

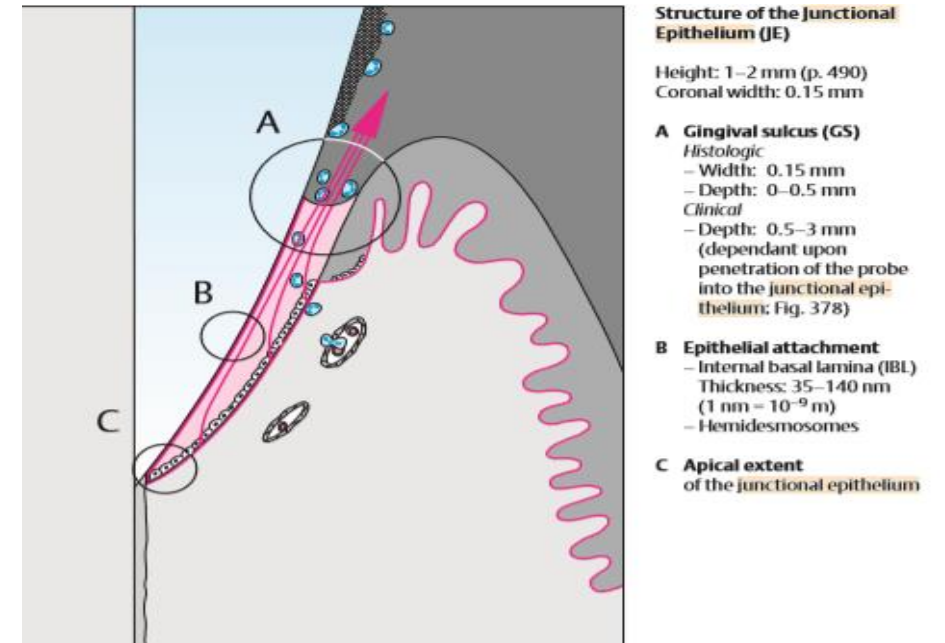
Junctional epithelium (JE)

The type of epithelium that attached the gingiva to the tooth surface. It consists of stratified squamous non-keratinizing epithelium. It is usually consisted of 3-4 of thick layers in early life, however, the number of layers increases with age to 10-20. It is thicker in the coronal portion but become thinner toward cemento-enamel- junction.

Junctional epithelial cells can be grouped in two layers:

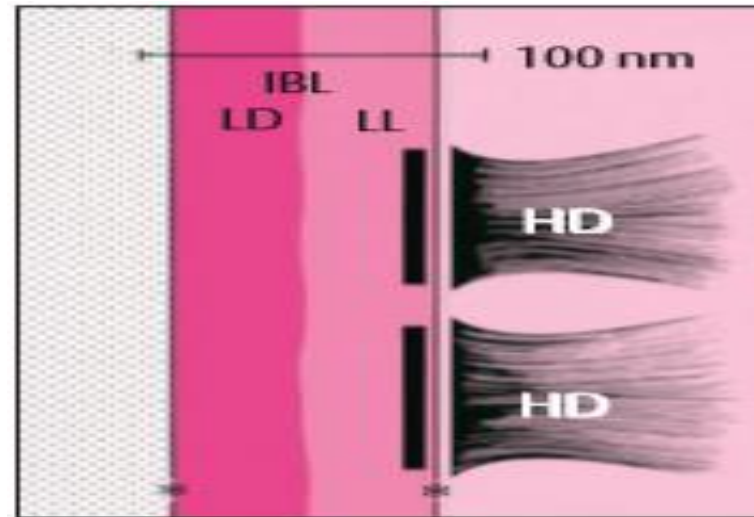
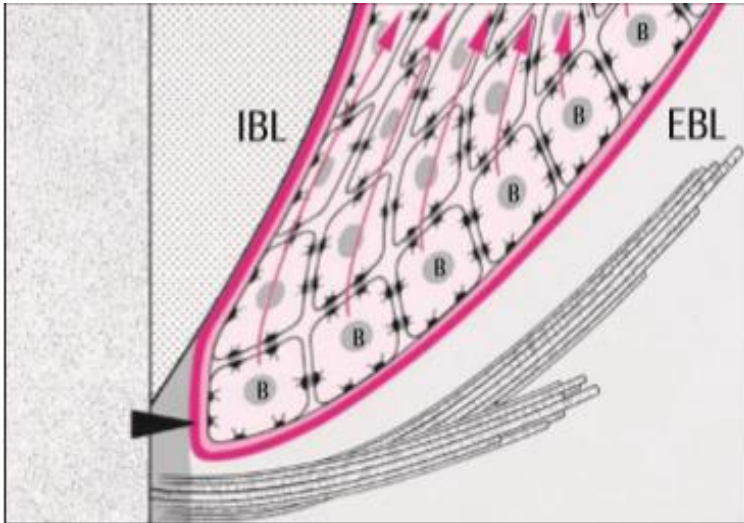
- 1- The basal layer
- 2- the supra-basal layer

It is continuously renewed through cell division in the basal layer and the cell migrate coronally to the base of the gingival sulcus, where the cells can shed (cell turn over).



