Immunohistochemical and biochemical identification of MMP-2 in dentin

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Matrix metalloproteinases (MMPs) play an important role in many biological and pathological processes because of their ability to degrade all extracellular matrix (ECM) components. The purpose of this study was to identify MMP-2 in human dentin by immunohistochemical and biochemical methods.

Dentin cryo-fractured fragments were obtained from human sound teeth, partially decalcified in 0.5 M EDTA pH 7.4 for 30min and submitted to a pre-embedding immunolabeling technique, using primary monoclonal antibodies anti-MMP-2 and exposed to a secondary antibody conjugated with gold nano-particles. Observations were performed by means of a FEI-SEM. Furthermore, the presence of MMP-2 was correlatively assayed by a colorimetric assay system (Quantisir) that allows direct measurement of MMP-2 levels.

The immunohistochemical analysis revealed an intricate three-dimensional network of type I collagen and positive immunolabeling patterns for MMP-2 showing its distribution along with the collagen fibrils. The colorimetric assay resulted in higher presence of MMP-2 in mineralized dentin, compared to the partially demineralized counterpart.

The role and function of dentin MMPs is not well known, but they have shown to contribute to auto-degenerative processes in dentin, such as inflammation of dental pulp, progression of caries lesions. This study demonstrated using an immunohistochemical and a biochemical approach that MMP-2 is an intrinsic component of the human dentin organic matrix, with possible roles in dentin matrix turnover and degenerative processes.

Keywords: MMPs, dentin, FEI-SEM