Oral histology

Cementum

Lect 10 **Dr.Enas Fadhil Kadhim**

Cementum

• One of the four tissues of the periodontuim.
• Thickest at the root apex and in the interradicular areas.
• Cementum is continuous with the PDL on it's outer surface and firmly adherent to dentine.
• It's 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 hyroxyapatite, 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 diffrentiate cementum and bone.
 Cementum is rich in Glucose aminoglucan esp. chondroitin sulphate and located around cementum lacunae.

Classification of cementum

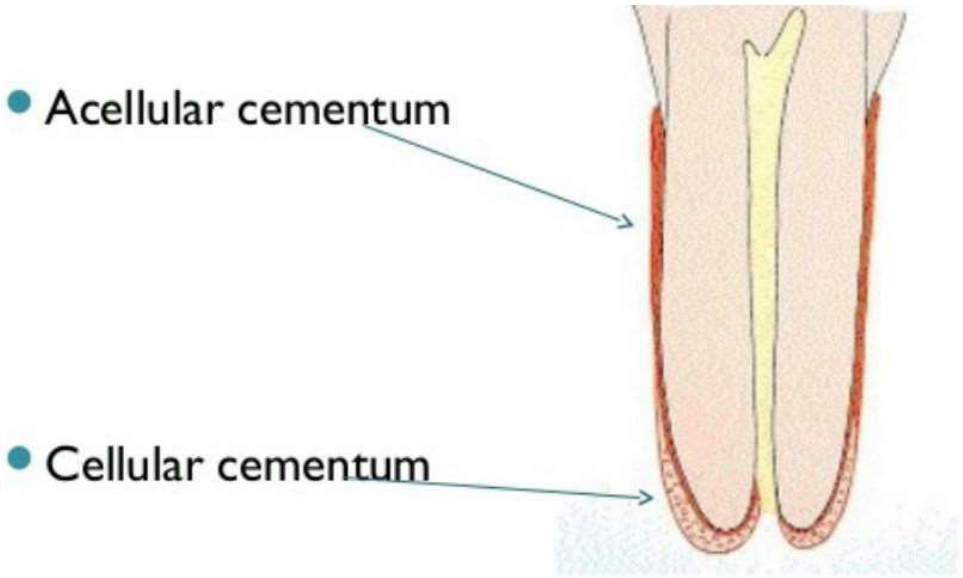
1. Based on the presence or absence of cells.
2. Based on the nature and origin of the organic matrix.
3. Based on the presence or absence of cells and on the nature and origin of the organic matrix.

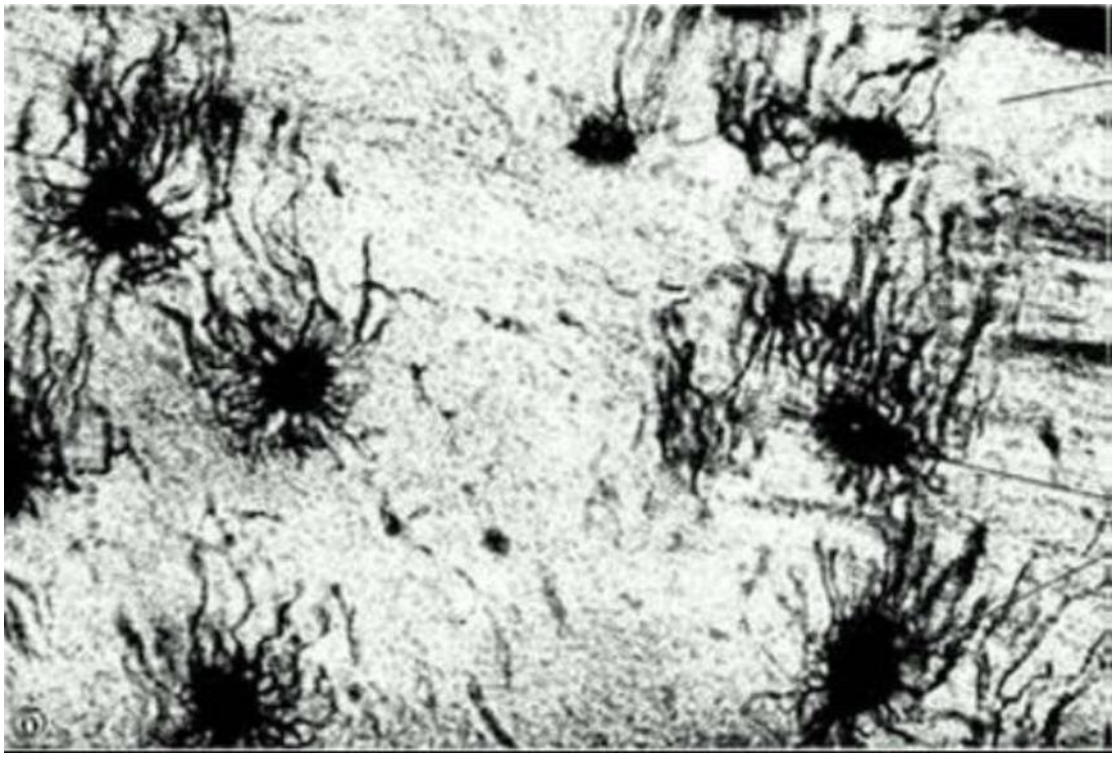
1.Based on the presence or absence of cells.