JE is attached to the tooth surface by means of an internal basal lamina and hemidesmosomes, whereas it is attached to the gingival connective tissue by an external basal lamina and hemidesmosomes

- Healthy JE demonstrates no rete pegs where connects to the connective tissue



- JE has a prime role in the maintenance of periodontal health, it comprises the firm epithelial attachment ,that connects the soft tissue to the tooth surface.
- JE is quite permeable and thus serves as a pathway for diffusion of bacterial plaque products into connective tissue.
- An opposite movement is also found towards the sulcus of the host defence substances, which help to mount an immune response

The differences between the JE and sulcular and oral epithelium

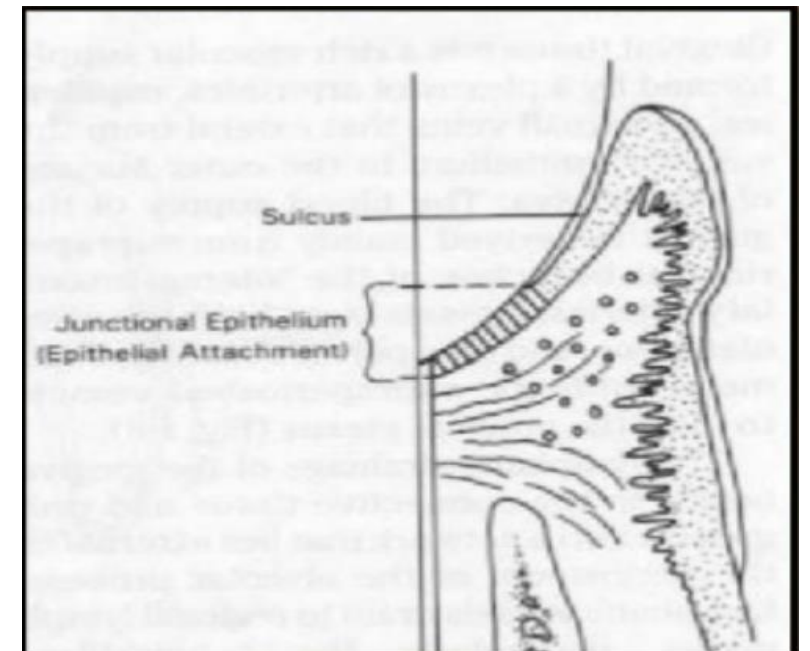
- 1- The size of the cells of JE is relatively larger than oral epithelium
- 2- The intercellular space of JE is wider than in the oral epithelium (the intercellular space is preferred route for tissue fluids and inflammatory cells to migrate from the connective tissue to the gingival sulcus)
- 3- Desmosome's number is fewer in JE than in the oral epithelium, which may explain JE susceptibility to tear during probing in addition, the permeability to migrate cells and fluids
- 4- The sulcular and JE are not as thick as the oral epithelium, because both are not keratinised and have no rete pegs in health conditions
- 5- The turn over rate of JE is very high (4-6 days) compared to oral epithelium, which has the longest turn over (6-12 and up to 40 days)
- 6- JE forms the attachment of the gingiva to the tooth surface, whereas oral sulcular epithelium have no attachment to the tooth surface

Gingival crevicular fluid (GCF)

- GCF is continuously secreted from gingival connective tissue into the gingival sulcus through the sulcular epithelium
- In purely normal gingival condition, little or no fluid can be collected but increase in GCF flow is a first sign of inflammation
- GCF contains a variety of enzymes, cells, electrolytes, proteins and antibodies

The functions of GCF

- 1- Mechanical cleaning of the sulcus
- 2- Antimicrobial properties
- 3- Possess immune antibodies that enhance resistance of the gingiva to the inflammation
- 4- Contain plasma proteins which may improve the adhesion of the epithelium to the tooth surfaces



Gingival connective tissue (CT)

It is known as lamina propria and consists of 2 layers:

1- **The papillary layer:** consists of papillary projections invaginated in epithelial rete pegs

2- **The reticular layer:** is continuous with the periosteum of the alveolar bone

The major components of the CT are:

1- Collagen fibers 60%

2- Cells 5%

3- Ground substance, nerves, blood and lymphatic vessels

Gingival fibers

1- Collagen fibers are the most predominant type of fibers in the gingival CT

2- Oxytalan fibers

3- Elastic fibers

Arrangement of gingival fibers

The supra alveolar crest fibers are arranged in groups of bundles according to their insertion and orientation in the tissue

1- Circular fibers: pass through the CT of the marginal and interdental gingiva and encircle the tooth as a ring like fashion

