Previous in vitro studies has demonstrated that Ho:YLF laser is capable of inducing physical and chemical changes on dental surfaces for caries prevention. The temperature changes in the pulpal chamber was firstly evaluated in vitro to determine safe energy irradiation conditions range. The purpose of this work is to verify the occurrence of pulp inflammation under those irradiation conditions in rabbits. Ten rabbits (NZB) were divided in 5 groups according to the sacrifice period (control, immediately after irradiation, 6, 24 and 72 hours after irradiation). The rabbits posterior upper region teeth of each animal were irradiated with 10 pulses of a Ho:YLF prototype operating at 0.5 Hz and 300mJ/pulse on the left side and 500mJ on the right side. Sacrifices were obtained through transcardiac perfusion and the samples were prepared for pathological analysis. The in vitro temperature monitoring revealed an increase of 1°C to the 300mJ energy and 4.5°C for the 500mJ energy. SEM observations showed the occurrence of melting and resolidification. From the in vivo analysis it can be concluded that there was low degree of inflammation for the highest energy used and no pulpal alterations for the lowest one.

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Carieslike Lesion Initiation in Sound Enamel following CW CO_2 Laser Irradiation: an In-Vitro Study

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Purpose : This study aimed to asses the caries - preventive potential of various CW CO_2 laser parameters, and to explore the effect of the laser power density, and the exposure time on the caries inhibition activity.
Materials and Methods: Extracted human premolar teeth were irradiated with three different power densities (7.95, 15.9 and 31.8) W/cm^2 for three different exposure times (0.2, 0.4 and 0.8) sec of 10.6 mm CW CO_2 laser. All teeth were subjected to carieslike lesion formation by 3.5 pH lactic acid for 21 days. The teeth after that were sectioned into ground cross sections and the lesion depths were measured using a gratitude under polarizing microscope.
Results: CW CO_2 laser preventive treatments inhibit carieslike lesion progression upto 44%. This effect was improved with: (1) increased power density for each of the three exposure times. (2) decreased exposure time for each of the three power densities within the limits of the previously listed laser parameters.
Conclusion: (1) Short exposure time of CW CO_2 laser results in a significant inhibition of the enamel carieslike lesion formation. (2) The inhibitory effect depends upon the power density and the exposure time of the laser beam. (3) The optimal CW CO_2 laser parameters used for caries inhibition purpose is achieved with approximately 30 W/cm^2 power density and 0.2 sec exposure time.

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In Vitro Study of Hydroxyapatite and Enamel Powder Fused in human Enamel by Nd:YAG Laser

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This study had the aim of evaluating the effects of pulsed Nd:YAG (1064nm) laser irradiation on hydroxyapatite and enamel powder fusion. This laser beam is not well absorbed by these two compounds and for that reason they were mixed with vegetal coal in order to increase the absorption of the laser beam. Fifteen enamel flat surfaces were covered with three different substances: 1) hydroxyapatite mixed with vegetal coal (3:1 in weight); 2) enamel powder mixed with vegetal coal (3:1 in weight); 3) vegetal coal. Flat surfaces were used to determine the fusion of hydroxyapatite and enamel powder. All samples were irradiated with Nd:YAG laser with the following parameters: 80mJ; 15 Hz; 1,2 W; 100ms pulse-width, 131,1J/cm^2. The

laser beam was delivered to the samples by using a 300 mm diameter fiber optic, in contact. Morphology of the irradiated surfaces was examined by Scanning Electron Microscopy (SEM). Results: Compounds with hydroxyapatite and enamel powder were fused to enamel surfaces.

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Comparative study of tensile bond strength of 6th generation adhesive system on dentin irradiated with Er:YAG laser

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The purpose of this in vitro study was to evaluate the effects of a pulsed Er:YAG laser irradiation on dentin of bovine teeth with tensile bond strength tests using different adhesive systems. Sixty sound bovine incisors were used, exposing the buccal dentin by polishing with sandpapers. The samples were divided into 4 groups of 15 specimen: G1 - Prompt-L Pop adhesive system, G2 - Er:YAG laser irradiation and same as G1; G3 - Etch & Prime 3.0 adhesive system, G4 - Er:YAG laser and same as G3. The energy setting for Er:YAG laser irradiation was 60 mJ, 4 Hz, defoccused, scanning a round area of 10 mm of diameter. Composite resin Z100 - 3M was filled and tensile bond strength test was done. Er:YAG laser dentin conditioning did not show difference statistically significant in the tensile bond strength of composite resin. The conclusion of this in vitro study was that Er:YAG laser irradiation on dentin do not affect the tensile bond strength in single step adhesive systems.

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Effect of Erbium Cr : YSGG Laser on Human Dentin Collagen. A preliminary study.

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The aim of this study was to determine any changes to the organic substrate of human dentin under the use of Hydrokinetic Effect of Biolase Technology Millenium Laser of Erbium Cr:YSGG.

The changes occurring were determined by using 5% ninydrine, a substance that produces chromatic changes to the substrate, upon the presence of available carbohydrate and amino-groups.

Fifteen standardized human dentin discs (each 2 mm thick) were prepared, divided in halves and organized in 3 equal groups.

In group A, one half was exposed to 3,5watt Laser and the remaining served as control.

In group B, one half was exposed to 6watt Laser and the remaining served as control.

In group C, both halves were etched, one half was exposed to 3,5watt Laser and the remaining served as control.

All discs were immersed for 3h in 5% ninydrine solution and then examined under light microscope (x10 and X20 magnification).

Results showed that control areas from groups A+B showed similar color changes (a blue-reddish color) whereas the lased subjects showed circular areas with no color changes surrounded by deep blue rings.

The etched control subjects showed white areas disturbed by light-blue lines.

From this preliminary study it is suggested that there is a severe change of human dentin collagen under the use of Hydrokinetic Effect of Biolase Technology Millenium Laser and lesser changes occur after the use of etchant.