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

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

 Although usually cellular cementum overlie acellular cementum the reverse may occur , or the two varients of the cementum to alternate.





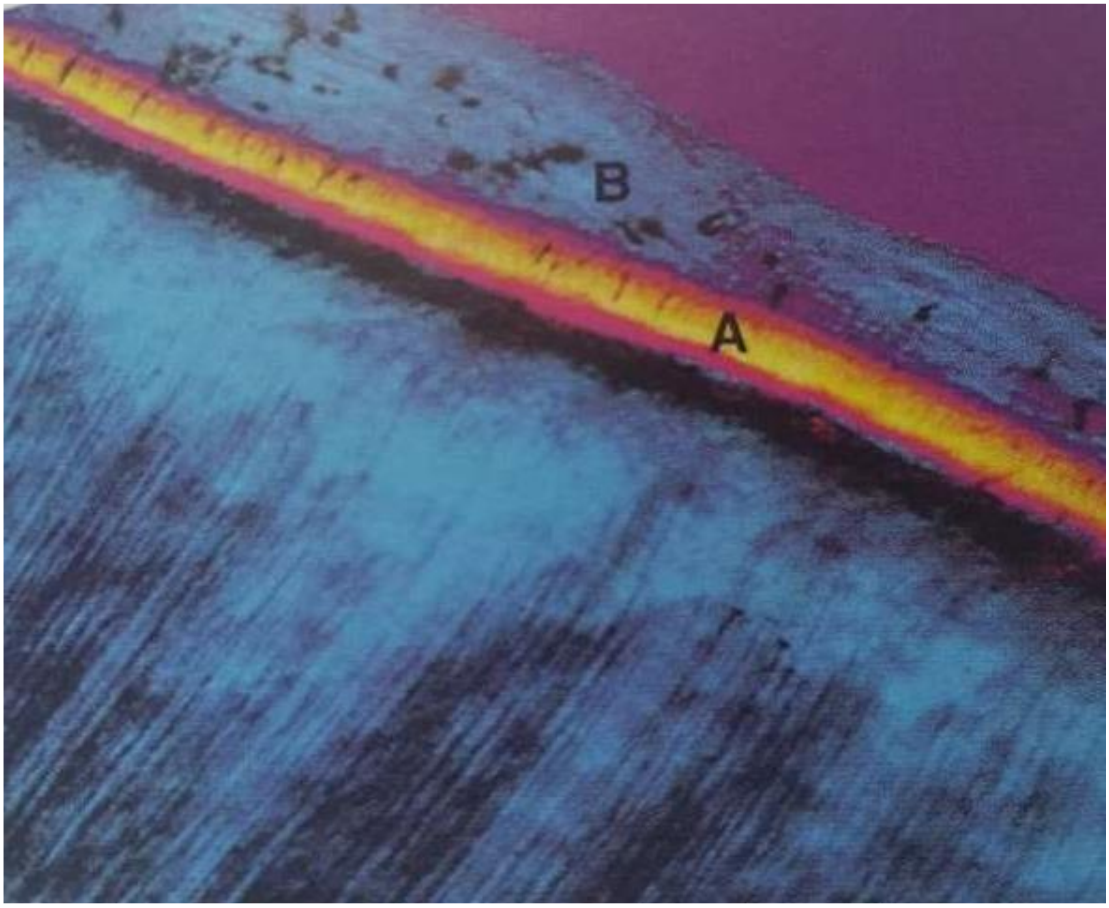
2.Based on the nature and origin of the organic matrix

