H009 Effect of 980 nm diodo laser on bond strength of AH Plus and Epiphany sealers on dentin walls, using push-out test

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This study evaluate the bond strength of AH Plus and Epiphany sealers in radicular human dentine irradiated with laser 980 nm diode laser, using push-out test. Roots of 60 canines were seccioned transversally at 4 mm of the cervical region, obtaining dentin discs. The root canals of dentin discs were prepared with diamond conic drill (large diameter = 2.70 mm, small diameter = 2.30 mm, and height = 4 mm) and irrigated with NaOCl, EDTA and distilled water. The specimens were distributed in 3 groups according to the laser potency used: 1.5 W (n = 24); 3.0 W (n = 24) and without irradiation (n = 12). The irradiated groups were subdivided in 2 subgroups (n = 12) according to the frequency: CW and 100 Hz. After laser irradiation, half of the specimens had the root canals filled with AH Plus and the other with Epiphany. Push-out test was performed in the Instron Machine and the results (MPa) were submitted to the statistical analysis by ANOVA and Tukey tests ($p < 0.05$). Fracture types were analysed by SEM. The specimens irradiated with laser and filled with AH Plus presented superior values (8.69 ± 2.44a) than groups filled with Epiphany (3.28 ± 1.58b) and the non-irradiated samples (control= 3.85 ± 0.60b), however, the groups filled Epiphany did not present significant difference among themselves and to the control (1.75 ± 0.68b). The predominant failure types were: adhesive (77%) for Epiphany-dentin interface and mixed (67%) for AH Plus-dentin interface.

It was concluded that the irradiation of 980 nm diode laser increased the bond strength AH Plus sealer and not altered the Epiphany adhesion.

H010 Autogenous Tooth Transplantation: Evaluation of a 91 case series performed and followed though 21 years

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One hundred and eight transplanted teeth from 91 patients were clinicaly and radiographicaly examened in order to study the pulpal and periodonal reparatory phenomena and propose a clinical protocol well fundamented. Clinical examination consisted in pulpal senssibility tests and periodontal condition assessment. Periapical radiographs were also applied throughout follow-up examinations. The results reveled that pulpal response decrese along the time in teeth with incomplete root formation; pulpal calcifications and radiopacity of the root canal increases when comparing the trasplanted teeth with its nontransplanted homologs; raiographic signs of pulpal necrosis were more frequent in teeth with complete root formation; gengival retraction and gingival bleeding were eventual findigns related to poor oral hygene; external root resorption did not impaired the transplants; teeth transplanted during incomplete root formation stages presented better pulpal repair results rather than teeth with complete root formation.

These findigs supports that autogenous tooth transplantation is capable of rehabilitate physiologic and aestetic aspects of tooth loss coused by dental trauma; the success of this therapy depends on several factors leeded by a straight surgical control.

H011 Influence of Er:YAG laser on microhardness of enamel adjacent to restorations submitted to cariogenic challenge *in situ*

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Er:YAG (Erbium:Yttrium-Aluminum-Garnet) laser has been studied as an alternative tool for cavity preparation, with the aim of overcoming limitations of air turbine handpieces. The present study aimed to assess the effect of Er:YAG laser on enamel adjacent to composite restorations submitted to cariogenic challenge *in situ*, by microhardness analysis. Slabs of human enamel were randomly assigned to 7 groups (n = 12), according to the type of cavity preparation: I. Er:YAG laser - 250 mJ/2 Hz; II. 250 mJ/3 Hz; III. 250 mJ/4 Hz; IV. 350 mJ/2 Hz; V. 350 mJ/3 Hz; VI. 350 mJ/4 Hz; VII. High-speed handpiece - control. Specimens were restored (Single Bond/Z250) and fixed in intra-oral appliances, worn by 12 volunteers for 14 consecutive days. Cariogenic challenge was simulated by application of sucrose solution on each slab 6 times per day. Thereafter, samples were removed from the appliances, sectioned and observed for microhardness in different distances (100, 200 and 300 µm) and depths (30, 60 and 90 µm), from restoration and enamel surface, respectively. Statistical analysis was performed by Split-plot Analysis of Variance, each volunteer being a complete statistical block. Significant factors were identified by contrast technique. Differences were observed among volunteers ($p < 0.0001$) and among depths ($p < 0.0001$). However, there was not statistical difference among the types of cavity preparation or among the distances.

