

Oral histology

Cementum

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Cementum

- One of the four tissues of the periodontium.
- Thickest at the root apex and in the interradicular areas.
- Cementum is continuous with the PDL on its outer surface and firmly adherent to dentine.
- Its prime function is to give attachment to collagen fibers of the PDL.
- It is involved in tooth repair and regeneration.

Physical properties

Cementum is pale yellow.

Softer than dentine and more permeable(permeability decreases with age).

Relative softness with its thinness cervically means that it can be removed readily with abrasion when gingival recession exposes the root causing sensitivity.

Chemical properties

Contains organic and inorganic material.

The principle inorganic material is hydroxyapatite, calcium is also found (in higher levels than enamel and dentine).

The organic matrix is primarily collagen type I.

Other non-collagenous proteins: bone sialoprotein, dentine sialoprotein, fibronectin..

CAP (cementum derived attachment protein) promote attachment of mesenchymal cells to extracellular matrix, and may be a marker to differentiate cementum and bone. Cementum is rich in Glucose aminoglycan esp. chondroitin sulphate and located around cementum lacunae.

Classification of cementum

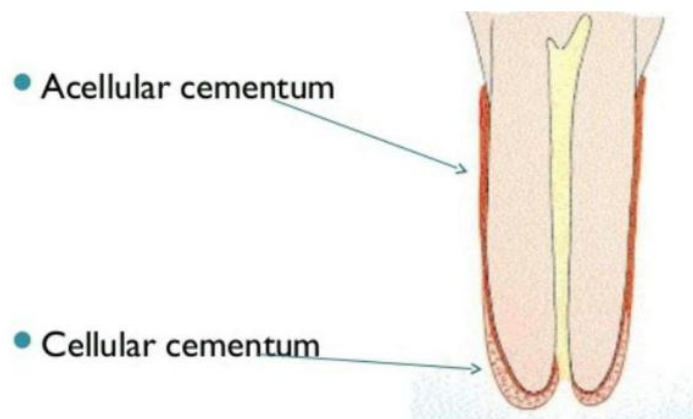
1. Based on the presence or absence of cells.
2. Based on the nature and origin of the organic matrix.
3. Based on the presence or absence of cells and on the nature and origin of the organic matrix.

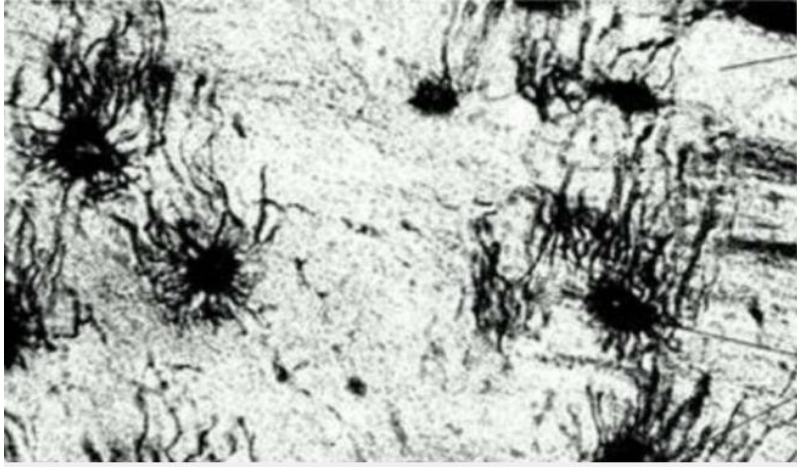
1. Based on the presence or absence of cells.

A. **Acellular cementum** (primary cementum) : forms first
Does not contain cells , covers the root adjacent to dentine.

B. **Cellular cementum**(secondary cementum): contains cementocytes, formation rate is slow , it is well mineralized, found mainly in the apical area covering apical area overlying acellular cementum.

cementum the reverse may occur , or the two variants of the cementum to alternate.