cementum derives it's organic matrix from two sources:

A.Extrensic fibers: they are sharpey fibers from the PDL, these fibers continue in the same direction as the principle fibers of the ligament.

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

C.Mixed fibre cementum : both extrensic 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 extrensic fibre cementum (AEFC):

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

 Fibers derived from sharpy fibers.

 Formed slowly and root surface is smooth.

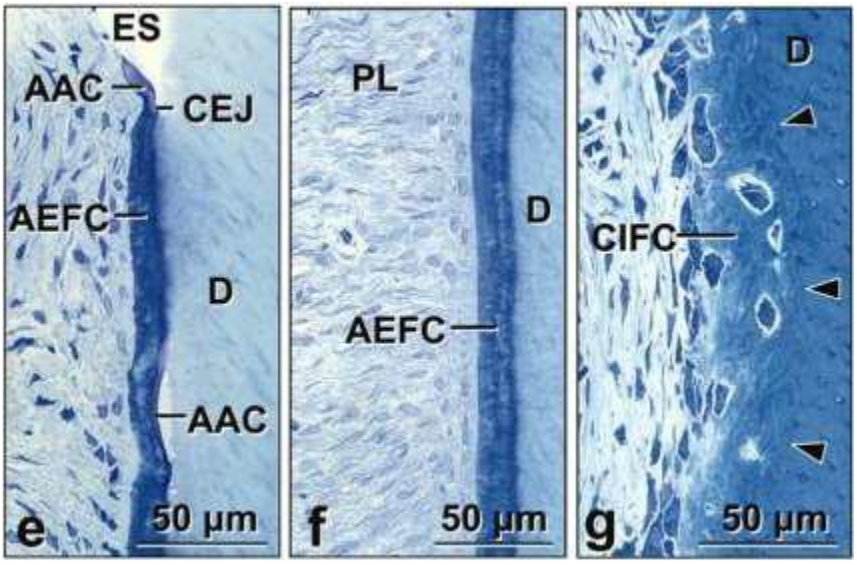
B. Cellular intrinsic fibre cementum(CIFC):

 Corrosponds to cellular cementum .

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

 Has no role in tooth attachment since there's no sharpy fibers.

 Less cellular than bone and has a cemetoid seam on its outer surface.



C.mixed fibre cementum:

 Collagen fibers are both extrinsic and intrinsic .

 Intrinsic fibers are fewer in number and run between the larger ovoid or round extrinsic fibers.

 If the formation rate is slow cementum may be termed acellular mixed fibre cementum.

 If the formation rate is fast, cementum may be termed cellular mixed fibre cementum.

D. Afibrillar cementum

 Contains no collagen fibers.

 Sparsely distributed and consists of a well mineralized ground substances that may be of epithelial origin.

 It's thin, acellular layer covers cervical enamel or in between fibrillar cementum and dentine.

 Formed following the loss of reduced enamel epithelium.

