



THE IMPORTANCE OF CEMENTUM: A REVIEW

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ABSTRACT

Cementum is calcified substance covering the root of an human tooth and is excreted by cells called cementoblasts within the root of the tooth and is thickest at the root apex. Its main functions include the reversal of root resorption and protection of dentin. A review of few patents is also provided which involves cementum.

Key words: Cementum, Root, Patents etc.

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INTRODUCTION

Cementum is a specialized calcified substance covering the root of a tooth [1]. Cementum is excreted by cells called cementoblasts within the root of the tooth and is thickest at the root apex. These cementoblasts develop from undifferentiated mesenchymal cells in the connective tissue of the dental follicle. Cementum is slightly softer than dentin and consists of about 45% to 50% inorganic material by weight and 50% to 55% organic matter and water by weight [2]. The organic portion is composed primarily of collagen and protein polysaccharides. Sharpey's fibers are portions of the principal collagenous fibers of the periodontal ligament embedded in the cementum and alveolar bone to attach the tooth to the alveolus [3].

Cementum is avascular and light yellow and is slightly lighter in color than dentin. It has the highest fluoride content of all mineralized tissue. Cementum also is permeable to a variety of materials. It is formed continuously throughout life because a new layer of cementum is deposited to keep the attachment intact as the superficial layer of cementum ages. Two kinds of cementum are formed: acellular and cellular [4]. The acellular layer of cementum is living tissue that does not incorporate cells into its structure and usually predominates on the coronal half of the root; cellular cementum occurs more frequently on the apical half. Cementum on the root ends surrounds the apical foramen

and may extend slightly onto the inner wall of the pulp canal. Cementum thickness can increase on the root end to compensate for attritional wear of the occlusal/incisal surface and passive eruption of the tooth [5].

The cementodentinal junction is a relatively smooth area in the permanent tooth, and attachment of cementum to the dentin is firm but not understood completely [6]. The cementum joins the enamel to form the cemento-enamel junction, which is referred to as the cervical line. In about 10% of teeth, enamel and cementum do not meet, and this can result in a sensitive area. Abrasion, erosion, caries, scaling, and the procedures of finishing and polishing may result in denuding the dentin of its cementum covering, which can cause the dentin to be sensitive to several types of stimuli [7]. Cementum is capable of repairing itself to a limited degree and is not resorbed under normal conditions. Some root resorption of the apical portion of the root may occur, however, if orthodontic pressures are excessive and movement is too fast. Some experts also agree on a third type of cementum, afibrillar cementum, which sometimes extends onto the enamel of the tooth. The excessive build up of cementum on the roots of a tooth is a pathological condition known as hyper-cementosis [8].

Functions of Cementum [9,10]:



Its main functions are as follows:

- It protects the dentin.
- It provides attachment of the periodontal fibers.
- It reverses tooth resorption.

Few Patents on Cementum:

1. Protein Composition Inducing a Binding between Parts of Mineralized Tissue: The patent relates to new biologically based techniques useful with regard to inducing binding between parts of mineralized tissue. At normal dental status the teeth are anchored in special cavities called alveoli, in the jaw bone. Between the roots of the teeth and the jaw bone a so called periodontal membrane is located. The roots of the teeth are mainly constituted by a material called dentin. This dentin is peripherally covered by a thin layer of cementum, thickness about 0.01 to 1 mm. In this cementum inter alia collagen fibres are found which extend from the cementum through the periodontal membrane and which are anchored in the jaw bone. Thus, the cementum is extremely important for the attachment of a tooth to the jaw bone. The periodontal membrane has a thickness of about 0.2 mm and consists of the above-mentioned collagen fibres and vessels and nerves lying between said fibres and cells belonging to these tissues [11].

2. Method and appliance for promoting the healing of oral tissues: A dental appliance promotes the healing of oral tissues, such as bone tissue, cementum and periodontal ligament destroyed by periodontal disease. The appliance includes a flat piece of elastic material, connected at its two opposing edges to two pieces of a biocompatible membrane. The elastic material has one or more punch holes which allow the material to be fitted around a patient's teeth. The elastic material forms a barrier which protects the area of damaged tissue, and promotes regeneration of that tissue. The elastic seal minimizes intrusion of saliva and bacteria into the diseased area, and it is easily cleaned, thus preventing harmful bacteria from colonizing on the material, and prolonging the time during which the appliance can remain in the mouth. The membrane is held under the patient's gums. Due to the biocompatibility of the membrane, gum tissue becomes attached to the membrane, so that the appliance is firmly held in place for an extended period of time. Thus, the appliance can be held in place for a sufficient period to enable the damaged tissue to regenerate. The invention also includes the method of inserting and using the appliance [12].

3. Hybrid Dental Implant: This patent says that there is cementum particle on a surface of a dental implant substrate which is helpful in implant prosthesis. It

explains about a hybrid dental implant which induces an alveolar bone-periodontal membrane-dental root attachment system similar to the attachment system of an alveolar bone-periodontal membrane-dental root of a normal, natural tooth [13].

4. Phosphoprotein Extraction from the Dentin/Cementum Complex of a Human Root: in this patent design, the root shards were placed in dialysis tubing and demineralized to completion in either 10% disodium EDTA, pH 7.4, 0.6 M HCl, 0.1 M HCl, 0.5 M acetic or 75 mM-25 mM lactic-acetic acids. The demineralized shards were then re-extracted with 0.05 M tris-HCl, 1.0 M NaCl. DEAE chromatography revealed that the major peak of the 0.6 M CHI and EDTA extracts contained organic phosphorus, whereas much less organic phosphorus was found in the major peak of the 0.1 M HCl extract. Analysis of the re-extracts gave a pattern opposite to that obtained from the initial extractions. Measurements of protein and organic phosphorus released during extraction and re-extraction confirmed these results. Staining of SDS-PAGE gels for phosphoprotein with Stains-All resulted in a blue smear infractions containing organic phosphorus. Thus the extraction of phosphoproteins from human tooth roots differed depending upon the demineralizing conditions. This ability to remove phosphoprotein differentially will allow further investigation of the role of phosphoprotein in mineralization and remineralization [14].

5. Composition and Method for Desensitizing Dentin: Hypersensitive dentin or cementum is treated by applying thereto two copolymerizable monomers which are polymerized in place and function to desensitize the hypersensitive areas. The first copolymerizable monomer used in the invention is the reaction product of N-phenylglycine or N-(p-tolyl)glycine and glycidyl methacrylate (NPG-GMA or NTG-GMA). The second copolymerizable monomer is selected from certain compounds produced by the reaction of an acid anhydride with excess hydroxyethyl methacrylate, e.g., biphenyl dimethacrylate. In a preferred embodiment, the mixture of monomers also contains a photosensitizer, such as camphoroquinone, which makes the mixture photocurable in addition to self-curable [15].

CONCLUSION

Cementum is not only an important part of human root but also it compensates for the loss of root resorption and thereby helps in maintenance of normal tooth anatomy. It not only protects the dentin but also provides an attachment to the periodontal fibers.

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