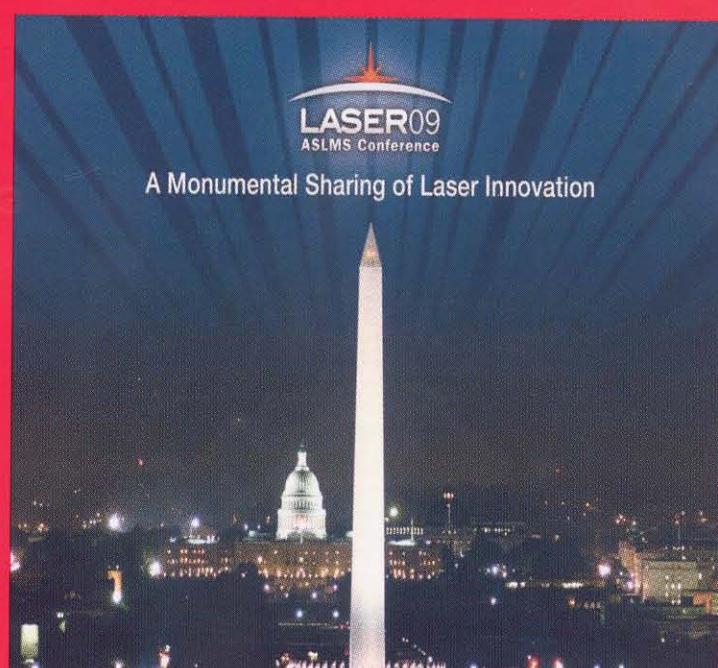
Lasers in Surgery and Medicine

The Official Journal of the ASLMS
SCIENCE • TECHNOLOGY • MEDICINE
www.aslms.org

American Society for Laser Medicine and Surgery
Twenty-Ninth Annual Conference
April 1–5, 2009
Abstracts

CAROL



Supplement 21, 2009

WILEY-BLACKWELL

ISSN 0196-8092

response was observed and increased amounts of collagen III were shown around the damaged areas at day 3 already.
Conclusion: The results of this study demonstrate a great potential of the LIOB technology for skin rejuvenation. It was shown that LIOB can be used for creating localized intradermal damage zones that will initiate a natural healing response and can lead to a regeneration of the collagen network in the skin.

DENTISTRY/ORAL AND MAXILLOFACIAL

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EFFECTS OF LASERS ON CHEMICAL COMPOSITION OF ENAMEL AND DENTIN

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Background: Laser irradiation is a promising alternative for caries prevention due to the possibility of changing the microstructure of dental hard tissues. However, the chemical changes promoted by infrared lasers interaction with dental hard tissue are still unclear. This study investigated chemical and crystallographic changes on enamel and dentin after irradiation with Nd:YAG and Er,Cr:YSGG lasers aiming caries prevention.
Study: Thirty enamel and dentin slabs were obtained from bovine teeth, and were randomly distributted into six groups: G1- unlased enamel; G2- unlased dentin; G3- enamel irradiated with Er,Cr:YSGG laser ($\lambda = 2.78$ μm) at 5.6 J/cm^2 (25 mJ/pulse); G4- dentin irradiated with Er,Cr:YSGG at 2.8 J/cm^2 (12.5 mJ/pulse); G5- enamel irradiated with Nd:YAG laser ($\lambda = 1.064$ μm) at 84.9 J/cm^2 (60 mJ/pulse), and G6- dentin irradiated with Nd:YAG at 84.9 J/cm^2 (60 mJ/pulse). Sample surfaces were analyzed by micro-Fourier transform infrared spectroscopy (μ-FTIR) at 4000–650 cm^{-1} range and with 4 cm^{-1} resolution. After μ-FTIR, samples were also evaluated by X-ray diffraction at a Synchrotron monochromatic X-ray beam (Cu-Ka, wavelength of 0.0954 nm).
Results: Irradiation with Er,Cr:YSGG laser promoted the decrease on carbonate content of enamel. After Nd:YAG irradiation, it was observed a significant decrease ($p < 0.05$) of all organic content of enamel. Er,Cr:YSGG and Nd:YAG lasers promoted a significant decrease on the contents of amides I and carbonate of dentin. Both laser irradiations also promoted the formation of tricalcium and tetracalcium phosphates, and also a significant increase ($p < 0.05$) on the crystal growth of the apatite of enamel and dentin.
Conclusion: In conclusion, high IR intensity laser irradiation changes mainly the organic and carbonate contents of both enamel and dentin, as well promotes an increase in crystallite sizes and the formation of new crystallographic phases. These changes can be correlated with the mechanism of the improved resistance of these tissues to demineralization observed in our previous studies.
Acknowledgements: FAPESP (Proc.2006/06746-0 and 05/51689-2), MCT/CNPq (473723/2007-7) and PROCAD/CAPES (021905-3).

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CORRELATION BETWEEN EPR SIGNAL INTENSITY AND WATER ABSORPTION IN TOOTH ENAMEL

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Background: Electron paramagnetic resonance (EPR) measurement in human tooth enamel is a highly accurate physical method for personnel radiation dose reconstruction. An interesting feature of the native signal in tooth enamel is the monotonic dependence of its intensity (peak-to-peak amplitude) on the powder particle size; e.g. the smaller the particle size, the higher the peak-to-peak amplitude of the native signal.
Study: Enamel was separated from dentine using a low-speed water-cooled dental drill. The tooth enamel pooled from all samples was washed with distilled water and dried at 40°C under vacuum for 14 h. The pieces were then crushed with a mortar and pestle and carefully mixed. The resultant powder was segregated using a set of four sieves into 5 fractions with different particle sizes. A microbalance with an accuracy of 10 μg was used for the sample mass measurements.
Results: The intensity of the native signal is largely determined by the relative mass of loosely bound water. As the water content increases, the physical mechanism responsible for increasing the concentration of non-radiation induced radicals in tooth enamel is most likely due to ionization of the organic matter facilitated by the loosely bound water outside the crystal lattice.
Conclusion: There is definitely a correlation between the water content in tooth enamel and the peak-to-peak amplitude of the native signal, which in turn has two important implications for further refinement of the retrospective EPR dosimetry technique. First, environmental conditions (humidity and temperature) during the EPR measurements affect reproducibility of the dose reconstruction results, especially in terms of the radiation sensitivity. Second, these results point to new directions in our search for ways to reduce the native signal intensity. Controlling or knowing the exact water content of EPR mineralized tissue samples may be a necessity for accurate dose reconstruction.

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EFFECT OF RAPID TISSUE DEHYDRATION ON THE EFFICIENCY OF Er:YAG LASER ABLATION OF ENAMEL, DENTIN AND BONE

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Background: The Erbium YAG laser is assumed to ablate enamel, dentin and bone efficiently under routine clinical situations. However, ablation efficiency is dramatically affected by proximity of the laser tip to the tissue surface, volume of water coolant, laser energy level, tip angulation, tip movement and tip condition. It has been recognized clinically that ablation diminishes and may even stop if energy is dispensed to a small area of tissue for an extended period of time. This study explores the influence of tip movement on final laser efficiency.
Study: Unerupted third molars and bovine femur cortex were subjected to laser ablation using an Er:YAG laser. Enamel (250 mj/25 pps), dentin (160 mj/30 pps) and bone (100 mj/30 pps)

Published online in Wiley InterScience (www.interscience.wiley.com).