

### HA008 Effects of photobiomodulation on the masseter of children with spastic cerebral palsy: a pilot study

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This longitudinal study on 20 children with spastic type cerebral palsy (CP), followed by the Association for the Care of Disabled Children (Associação de Assistência à Criança Deficiente, AACD), evaluated the effect of photobiomodulation laser on the thickness of their masseter muscles. The Laser Group (LG) comprised 10 children with complaints of mouth opening restriction and difficulty in performing oral hygiene; the non-Laser Group (nLG) comprised 10 children with no restriction. LG was submitted to six infrared laser applications: LED, low intensity, As-Ga-Al, at  $\lambda = 808 \pm 3$  nm, 120 mW, by MMOptics Twin Flex Evolution laser; using 10.0 J/cm<sup>2</sup> of energy/dose and 20 s of exposure/site, at 7-day intervals. Masseter muscle thickness was evaluated using ACUSON X300 ultrasound equipment (SIEMENS). LG was assessed before any application and after six sessions, while the nLG was assessed twice, at 7-day intervals. The t tests for dependent and independent samples were used, at a 5% significance level. The groups were similar in sex and age, though differences ( $p = 0.003$ ) were verified for the clinical form of CP; LG with tetraparesis showed greater values. The thickness of the right masseter before ( $8.9 \pm 2.1$ ) and after ( $9.9 \pm 2.9$ ) six laser applications differed significantly ( $p = 0.039$ ), as did the left ( $9.1 \pm 1.9$ ,  $9.7 \pm 1.6$ ;  $p = 0.023$ ). Masseter muscle measurements of nLG and LG after six weeks showed no significant difference (right:  $p = 0.484$ ; left:  $p = 0.395$ ).

*Photobiomodulation has a positive effect, as verified by the increase in thickness of the spastic masseter muscles* (Apoio: Fundação de Amparo à Pesquisa do Estado de São Paulo - Processo 2014/15662-1)

### HA010 Effect of bioactive primers on dentin-adhesive interface

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Recently, it was reported that the degradation of dentin matrix by metalloproteinases (MMPs) could affect the adhesive interface stability. Thus, searching for better results in the longevity of adhesive restorations, the aim of this study was to evaluate the effect of bioactive primers (chlorhexidine - CHX, grape seed extract - GSE, doxycycline - DOXY) on bond strength (BS) of resin composite restorations submitted to load cycling (LC). For this, cavities were performed in 48 healthy human molars. Then, it was separated into 4 groups according to surface treatment received after the acid etching: GI - Control (Adhesive System, AS); GII - CHX 0.2% + AS; GIII - GSE 15% + AS and GIV - DOXY 3% + AS. After, the samples were separated into 2 subgroups: A - Control and B - Submitted to LC. Then, the specimens were submitted to microtensile test and in situ zymography. Assay of collagenase/gelatinase and gelatin zymography were also performed. According to the statistical analysis (2 - way ANOVA, Tukey,  $p > .05$  - SPSS), BS values were not influenced by the use of bioactive primers and by LC ( $p > .05$ ). In situ zymography analysis demonstrated that the bioactive primers decreased the activity of MMPs compared to GI ( $p < .05$ ). GI showed the highest value ( $p < .05$ ), while no differences were found in the groups treated with bioactive primers ( $p > .05$ ). Assay of collagenase/gelatinase and gelatin zymography showed that bioactive primers were able to inhibit MMPs, considering CHX less efficient.

*In conclusion, the bioactive primers could be used in restorative procedures once they did not affect the BS values and decreased the MMPs activity.* (Apoio: CAPES)

### HA012 Biomimetic adhesive resin with Triclosan-doped Halloysite nanotube fillers

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The aim of this study was to characterize and evaluate the properties of adhesive resin with Triclosan-doped Halloysite nanotube fillers. Experimental adhesives with Bis-GMA/TEGDMA, 75/25 wt% and CQ/EDAB/DPIHFP 1 mol% as photoinitiators were formulated. Halloysite Nanotubes (HNT), functionalized or not with 1:1 Triclosan (TCN), were incorporated into the adhesive at 5, 10, and 20 wt%, totalizing 7 groups with one control group without filler addition. Groups were evaluated by Knoop hardness and softening in solvent, surface free energy (SFE) using optical tensiometer, transmission electron microscopy (TEM), polymerization kinetics and degree of conversion (DC) using FTIR spectroscopy, mineral deposition after artificial saliva immersion using Raman spectroscopy (965 cm<sup>-1</sup> - PO4<sup>3-</sup> peak), and antimicrobial activity against *Streptococcus mutans*. SFE and Knoop hardness increased with higher amount of HNT. TEM showed the presence of TCN particles in the inner and outer surfaces of HNT. The DC(%) of HNT/TCN 5 ( $55.37 \pm 0.87$ ), 10 ( $57.12 \pm 0.06$ ), and 20 wt% ( $55.97 \pm 0.91$ ) increased significantly ( $p < 0.05$ ) comparing to control group ( $48.50 \pm 1.13$ ). Polymerization rate decreased with TCN-doped HNTs. As the HNT content increased, mineral deposition increased for all groups after 14 days of immersion. Bacterial growth inhibition was found with HNT/TCN 20 wt%.

