

Quantitative analysis of human dental enamel demineralization by using optical coherence tomography

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The diagnosis of dental caries in early stages enables the implementation of conservative treatments centered on tooth preservation, avoiding surgical and restorative treatments. Therefore, exams capable of early detection of caries lesion are suitable. Optical Coherence Tomography (OCT) is a technique that provides information about optical properties of the sample. In the caries process, the optical properties of dental enamel change due to demineralization. Thus, the objective of this study was to evaluate the validity of applying OCT technique for detection of different degrees of dental enamel demineralization in simulated caries lesions. For this study, 11 sound third-molars were used. All of them had their crowns sectioned to obtain 42 samples which were separated in 6 groups and submitted to different periods of pH cycling to simulate caries lesions in different stages. To analyze the changes that can occur in each sample, they were submitted to the OCT technique at the start of the experiment and after each pH cycling ending. For this comparison, the average optical attenuation coefficient of each sample, in different periods of cycling, was obtained from OCT images using a special software tool developed in LabView 8 environment. The results were evaluated using statistical t-test for paired samples. Average optical attenuation coefficient was significantly different before and after cariogenic challenge, for studied periods except for the last one. Therefore, OCT technique showed suitable for quantitative assessment of enamel demineralization stages in simulated caries lesions.