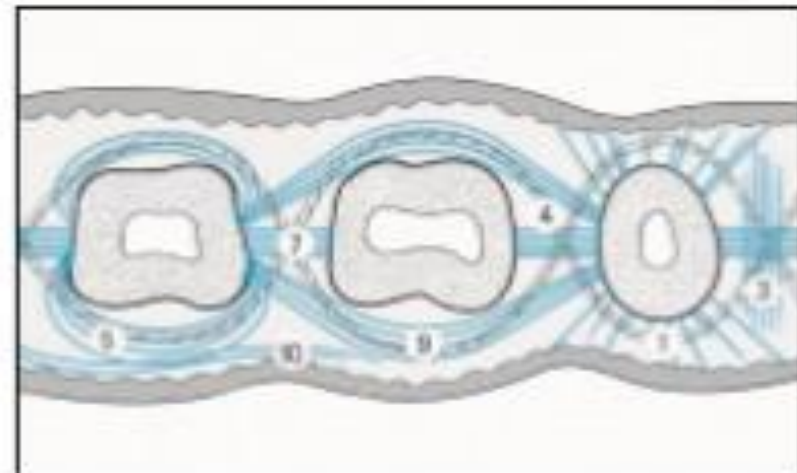
2- Dentogingival fibers: project from the cementum in a fan shape fashion towards the free gingiva

3- Dentoperiosteal fibers: extend from the cementum in an apical direction to the periosteum of the alveolar bone and terminate in the attached gingiva

4- Trans-septal fibers: located interproximal, arranged in horizontal bundles that extend between the cementum of approximating teeth into which they are embedded

Course of the gingival fiber bundles (see also Fig. 27)

- 1 Dentogingival
 - Coronal
 - Horizontal
 - Apical
- 2 Alveologingival
- 3 Interpapillary
- 4 Transgingival
- 5 Circular, semicircular
- 6 Dentoperiosteal
- 7 Transseptal
- 8 Periosteogingival
- 9 Interdental
- 10 Interalveolar



Functions of the gingival fibers

- 1- To brace of the gingival margin firmly against the tooth surface
- 2- To provide the rigidity to withstand the force of mastication without being deflected away from the tooth surface
- 3- To unite the free gingival margin with the root cementum and the adjacent attached gingiva

Cellular elements of the gingival CT

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graph TD; A[Cellular elements of the gingival CT] --> B[Fibroblasts]; A --> C[Mast cells]; A --> D[Macrophages]; A --> E[Inflammatory cells];
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Fibroblasts

- The most predominant cells (65%)
- Synthesise collagen, elastic fibers and CT matrix
- Regulate collagen degradation

Mast cells

- Responsible for production of some of matrix components
- Produce vasoactive substances, which may control the flow of blood through the tissue

Macrophages

- Demonstrated phagocytic function
- Involved in the defence of the tissue against irritating substances

Inflammatory cells

- Polymorphonuclear leukocytes (PMNL)
- Lymphocytes
- Plasma cells
- All have different immunological functions

Matrix of the CT (ground substance)

It fills the space between fibers and cells and has a high water contents. The matrix is first produced by fibroblasts although some constituents are produced by mast cells and some derived from blood.

- It is considered as a medium in which the CT are embedded and it is essential for its normal function
- Thus the transportation of water, electrolytes, nutrients and metabolites to and from the CT cells occurs within this matrix
- The main constituents of it are **proteoglycans** and **glycoproteins**

Blood supply of the gingiva

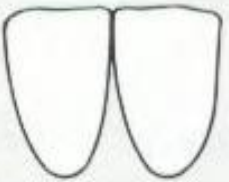

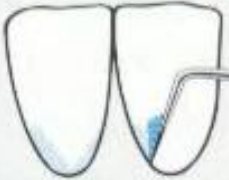


Gingival tissue has rich vascular supply which arise from the terminal branches of the internal maxillary artery

Gingival blood supply consists of

- Supra periosteal vessels
- Vessels come from PDL and alveolar bone
- These blood vessels coalesce (merge) in the gingival papilla as a gingival plexus

Innervation of the gingiva

- Is derived from the terminal branches of the maxillary and mandibular branches of the trigeminal nerve

<p>Score 0</p>	<p>No plaque</p>		
<p>1</p>	<p>Thin film of plaque at the gingival margin, visible only when scraped with an explorer</p>		
<p>2</p>	<p>Moderate amount of plaque along the gingival margin; interdental space free of plaque; plaque visible with the naked eye</p>		
<p>3</p>	<p>Heavy plaque accumulation at the gingival margin; interdental space filled with plaque</p>		

Grade 0	normal gingiva, no inflammation, no discoloration, no bleeding
1	mild inflammation, slight color change, mild alteration of gingival surface, no bleeding
2	moderate inflammation, erythema, swelling, bleeding on probing or when pressure applied
3	severe inflammation, severe erythema and swelling, tendency toward spontaneous hemorrhage , some ulceration

59 Gingival Index (GI)

This index is used worldwide in epidemiological studies and scientific investigations. The GI scores gingival inflammation on the facial, lingual and mesial surfaces of all teeth. The symptom of bleeding comprises a score of 2.

The GI is recommended for epidemiological studies. It is less applicable for individual patients because the differences between the scoring levels are too gross.