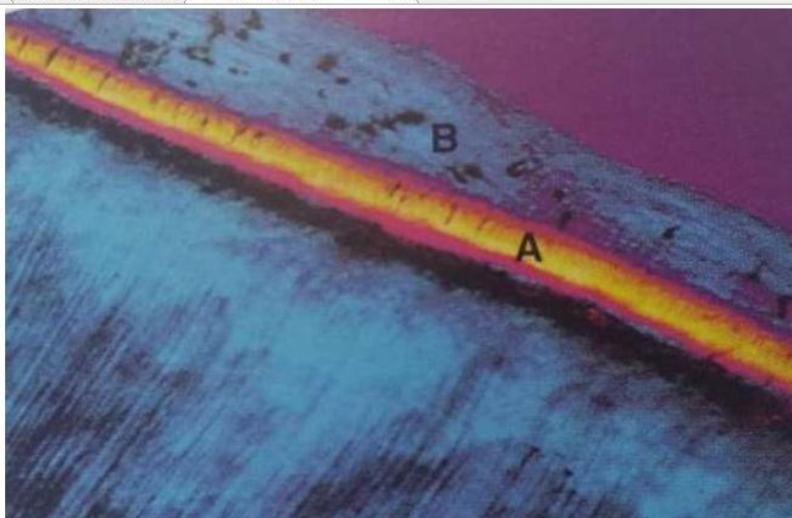


2. Based on the nature and origin of the organic matrix sources:

A. Extrinsic fibers: they are Sharpey fibers from the PDL, these fibers continue in the same direction as the principal fibers of the ligament.

B. Intrinsic fibers: derived from cementoblasts, run parallel to the root surface and at right angle to the extrinsic fibers.

C. Mixed fibre cementum : both extrinsic and intrinsic fibers are present.



3- Based on the presence or absence of cells and on the nature and origin of the organic matrix.

A. Acellular extrinsic fibre cementum (AEFC):

Corresponds with acellular cementum, found in the cervical two thirds.

Fibers derived from Sharpey fibers.

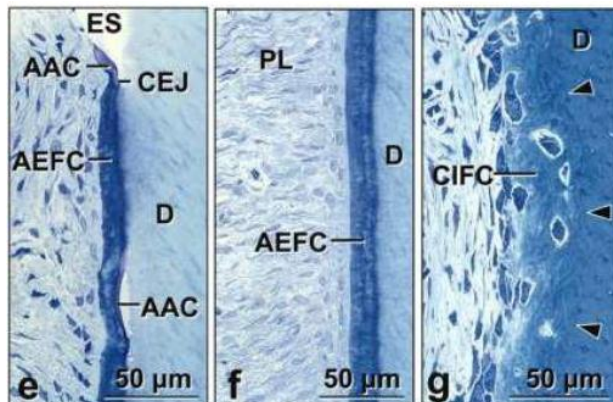
Formed slowly and root surface is smooth.

B. Cellular intrinsic fibre cementum (CIFC):

Corresponds to cellular cementum.

Composed only of intrinsic fibers running parallel to the root surface.

Has no role in tooth attachment since there's no Sharpey fibers. Less cellular than bone and has a cementoid seam on its outer surface.



C. mixed fibre cementum:

larger ovoid or round extrinsic fibers.

acellular mixed fibre cementum.

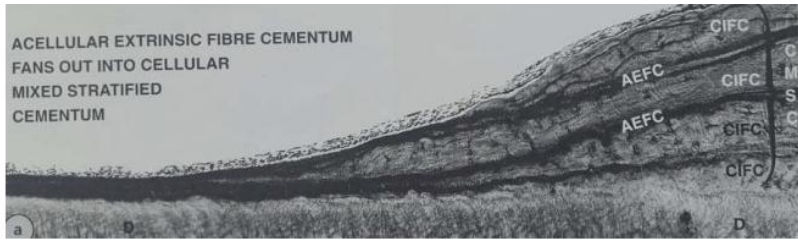
cellular mixed fibre cementum.

D. A fibrillar cementum

distributed and consists of a well mineralized

ground substances that may be of epithelial origin.

fibrillar cementum and dentine.



Cementum-dentine junction

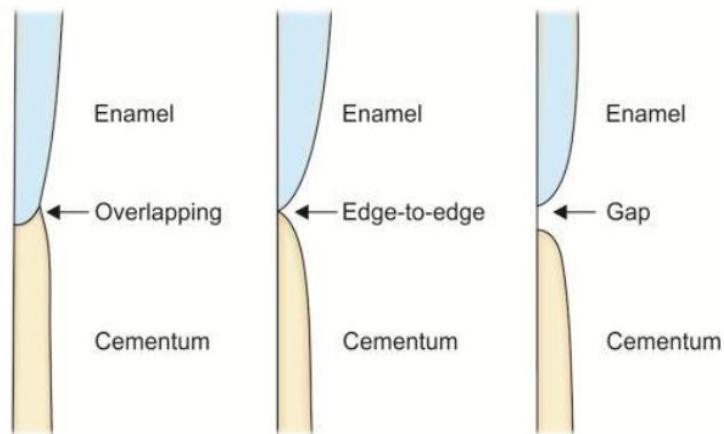
This junction is of clinical importance because of the processes involved in maintaining tooth function while repairing diseased root.