Er:YAG laser, employed for cavity preparation, did not influence microhardness of enamel adjacent to composite restorations submitted to cariogenic challenge in situ. *(Support: CAPES - Demanda Social)*

H012 Effect of a 15% xylitol-chewing gum on salivary MS levels, on *S. mutans* genotypes and on th e detection of xylitol tolerant (X^R) isolates

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Very little is known about the effect of xylitol on the clonal variation of *S. mutans* despite of its effect on caries prevention. This study evaluated the effect of xylitol on reduction in salivary MS levels, on *S. mutans* genotypes and on the detection of xylitol tolerant (X^R) isolates. Ten subjects with MS salivary levels 10^7 CFU/ml saliva used 15% xylitol chewing gum, 5 X/day, 30 days. Saliva was collected at baseline, 30 days after gum usage, and 30 days after the interruption of the usage. The average salivary levels of MS decreased from $9.8 \pm 10^5 \pm 2.6 \pm 10^5$ to $2.1 \pm 10^5 \pm 1.9 \pm 10^5$ after experimental period and it was statistically significante, using variance analysis to repeated values (Tukey test, $\alpha = 1\%$), but after interruption of xylitol usage, values were similar to baseline ($3.5 \pm 10^5 \pm 2.71 \pm 10^5$), with no difference. Fifteen isolates of *S. mutans*/subject/ phase were genotyped by RAPD-PCR using OPA-02 primer and 17 genotypes were detected. Xylitol resistance/tolerance was studied in 124 isolates, representative from these 17 genotypes and in 6 of them X^R isolates were found. Growth was monitored by optical density measurements of cultures in BHI and BHI +1% xylitol at time zero and every other hour for 16 h. X^R isolates were considered those that exhibited growth in BHI+xylitol media similar to the negative control, X^S strain TW17 (Tanzer, 1995). X^R and X^S isolates within the same genotype were detected in 4 of those 6 X^R genotypes considering all phases (including baseline).

Xylitol used this way helps reduce salivary MS levels temporarily but it is not determinant to select XR genotype in vivo.

H013 Restorative materials and caries-inducing methods: analysis through polarized light microscopy, SEM and X-ray diffraction spectroscopy

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Different caries-inducing methods may present different results. The purpose of this study was to evaluate caries-inducing methods (*Streptococcus mutans* cariogenic challenge – Group A – and pH cycling – Group B) in human enamel with Class V cavities restored with: Z250 resin composite (I), Freedom compomer (II), Fuji IX glass-ionomer cement (III) and Vitremer resin-modified glass ionomer (IV), through SEM and polarized light microscopy for the area of caries lesion and X-ray diffraction spectroscopy (EDS) for the concentration of calcium, phosphorous and fluoride. The control group was restored and kept at 37°C/100% relative humidity (n = 24). In Group A, samples were immersed in glucose broth with 0.1 ml of *S. mutans* suspension (10^6 cells) and remineralizating solution for 14 days. In Group B, samples were cycled in des and remineralizating solutions for 9 days. For SEM and EDS, samples were dehydrated, gold sputtered and a 15 kV electron beam measured the concentration of the chemical elements. Data was compared to the control group and submitted to Anova and Tukey (5%) statistical analysis. Significant differences were found between Group A (element/material): calcium/III, phosphate and fluoride/I, II, III and Group B: phosphate/I, II, III. Mean caries area in mm^2 (± SD) were: I 9.55(± 1.75)a, II 10.27(± 1.52)a, III 4.2(± 3.2)b, IV 7.22(± 2.42)b. Different letters indicate different statistical findings.

Caries-inducing methods present different results for the same restorative materials regarding concentration of chemical elements, but not lesion area. (Support: FAPESP - 05/58458-6)

H014 Induced growth of hydroxyapatite in dentin – approaches for functional remineralization

