

# Oral Histology

## **Junctional epithelium (JE) or dentogingival junction:**

**Junctional epithelium(JE)** is the non keratinized stratified squamous epithelium which attaches and form a collar around the cervical portion of the tooth that follows CEJ .

**Epithelial attachment** is the structural complex (hemidesmosomes & basal lamina) and this Combination by which junctional epithelium is attached to the tooth surface.

The region where the oral epithelium meets the surface of the tooth is a unique junction of considerable importance because it represents a potential weakness in the epithelium of the oral cavity. The bacteria that present on the tooth surface produce toxin that cause inflammation if they enter the mucosal tissue; so the junction between the epithelium and the enamel or cementum is the principle seal between the oral cavity and the underlying tissue.

### **Function of JE:-**

First, JE is firmly attached to the tooth and thus forms an epithelial barrier against the plaque bacteria.

Second, it allows the access of GCF (Gingival crevicular fluid), inflammatory cells and components of the immunological host defense to the gingival margin.

Third, JE cells exhibit rapid turnover, which contributes to the host parasite equilibrium and rapid repair of damaged tissue

Fourth, Helps maintain integrity of tooth / periodontium structure.

**Gingival sulcus:** Its an invagination between the gingiva and tooth surface. The gingiva encompassing the sulcus is the free or marginal gingival. Gingival sulcus extend vertically from the free gingival margin to the dentogingival junction(D.G.J).

Normally has a depth of 0.5- 3 mm, with an average of 1.8 mm. Any depth greater than 3 mm can be considered pathologic, and the sulcus is

known as periodontal pocket.

The floor of the gingival sulcus and the epithelium cervical to it termed as junctional epithelium. The wall of the sulcus are lined by sulcular epithelium, which is nonkeratinized str. Sq. epith. thinner than the epith. Of the gingiva, it has no ridges, therefore it forms a smooth interface with lamina propria, its continuous with the gingival epith. from above and with junctional epith. from below.

Junctional epith. normally it extend from the bottom of gingival sulcus towards the C.E.J. It has very low resistance to the mechanical forces of mastication and to the bacterial toxin produced by dental plaque and calculus.

### **Gingiva can maintain this junction intact through the followings:-**

1. By the epith. of the gingiva:-when the epith. is injured(due to some reasons), the turnover of the epith.cells and their ability to migrate from the basal layer to higher levels will repair the injured part of the wound.
2. By the lamina propria:- when the C.T. is injured the fibroblasts can form the collagen fibers and ground substance that can repair the wound.
3. By the defense mechanism of the body that can resist the bacterial toxin.

### **Development of JE :**

*Primary E. cuticle:* When the ameloblasts finish formation of enamel matrix, they leave a thin membrane on the surface of E. , the primary E. cuticle. After that epith. E. organ is reduced to a few layers of flat cuboidal cells called reduce E. epith.(REE) ,which covers the entire enamel surface extending to the CEJ and remains attached to the primary E. cuticle. The primary E. cuticle is soon removed by mastication because it's a very thin membrane, its remnant after eruption of the tooth is called Nasmyth's membrane.

The epith. that covers the tip of the crown degenerate in its center, and the crown emerges through this perforation into oral cavity. The R.E.E. remain organically attached to the part of E. that has not yet erupted, and once the tip of crown erupt the R.E E. is called primary

attachment epith. At the margin of the gingiva the attachment epith. is continuous with oral epith. As the tooth erupts, a shallow groove the gingival sulcus, develops between gingiva and tooth surface and extends around its circumference.

### **Histological feature of JE :**

#### **Microscopic features**

- 1-It has 15-30 cell layers coronally and 1-3 layers at apical termination
- 2- It has two strata- stratum basale and stratum supra basale
- 3-The basal and adjacent 1-2 supra basal cells are cuboidal to slightly
- 4-spindle shaped and all the remaining cells are flat and oriented parallel to the tooth surface
- 5-The innermost supra basal cells (facing the tooth surface) form and maintain the epithelial attachment apparatus
- 6- is a unique nonkeratinized oral epith.
- 7- Inter cellular spaces are more wider and occupied by inflammatory cells

#### **Transmission electron microscopic features:**

- 1-Lysosomal bodies are in large numbers
- 2-Golgi fields are large
- 3-Poly ribosomes are numerous
- 4-Keratinosomes (Odland bodies) are absent
- 5-It has two basal lamina – *Internal basal lamina*: which attached the J.E. to the tooth surface.  
*External basal lamina*: which attached the J.E. to the lamina propria.
- 6-Desmosomes (tonofilament) are less

**Morphologically:-** the J.E. consists of flattened cells aligned parallel to the tooth surface and tapering from 3-4 layers in thickness apically to 15-30 layers coronally. The epith. has a smooth C.T. (lamina propria) interface where a basal lamina has associated hemidesmosomes and is similar to that which attaches epith. to C.T. elsewhere in oral mucosa. Between the plasma membrane of JE cells and the enamel (sometimes cementum) surface a basal lamina structure with similar morphology is

present, associated with hemidesmosomes on the membranes of epithelial cells.

The lamina propria of JE shows an inflammatory infiltration particularly neutrophil leukocytes and mononuclear leukocyte cells. Which continually migrate into J.E. and pass between epithelial cells to appear in G.S. and then in oral fluid.

One of the remarkable properties of J.E. is that it readily regenerates from the adjacent oral sulcular or oral epithelium if its damaged or surgically excised.