Intermediate layer found between cementum and dentine. This layer is characterized by wide, irregular, branching spaces which interconnect with dentinal tubules. Intermediate layer may function as a permeability barrier preceding cementogenesis. Also related to regeneration of the periodontium following Periodontal surgery.

- Cementum near the periodontium is not homogenous because of the ongoing calcification and the presence of Sharpey fibers.
- At deeper levels, closer to dentine acellular cementum resembles dentine.

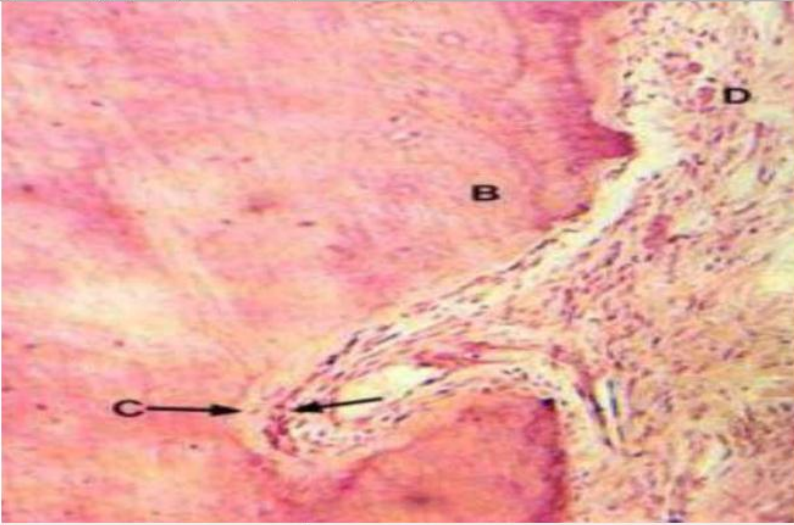
Types of cemento-enamel junction

- 1-In 60% of the teeth cementum overlaps the enamel.
- 2-In 30% of teeth cementum meets the enamel forming an abutment joint.
- 3-In 10% of teeth there is a gap between the cementum and enamel.



Resorption and repair of cementum

- Cementum is less susceptible to resorption than bone, but localised areas of resorption are found associated with micro trauma.
- Resorption is carried out by multinucleated odontoclasts.
- The unmineralized surface layer of collagen protects against resorption.
- Repair occurs as a layer of formative cells (cementoblasts) depositing a thin layer of precementum.
- **Reversal line** separates the repair tissue from underlying dental tissues.
- When the speed of formation of the repair tissue is slow the repair tissue cannot be distinguished histologically, and it is well mineralized
- If the speed is rapid it resembles woven bone.



Clinical consideration
cemental callus

- sometimes form around root fractures
- Does not usually remodel to the original dimensions of the tooth.

cementicles

attached to the root or free in the PDL

More common in apical and middle thirds of the root and in bifurcation areas



Hypercementosis

is an abnormal thickening of cementum. It may be diffuse or circumscribed. It may affect all teeth of the dentition, be confined to a single tooth, or even affect only parts of one tooth. In localized hypertrophy a spur or prong like extension of cementum may be formed. This condition frequently is found in teeth that are exposed to great stress. The prong like extensions of cementum provide a larger surface area for the attaching fibers; thus a firmer anchorage of the tooth to the surrounding alveolar bone is assured.

Localized hypercementosis may sometimes be observed in areas in which enamel drops have developed on the dentin. The hyperplastic cementum covering the enamel drops occasionally is irregular and sometimes contains round bodies that may be calcified epithelial rests. The same type of embedded calcified round bodies frequently are found in localized areas of hyperplastic cementum . Such knob like projections are designated as **excementoses**. They too develop around degenerated epithelial rests.

Extensive deposition of cementum is occasionally associated with chronic periapical inflammation. The excessive deposition is circumscribed and surrounds the root like a cuff

A thickening of cementum is often observed on teeth that are not in function. It may extend around the entire root of the nonfunctioning teeth or may be localized in small areas.

Hypercementosis of cementum in nonfunctioning teeth is characterized by a reduction in the number of Sharpey's fibers embedded in the root. The cementum is thicker around the apex of all teeth and in the furcation of multirrooted teeth than on other areas of the root. This thickening is found in embedded and in newly erupted teeth. In some cases an irregular overgrowth of cementum can be found, with spike like extensions and calcification of Sharpey's fibers and accompanied by numerous cementicles. This type of hypercementosis can occasionally be observed on many teeth of the same dentition and is, at least in some cases, the sequela of injuries to the cementum.



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