Cementum-dentine junction

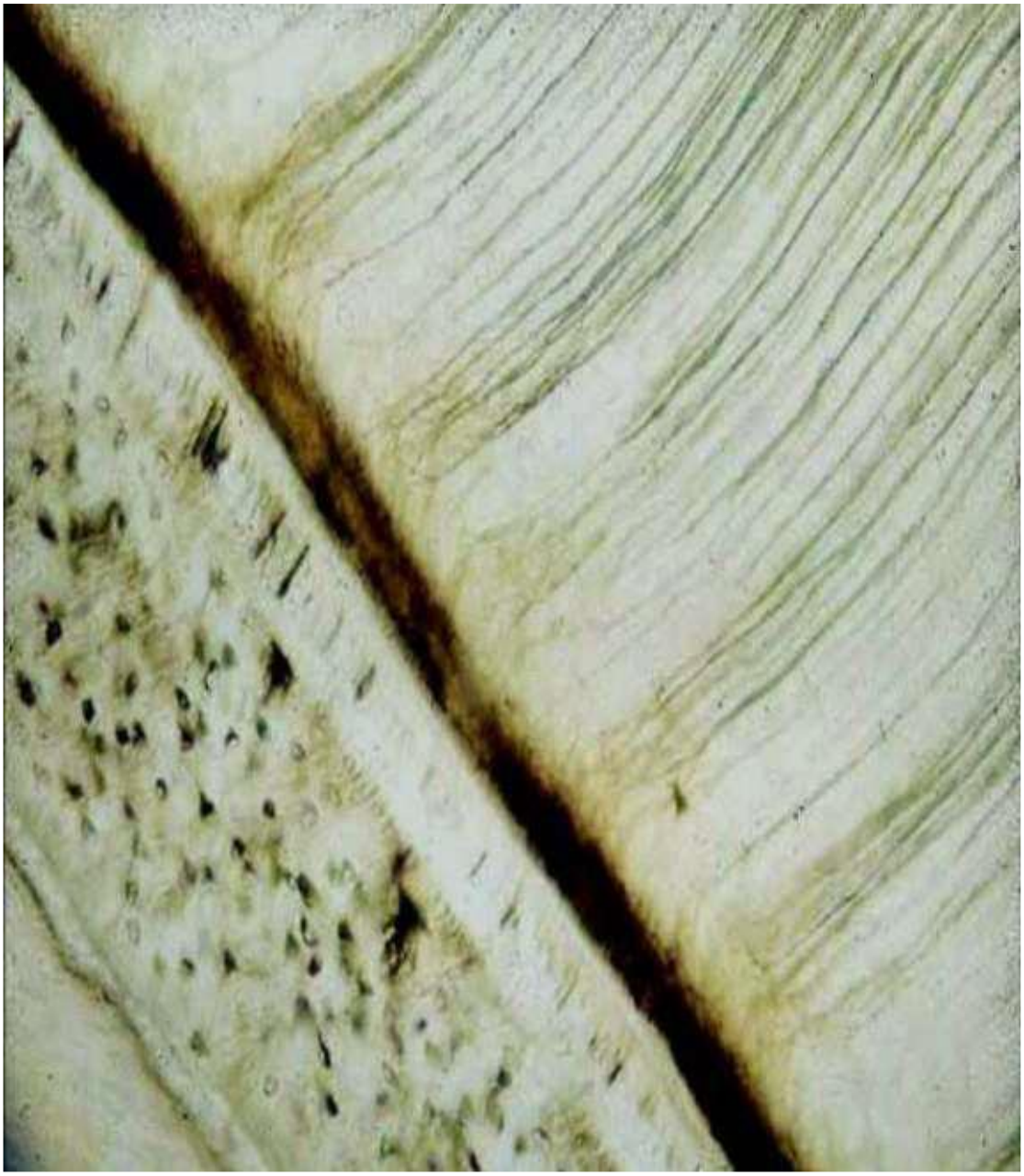
 This junction is of clinical importance because of the processes involved in maintaining tooth function while repairing diseased root.

 Intermediate layer found between cementum and dentine.

