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**EFFECTS OF Nd:YAG LASER AND PROFESSIONAL FLUORIDE APPLICATION ON CHEMICAL CHANGES OF ENAMEL AND ITS INFLUENCE ON CARIES PREVENTION**

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This in vitro study evaluated the combination effect of Nd:YAG laser and acidulated phosphate fluoride gel application (APF-gel) on enamel compositional change, formation and retention of calcium fluoride ( $\text{CaF}_2$ ) and on resistance to demineralization. Methods: Two-hundred human enamel slabs were randomly distributed into five treatment groups (n=40): G1- untreated; G2- treated for 4 min with APF-gel (1.23%F<sup>-</sup>) ; G3- irradiated with Nd:YAG laser ( $\lambda=1064\text{nm}$ ,  $84.9\text{J}/\text{cm}^2$ ); G4- pre-irradiated with Nd:YAG and subjected to APF-gel application; G5- application of APF-gel and post-irradiation with Nd:YAG laser. After treatments, the enamel composition of 10 slabs of each group was analyzed by micro-Fourier transformed infrared spectroscopy and in other 10 slabs  $\text{CaF}_2$  formed was determined. The remaining 20 slabs of each group were submitted to a 10-day pH-cycling caries regimen and, subsequently, enamel demineralization was evaluated by cross-sectional microhardness in 10 slabs of each group and  $\text{CaF}_2$  was determined in the other 10 slabs. Statistical analysis was performed by ANOVA/Tukey test ( $\alpha=0.05$ ). Results: Laser irradiation decreased both carbonate and organic contents (amides I and II) of enamel when compared to G1 and G2 groups, however the groups submitted to laser, combined or not with APF-gel application, did not differ among them. Enamel demineralization was reduced by laser irradiation ( $p<0.05$ ), but the combination of laser and fluoride was not more efficient than their isolated effect. Laser+APF and APF+laser, in comparison with APF-gel group, not only promoted higher formation of  $\text{CaF}_2$  on enamel as the product formed showed to be stable since higher concentration was found retained after the pH-cycling regimen. Conclusions: Nd:YAG laser changes the microstructure of enamel, increases the formation and retention of  $\text{CaF}_2$  on enamel when combined with APF-gel application and improve enamel resistance to demineralization, suggesting its anticaries potential. Supported by FAPESP (Proc.2006/06746-0, CEPID-CEPOF 05/51689-2).