### **Length of the Junctional epithelium:**

- Length varies according to stage of eruption
- Tooth first erupts – most of enamel covered by JE
- Tooth reaches occlusal plane – ¼ enamel surface covered
- Eventually JE lies close to CE junction
- Older patients with root exposure (passive eruption or disease) JE proliferates apically - firm attachment with cementum.

### **The shift of dentogingival junction:**

The position of the gingiva on the surface of the tooth always change with time, when the tip of the enamel first erupts through the mucous membrane of the oral cavity, the epithelium almost cover the whole crown. The tooth eruption is relatively fast until the tooth reaches the plane of occlusion. This cause the attachment epithelium to separate gradually from the enamel surface, at this stage the primary attachment epithelium replaced by secondary attachment epithelium which is derived from gingival (oral) epithelium. While the crown emerges into oral cavity to reaches the plane of occlusion, one third to the one fourth of the enamel is still covered by gingival.

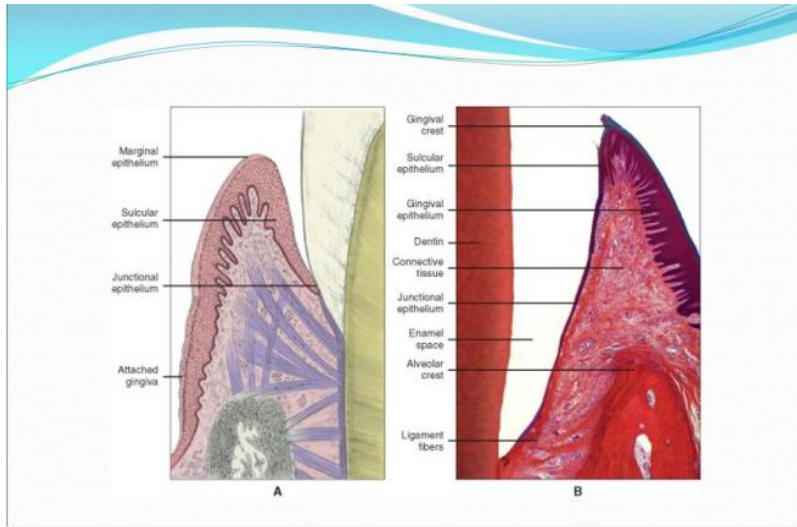
Actual movement of the teeth towards occlusal plane is termed *active eruption*, while the gradual exposure of the crown by separation of attachment epithelium from enamel surface is termed *passive eruption*, and this can be described in four stages, first and second stages may be physiologic. Many consider the third and fourth stages as normal also, but there is a strong possibility that they are pathologic.

**First stage:** This stage normally persists in the primary teeth almost up to 1 year of age before shedding and, in permanent teeth, usually to the age of 20-30 years. In this stage the bottom of the gingival sulcus or the coronal end of the attachment epithelium is on the enamel, while the apical end of the primary attachment epithelium stays at the C.E.J. In this stage the clinical crown (mean that part of the crown which is exposed in the oral cavity) is less than the anatomical crown (mean that part of the crown which is covered by the enamel) .

**Second stage:** This stage may persist to the age of 40 years or later. In this stage the bottom of the gingival sulcus or the coronal end of attachment epithelium is still on the enamel and the apical end of the attachment epithelium has been shifted to the cementum. The clinical crown is also less than the anatomical crown.

**Third stage:** In this stage the bottom of the gingival sulcus is on the CEJ and the apical end of the attachment epithelium is on the cementum. This stage is transitory because the epithelium shifts gradually along the tooth surface and the attachment epithelium does not remain at the linear C.E.J. for a long time. In this stage the clinical crown is equal to the anatomical crown.

**Fourth stage:** In this stage the entire attachment epithelium is present on the cementum, mean both the coronal and apical ends of attachment epithelium on the cementum. In this stage part of the cementum of the root is uncovered and is exposed to the oral cavity. The clinical crown is greater than the anatomical crown.



Dentogingival junction,...

**Erupted tooth :**

- 1-Pulp.
- 2-Dentin.
- 3-Reduce enamel epith.
- 4-Primary attachment epithelia.
- 5-Oral epithelium.
- 6-Enamel space.

Dentogingival junction,...

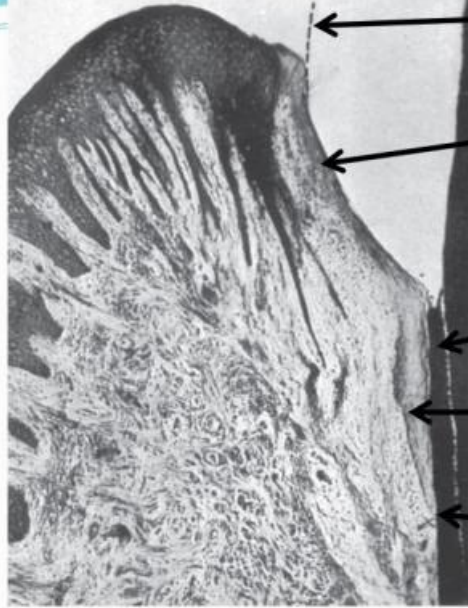
**First stage of DGJ shifting**

**Bottom of gingival sulcus**

**Attachment epithelium**

**C.E.J**

**second stage  
of DGJ  
shifting**



**Enamel  
surface**

**Attachement  
epith. on  
enamel**

**Cementum**

**Attachement  
epith. on  
cementum**

**End of  
epithelial  
attachment**