 This layer is characterization 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 periodontuim following periodontal surgery.

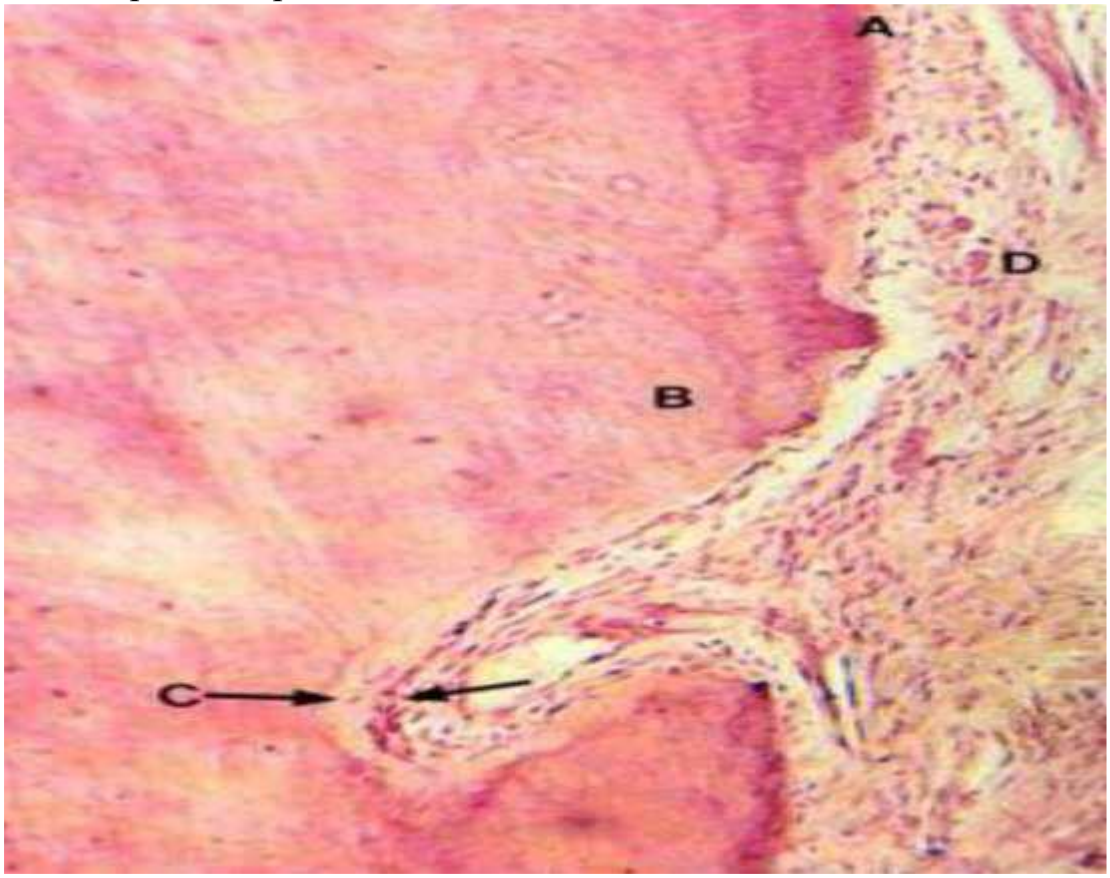


• Cementum near the periodontuim is not homogenous because of the ongoing calcification and the presence of sharpey fibers.
• At deeper levels , closer to dentine acellular cementum resembles dentine.

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 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

 Are small globular masses of cementum attached to the root or free in the PDL

 As a result of microtrauma

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

• **Local hypercementosis**

• In cases of chronic periapical infections.

• Fusion of adjacent teeth called **concrescence**.

• Hypercementosis affecting all teeth is associated with Paget's disease .

Hpophosphatasia
result in reduction of tissue non- specific alkaline phosphatase which causes significant reduction in amount of cementum formed, as a result the attachment of the PDL Fibers is compromised which causes premature loss of teeth (both primary and permenant dentition).