

# Role of Cementum in Tooth Attachment and its Support

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## DESCRIPTION

Cementum is a unique mineralized tissue that covers the roots of teeth. It is an essential component of the tooth-supporting apparatus, which includes the periodontal ligament, alveolar bone, and gingiva. Cementum is similar to bone in its composition and structure, but it differs in its function and development. It explores the anatomy, physiology, development, and clinical significance of cementum.

## Anatomy and composition of cementum

Cementum is a mineralized tissue that covers the roots of teeth. It is thinnest at the cervical portion of the tooth and gradually thickens toward the apex. The thickness of cementum varies depending on the location and function of the tooth. For example, cementum is thickest on the roots of molars, which have to withstand greater masticatory forces.

It is composed of mineralized collagen fibres and ground substance. The mineralized component of cementum is predominantly hydroxyapatite, which is the same mineral that makes up the enamel and dentin of teeth. The organic component of cementum is mainly type I collagen, which provides the structural framework for the tissue. Other proteins, such as osteocalcin and osteonectin, are also present in cementum.

Cementum can be classified based on its location and function. A cellular cementum is found in the coronal portion of the root and is not involved in tooth attachment. Cellular cementum, on the other hand, is found in the apical portion of the root and is involved in tooth attachment. This classification is based on the presence or absence of cementocytes, which are cells that reside in lacunae in the cementum matrix.

The primary function of cementum is to anchor the teeth to the alveolar bone through the periodontal ligament. Cementum plays a crucial role in tooth movement and maintenance of tooth

position. When a tooth is subjected to mechanical forces, such as mastication, cementum and the periodontal ligament respond by transferring the forces to the alveolar bone. This process is essential for maintaining the integrity of the tooth-supporting apparatus.

Cementum also has a reparative capacity. When the cementum is damaged or lost due to periodontal disease or trauma, it can regenerate through the activity of cementoblasts, which are cells that differentiate from the periodontal ligament. Cementoblasts synthesize new cementum matrix, which mineralizes over time and integrates with the existing cementum.

## Development of Cementum

Cementum is formed by a process called cementogenesis, which occurs during tooth development and continues throughout life. Cementogenesis is a complex process that involves the interaction of several cell types and signaling molecules.

During tooth development, the dental follicle gives rise to the periodontal ligament and the cementoblasts, which migrate to the root surface and begin to synthesize the cementum matrix. The mineralization of the cementum matrix occurs through the deposition of hydroxyapatite crystals, which are nucleated on collagen fibres. The mineralization process is regulated by several signaling molecules, such as bone morphogenetic proteins and fibroblast growth factors.

Cementoblasts differentiate from the mesenchymal cells of the periodontal ligament and are responsible for the synthesis of cementum matrix. Cementoblasts secrete type I collagen, which forms the structural framework of the tissue. The collagen fibres provide a scaffold for the mineralization process to occur.

Cementocytes are cells that reside in lacunae in the cementum matrix. They are thought to be derived from cementoblasts and are involved in the maintenance of the tissue.

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