*Addition of HNT with TCN at 20% to adhesive resin was able to promote antimicrobial activity and mineral deposition without compromising chemical mechanical properties.* (Apoio: CAPES)

### HA009 The osteoprotective effect of estrogen receptor alpha in maxillary bone

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Introduction: Estrogen deficiency results in systemic bone loss. However, the contribution of estrogen receptor alpha (ER $\alpha$ ) in maintenance of alveolar bone microarchitecture and underlying mechanisms were not defined yet. Methods: 8-10 weeks old females and males homozygote ER $\alpha$ +/+ (wild type - WT) and ER $\alpha$ -/- (ERKO $\alpha$ ) mice were submitted to mechanical loading-induced bone remodeling by using an orthodontic appliance to promote tooth movement (OTM). The maxillary bone samples were analysed using microCT, qPCR and energy dispersive spectroscopy (EDS). Bone marrow cells (BMC) from WT and ERKO $\alpha$  mice were isolated and differentiated in osteoblasts and osteoclasts. Results: Both female and male ERKO $\alpha$  demonstrated an osteoporotic phenotype in the femur and vertebrae. Maxillary alveolar bone loss and OTM were significantly augmented in ERKO $\alpha$  mice and associated with decreased calcium percentage levels and increased expression of IL-33 in the periodontium. In vitro osteoclasts and osteoblasts differentiation was significantly higher in BMC from ERKO $\alpha$  than WT mice.

*In conclusion, we provided herein evidence for the first time that estrogen receptor alpha (ER $\alpha$ ) is important to maintain the microarchitecture and control bone remodeling of maxillary alveolar bone. ER $\alpha$  also protects femur and vertebrae from bone loss, either in female and male mice. ER $\alpha$  effects might be related to local production of IL-33, but seems independent of RANK/RANKL. ER $\alpha$  has yielded osteoclastogenesis down-regulation which contributes to bone protection.* (Apoio: CAPES - PDSE5623/13-8)

### HA011 A new perspective of bonding agents

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This study evaluated the bond strength of the adhesive Scotchbond Universal applied either in etch-and-rinse or self-etch strategies compared to Adper Single Bond 2 and Clearfil SE Bond in two different conditions of dentin (sound and demineralized) commonly observed in minimal invasive restorations. Forty-eight sound human third molars had mid-coronal dentin surfaces exposed by removing the occlusal third. Twenty-four molars were submitted to pH-cycling to create demineralized dentin, and the other half remained intact until the bonding procedure. Eight groups ( $n = 6$ ) were created according to the adhesives tested and conditions of the dentin. After bonding procedures, a composite core was build-up to a height of 4-5mm and then was sectioned perpendicular to the adhesive interface in order to obtain rectangular sticks (0.8 mm<sup>2</sup>) that were submitted to microtensile tests (1mm/min). Two-way ANOVA and post-hoc Tukey's test ( $\alpha = 0.05$ ) were performed as statistical analysis. Lower bond strength values were obtained to demineralized dentin ( $p = 0.000$ ), irrespective of the adhesive/strategy evaluated. Scotchbond Universal in both strategies evaluated had similar bond strength values to both compared adhesives ( $p = 0.07$ ). A higher number of premature failures (ptf) were observed in groups that the bonding procedure was performed in demineralized dentin.

*The new 'universal' adhesive can be used in both strategies, irrespective of the substrate, without the concern of jeopardize the restorative procedure to perform minimal invasive resin composite restorations.*

### HA013 Novel natural dentin biomodification agent from cashew nut shell and its application as monomer on dentin bonding

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The aim of this study was to assess the dentin biomodification of proanthocyanidins (PACs, gold standard) and that of cardol (extracted from the cashew nut shell liquid). Demineralized dentin bars were evaluated for the initial weight and elastic modulus by flexural test. The modulus was re-evaluated after bars immersion for 60s ( $n = 10$ ) in distilled water (control), 2% PACs or cardol solutions. The samples were then stored in artificial saliva and the weight was re-evaluated after 1 and 4 weeks. The cardol was reacted with methacrylic acid to synthesize the new monomer CMA (cardol-methacrylate) which was purified and characterized with gas chromatography. In flat dentin surfaces from extracted molars it was applied phosphoric acid for 15s, rinsed and it was applied distilled water, solutions of PACs, cardol or CMA (2% each) for 60s prior to the application of Singlebond Universal adhesive. The restored teeth were cut into sticks for the bond strength ( $\mu$ TBS) test. Data were submitted to ANOVA and Tukey test ( $\alpha = 95\%$ ). The statistical analysis showed that the modulus variation was higher with cardol ( $338.2 \pm 45.1\%$ ) than with PACs ( $56.3 \pm 5\%$ ). The weight loss (degradation) with the use of PACs ( $38.6 \pm 4.3\%$ ) was higher than with cardol ( $21.5 \pm 2.9\%$ ). The  $\mu$ TBS was increased from  $32.3 \pm 4$  MPa (control) to  $41.9 \pm 4.3$  MPa by using PACs and  $44.5 \pm 6.5$  MPa with cardol. However, the highest  $\mu$ TBS was obtained with CMA ( $52.3 \pm 4.2$  MPa).

*Cardol has demonstrated to be an efficient alternative for dentin biomodification and its analog CMA may be used to significantly improve the bonding to dentin.* (Apoio: CAPES)