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Immunohistochemical Study of Angiogenic and Antigen Presenting Cells in Pulp

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Objectives The purpose of this research was to analyze the role of angiogenic mechanisms in the human dental pulp as a defense response to dental caries and the presence and quantitative changes of class II antigen-presenting cells.

Methods In this study, we have examined 60 maxillary/mandibular premolars under 4 different clinical conditions: healthy teeth, shallow, moderate, and deep cavities. Teeth were extracted and immediately cut longitudinally; pulp tissue was extirpated and fixed in formalin for 24 hours at 4 °C. The specimens were embedded in paraffin, according to standardized laboratory procedure. Sections were cut at 5 µm thicknesses and stained by the streptavidin-biotin complex immunoperoxidase method. Cells were identified by using the following monoclonal antibodies: HLA-DR, CD68, and CD34. Wilcoxon and Mann-Whitney tests were used for statistical analysis.

Results In the pulp of healthy teeth HLA-DR-positive cells were distributed mainly in and around the odontoblast layer, with few CD68 positive cells located more coronary around the blood vessels and single CD34 positive cells. The number of HLA-DR, CD68, and CD34 positive cells showed an increase in teeth with shallow and moderate cavities. HLA-DR were located, for the most part just beneath the odontoblast layer. CD68 positive cells were present coronary mainly around the blood vessels, with an increased number of CD34 positive cells. A substantial change in the number of antigen-presenting and endothelial cells occurred in deep cavities, which caused aggregation of HLA-DR-positive cells and macrophages in the dental pulp corresponding to the lesion and CD34 positive cells subsequently coalesce to form solid vascular cords inside the connective tissue.

Conclusions Human dental pulp responds to dental caries with increased number of endothelial and antigen presenting cells. Interaction of class II antigen-presenting cells and the formation of new blood vessels plays a significant role in the defense and repair processes of the dental pulp.