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It has been suggested that wet mechanical properties of dentin is related with the presence of intrafibrillar mineral (Kinney *et al.*, JDR 2003). Remineralization of dentin can occur either by precipitation of mineral between the collagen fibrils or functionally, bound to its structure. We sought to restore the properties of demineralized dentin matrix by inducing the nucleation of hydroxyapatite (HAP) from Ca/PO_4 metastable solutions. Experiments used 12 mm^2 samples, demineralized with a 0.05 M acetate buffer (pH 5.0; 8 hours). Samples were remineralized with approximated Ca/PO_4 constant composition solutions, saturated for HAP (37°C, pH 7.4) for 5 days, and removed at 24 hrs (n = 5). Before and after experiments wet elastic moduli (E) of the tissues were measured using nanoindentation. Atomic Force Microscopy (AFM) and Scanning Electron Microscopy (SEM) images were made and mineral grown was evaluated by FTIR analysis. E values were calculated as a function of crystal growth and split into: mineral grown within the collagen or mineral precipitated over the tissue. Mean values of E were subjected to ANOVA and Tukey HSD ($p < 0.05$). Both conditions showed significant improvement on E of the tissues, however when the over precipitated mineral increased the initial values, 0.2 (0.1) GPa, up to 3.6 (3.2) GPa, the collagen related growth recovered E up to 10.9 (4.3) GPa. SEM and FTIR analysis indicated the presence of HAP on the samples, AFM showed pronounced growth of mineral within the collagen.

Thus, we concluded that, under specific conditions, functional remineralization has occurred within collagen fibrils of dentin. (Support: NIH/NIDCR - T32-DE17249/R)

H015 Effect of Er,Cr:YSGG laser associated with topical application of fluoride on fluoride retention and enamel demineralization *in vitro*

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This study evaluated the influence of Er,Cr:YSGG laser and topical acidulated phosphate fluoride (APF - 1.23% F) application on incipient caries development and on fluoride retention *in vitro*. One hundred and sixty (160) human enamel slabs were randomly divided into 8 groups (n = 20): G1 – untreated; G2 – treated with APF for 4 min; G3, G4 and G5 – irradiated with Er,Cr:YSGG at 2.8 J/cm², 5.6 J/cm² and 8.5 J/cm², respectively; G6, G7 and G8 – pre-irradiated with Er,Cr:YSGG at 2.8 J/cm², 5.6 J/cm² and 8.5 J/cm², respectively, and subjected to APF application. Samples were submitted to a pH-cycling model and after ten days the mineral loss and the retention of loosely bound fluoride (CaF_2) and firmly bound fluoride (fluorapatite) were evaluated. Calcium, inorganic phosphorous and fluoride contents were also evaluated in the demineralizing and remineralizing pH-cycling solutions. The statistical analysis (ANOVA) evidenced that the fluence of 8.5 J/cm² reduced the mineral loss when compared to the untreated group; however, this mineral loss was similar than that showed by APF application. Laser irradiation promoted an increase in CaF_2 retention after APF application, but did not increase the fluorapatite formation. The analysis of pH-cycling solutions showed higher formation and retention of fluoride on lased samples.

On conclusion, Er,Cr:YSGG laser at 8.5 J/cm² increased the retention of formed CaF_2 after APF application; however, the association of both treatments (laser + APF) did not present higher effect on reducing enamel demineralization than the effects of these treatments alone. (Support: FAPs - FAPESP - 04/02229-6)

H016 Insights of RANK/RANKL/OPG on enamel development

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Besides functional differences between ameloblasts and osteoclasts several features support an analogy between their ruffled ends. Osteoprotegerin (OPG) inhibits ruffled ends formation in mature osteoclasts. This study aimed to investigate the involvement of receptor activator of nuclear factor kappaB (RANK)/RANK ligand (RANKL) and OPG on dental fluorosis (DF) development. Wistar rats were treated for 30 days with 0 (GI), 5 (GII), 50 (GIII) and 100 (GIV) ppm fluoride (F) in the drinking water (n = 9/group). Data from plasma, urine, feces and diet F, and even DF (Thylstrup-Fejerskov Index) supported a dose-effect on F metabolism. Jaws were analyzed for ultrastructural changes and for amelogenin, matrix metalloproteinase 20 (MMP-20), RANKL and OPG through real-time polymerase chain reaction and immunohistochemical assays. G3 and G4 showed DF. G1 was RANK(+) and RANKL(+), and G4 was RANKL(+). G4 showed changes in amelogenin(+) and MMP-20 patterns. Changes in MMP-20 occurred in G2. All groups were OPG(-). OPG and amelogenin transcripts were increased in G2.

These data suggest (1) the importance of RANK during enamel formation for the integrity of dental enamel, (2) that most RANK must be soluble (extracellular) during the maturation stage to trigger the end of abnormal ameloblast synthesis in DF and maybe that (3) a 5 ppm F dose in drinking water may trigger initial biochemical/ultrastructural changes in dental enamel in respect to DF with no clinical signs. (Support: FAPs - Fapesp - Proc. 03/13437-6 and 05/01847-0)