

Al Rasheed College of Dentistry
Oral Histology

Dr. Omar Faridh Fawzi
Lecture 10

Cementum

Cementum: Is avascular mineralized dental tissue covering the anatomic roots of human teeth. Begins at cervical portion of the tooth at the cemento-enamel junction & continues to the apex. Furnishes a medium for the attachment of collagen fibers that bind the tooth to surrounding bone. The cementum is part of the **periodontium** (all the tissues that bind the tooth to the surrounding bone: cementum, periodontal ligament, alveolar bone and gingiva).

Development

Cementum is secreted by cells called **cementoblasts** which developed from undifferentiated mesenchymal cells of the **dental follicle or sac**. Many of the cementoblasts become entrapped by the cementum they becoming **cementocytes**. Cementum is more similar to alveolar bone, with its osteoblasts becoming entrapped osteocytes.

Cementum(C.) is formed continuously throughout life and it is capable of repairing itself to a limited degree and is not resorbed under normal conditions, it receives its nutrition through its own embedded cells from the surrounding vascular periodontal ligament.

Physical characteristics

1. The hardness of fully mineralized C. is less than that of dentin
2. C. is light yellow in color
3. Can be distinguished from enamel by its lack of luster and its darker hue.
4. Cementum is semipermeable to a variety of materials.

Chemical composition

Cementum is slightly softer than dentin and consists of about 45% to 50% inorganic material (hydroxyapatite) by weight and 50% to 55% organic matter and water by weight. The organic portion is composed primarily of collagen fibers and protein polysaccharides.

The inorganic material is hydroxyapatite crystals, which consist of calcium and phosphate. Also cementum has the highest **fluoride** content of all mineralized tissue.

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Structures of cementum

The cells of cementum are the entrapped cementoblasts, the **cementocytes**. Each cementocyte lies in its lacuna, similar to the pattern in bone. These lacunae also have canaliculi or canals. Unlike those in bone, however, these canals in cementum do not contain nerves, nor do they radiate outward. Instead, the canals are oriented toward the periodontal ligament and contain cementocytic processes. The cementocytes receive their nutrients from P.D.L by the process of diffusion.

Cementoblast secrete uncalcified matrix of cementum known as **cementoid**, mineralization of cementoid is a highly ordered event by deposition of calcium and phosphate ions in the form of hydroxyapatite. Cementogenesis is an arrhythmic process, as new layers of cementoid are formed after the old one calcifies.

Sharpey fibers are part of the principal collagenous fibers of the periodontal ligament embedded in the cementum and alveolar bone to attach the tooth to the alveolus.

Incremental lines of Salter are highly mineralized areas with less collagen and more ground substance than other portions of the cementum.

Cemento enamel junction (CEJ)

The cementum joins the enamel to form the cemento enamel junction (CEJ), which is referred to as the cervical line. Three types of CEJ junctions are present:

1-Cementum overlaps the enamel junction: this type of CEJ is seen in 60% of all teeth. This overlapping occurs due to degeneration of reduced enamel epithelium at their cervical ends this allows the C. T to come in direct contact with enamel surface and differentiate into cementoblast, which produce **afibrillar Cementum**, it does not contain collagen fiber.

2-Edge to edge junction: In about 30% of all teeth the cementum and enamel meet as a sharp line.

3-Gap junction: In about 10 % of all teeth, cementum and enamel fail to meet, a small segment of dentin is exposed between the enamel and cementum, this condition occurs due to delay in the separation of epithelial root sheath at the cervical portion of root, in this case C.E.J is not formed.

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Types of cementum:

- 1. A cellular extrinsic fiber cementum (primary cementum)(AEFC):**
 - a. This type of cementum is composed of densely packed bundles of Sharpey's fiber (extrinsic collagen fibers), which run perpendicular on c.
 - b. Develops slowly by cementoblasts which remains on its surface.
 - c. Does not contain cementocyte
 - d. The location of this C. from cervical margin to the apical third.
 - e. Well mineralized C.
 - f. Mainly its function is anchorage (attachment)
- 2. Cellular intrinsic fiber cementum (secondary C.)(CIFC):**
 - a. Forms after at least half the root is formed, it is a more rapidly formed C.
 - b. Is situated at middle to apical third and furcations area of roots.
 - c. It contains mainly intrinsic fibers, no Sharpey's fiber, fibers run parallel to the root surface, so they don't assist for tooth attachment.
 - d. Less mineralized than a cellular C.
 - e. It contains cementocytes.
 - f. Its function is adaptation and repair.
- 3. Mixed stratified cementum**
 - a. This type of C. contains alternating layers of acellular and cellular cementum.
 - b. Composed of extrinsic (Sharpey's) fiber (formed by fibroblast cells of P.D.L and intrinsic (collagen) fibers (formed by cementoblasts).
 - c. Contain cells in its matrix.
 - d. It is situated in apical portion and furcations, its function is adaptation.
- 4. A fibrillar Cementum:**
 - a. This type of C. does not contain collagen fibers or osteocyte cells.
 - b. Its present in cervical region only when C. overlying enamel.

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Functions of cementum

1-Acts as a medium for attachment of collagen fibers of PDL (Sharpey's fibers).

2-The continuous formation of cementum keeps the attachment intact.

3-Cementum deposition apically to compensate for the attrition occlusally.

4-It is a major reparative tissue (as in case of fracture or resorption of root)

Clinical considerations

- **Cementum is more resistance to resorption** than is in alveolar bone and it is for this reason orthodontic tooth movement is made possible.
- **Hypercementosis:** is a pathological condition which occur due to excessive formation of cementum on the roots of a tooth.
- **Cementicles** are mineralized bodies of cementum found either attached to the cemental root surface or lying free in the periodontal ligament. They form from the apposition of cementum around epithelial cell rest of Malassez in the PDL.