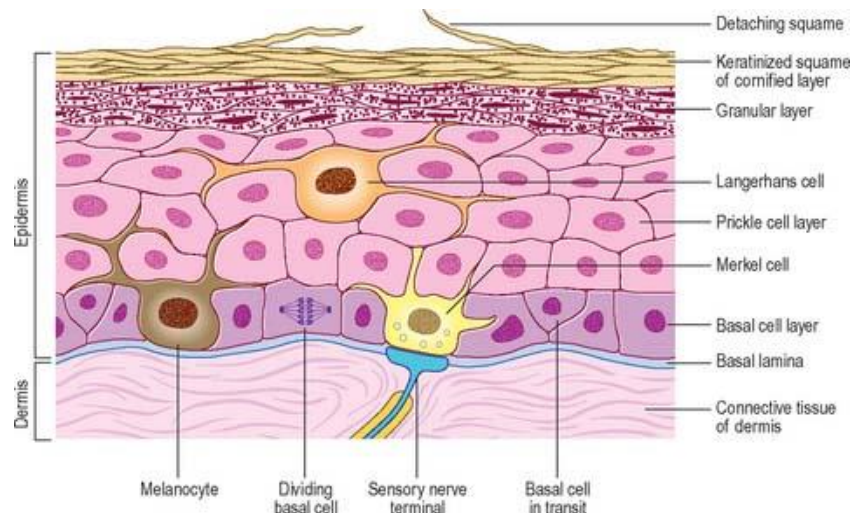
↓
Melanocytes

↘
Merkel Cells

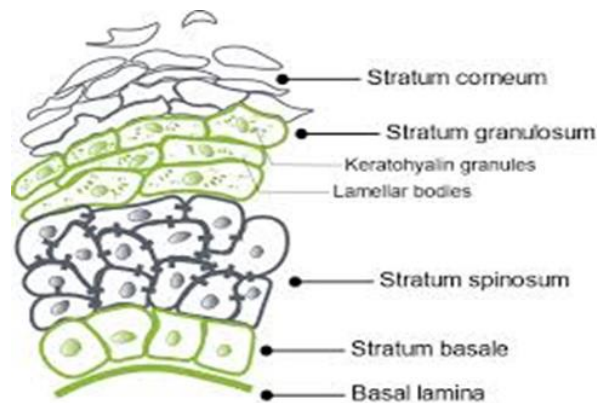


Keratinocytes :

- **Keratinocytes** constitute 90% of the cells of the epidermis, the outermost layer of the skin. Basal cells in the basal layer (stratum basale) of the skin, are sometimes referred to as basal keratinocytes.
- They are maintained at various stages of differentiation in the epidermis and are responsible for forming tight junctions with the nerves of the skin. They also keep Langerhans cells of the epidermis and lymphocytes of the dermis in place.
- Keratinocytes produce keratin, the protein that gives them their name. Keratin is also responsible for the strength and flexibility of our skin.



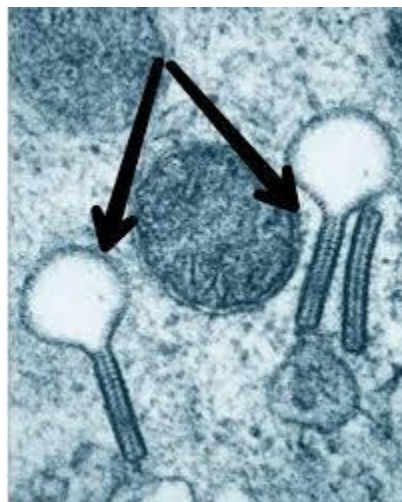
- **Odland bodies / Keratinosomes : Odland bodies** (lamellar) are small sub-cellular structures of size 200-300 nm that are present in the upper spinous and granular cell layers of the epidermis. These act as processing and repository areas for lipids that contribute to the epidermal permeability barrier.
- In the upper stratum spinosum and stratum granulosum layers of the epidermis, **lamellar bodies** are secreted from keratinocytes, resulting in the formation of an impermeable, lipid-containing membrane that serves as a water barrier and is required for correct skin barrier function.



Non-Keratinocytes :

1. **Melanocytes** : Dendritic cells located in the basal & spinous layers of the gingival epithelium . They produce Melanosomes (The **melanosome** is a specialized membrane-bound organelle, which is involved in the synthesis, storage and transport of melanin)
2. **Langerhans Cells** : Dendritic cells located among the keratinocytes suprabasally. They are **modified monocytes** derived form bone marrow . They have important role in immune reaction.

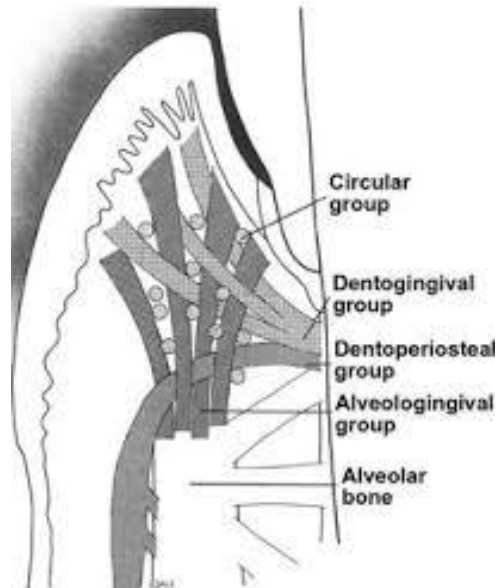
NOTE : Birbeck granules, also known as **Birbeck bodies**, are rod shaped or "tennis-racket" cytoplasmic organelles with a central linear density and a striated appearance. They are solely found in Langerhans cells.





3. Merkel Cells : Located in the deepest layer of the Epithelium .They are found in the basal layer of the epidermis. **Merkel cells** are oval-shaped, and their membrane interacts with nerve endings in the skin with synapse-like structures. They function as type 1 mechano-receptors and can sense light touches.

GINGIVAL FIBERS



- 1. Dento-Gingival :**
 - * Embedded in the Cementum near the CEJ
 - * On the facial & lingual surfaces , they project from the cementum in a fan like conformation towards the alveolar ridge crest
 - * They terminate on the attached gingiva or periosteum of bone.

- 2. Circular :**
 - * They are coarse through connective tissue of the marginal and interdental gingiva
 - * They encircle the tooth in a ring like fashion



3. Trans-Septal :

- * Located Interproximally
- * Formed by horizontal bundles extending between cementum of approximating teeth.

4. Semi-Circular :

- * Attaches the proximal surface of one tooth just below the CEJ and goes around the facial / lingual marginal gingiva of the tooth .

5. Trans-Gingival :

- *Extends from cementum near CEJ and run horizontally between adjacent teeth linking them to the dental arch unit.

