Optical coherence tomography provides the optical attenuation coefficient of bovine dentin irradiated by Nd:YAG

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Optical Coherence Tomography (OCT) is a non-destructive and non-invasive technique which provides transverse images of biological structures contactless with the sample, with no use of ionizing radiation to penetrate in the sample under analysis. These characteristics allow its clinical use without any side effects to the patient. The optical attenuation coefficient (OAC) is obtained by OCT and is related to the characteristics of the tissues. This study aims to analyze the OAC from the OCT signal in bovine dentin to distinguish sound from demineralized dentin. For this, sixty 8mm2 blocks of bovine root dentin, were randomized into 4 groups: G1- untreated; G2- treated with acidulated phosphate fluoride (APF, [F]=1.23%, pH=3.3 to 3.9); G3- irradiated with Nd:YAG laser (1064nm, 0.6W, 10Hz- Lares Research®) without photoabsorber; G4- irradiated with Nd:YAG laser (1064 nm, 0.6W, 10 Hz- Lares Research®) using a coal paste as photoabsorber. All samples were submitted to a 3-day erosive demineralization protocol (Citric acid 1%, pH=3.6, 5 min, 2x/day) under agitation, and remineralization (artificial saliva, pH=7, 120 min) cycling. In this study, it was noticed that the values of optical attenuation coefficient of all samples decreased after the erosive cycling. This finding indicates that the demineralization promoted by acids, such as the citric acid creates empty spaces in the structure of dentin that increases the number of interfaces and, as a consequence, increases the scattering of light and decreases the values of optical attenuation coefficients. It is possible to conclude that the optical attenuation coefficient, calculated from the OCT signal, is able to distinguish sound from demineralized bovine dentin. This quantitative parameter can be used for diagnosis and to monitor the evolution of mineral loss in patients in near future. This study was supported by CAPES/PROCAD 88881.068505/2014-01 and CNPq/INCT 465763/2014-6.