

**Conclusions:** Distinct from previous studies, this study presents a low-complication and effective procedure for intentional replantation using atraumatic forceps and fast-setting MTA. Although the sample size is limited in this study, no failures were seen due to root resorption resulting from extraction trauma or MTA setting problems. With the use of modern instruments and materials and thorough intraoperative inspection, including the use of intraoperative methylene blue, better surgical outcomes can be expected.

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96

Wear mechanisms of thin dental composites

M Osiewicz <sup>\*1,2</sup>, A Werner <sup>1</sup>, FJM Roeters <sup>1</sup>, CJ Kleverlaan <sup>1</sup>

<sup>1</sup> *Academic Centre for Dentistry Amsterdam (ACTA), Amsterdam, Netherlands*

<sup>2</sup> *Department of Integrated Dentistry, Jagiellonian University, Kraków, Poland*

**Purpose / Aim:** In patients with severe wear the performance of restorative materials is challenging, especially with load-bearing thin restorations. This study aimed to investigate the wear rate in thin layered restoration (1.5 mm) compared to more bulky restorations (3 mm) where less deformation and stress within the material is expected.

**Materials & Methods:** The wear rates of four resin-based composites were measured using one layer of 3 mm thickness compared to a thin layered specimen of 1.5 mm composite, which was supported by a flexible layer of 1.5 mm silicon impression material. The two- and three-body wear were measured using the ACTA wear device. Scanning Electron Microscopy analysis was performed to detect the surface alterations. One- and two-way ANOVA and Tukey's post hoc test were used to analyse differences in wear values.

**Results:** The 2-body wear of the 1.5 mm specimens was significantly higher ( $p < 0.001$ ) than the 3 mm specimens. The increase in wear rate between the 1.5 mm and the 3 mm specimens can be explained by the effect of fatigue wear. The 3-body wear of the 1.5 mm specimens of Heliomolar was significantly higher than the 3 mm HMR specimens. For the 3-body wear there was no significant difference for Clearfil AP-X and Clearfil Majesty ES-2 between the 1.5 mm and 3 mm specimens.

**Conclusions:** The results of this study show for the first time that fatigue wear plays a role in wear mechanism of thin (1.5 mm) dental resin-based composites. Therefore, deformation of restorations under loading should be minimised, by avoiding thin restorations and flexible circumstances and using resin-based composites with high E-moduli.

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'Clinical properties'

1

Co-doped titanium dioxide nanoparticles decrease in-office tooth bleaching's cytotoxicity

M Kury <sup>\*1</sup>, RAO Ribeiro <sup>2</sup>, CA Souza Costa <sup>2</sup>, FLE Florez <sup>3</sup>, V Cavalli <sup>4</sup>

<sup>1</sup> *Paulista University, São Paulo, Brazil*

<sup>2</sup> *UNESP, Araraquara, Brazil*

<sup>3</sup> *Oklahoma University Health Science Center, Oklahoma City, USA*

<sup>4</sup> *UNICAMP, Piracicaba, Brazil*

**Purpose / Aim:** To evaluate the efficacy and cytotoxicity of experimental 6% and 35% hydrogen peroxide gels (HP6 or HP35) incorporated with titanium dioxide nanoparticles (NP) co-doped with nitrogen and fluorine and irradiated with a violet LED light (LT).

**Materials & Methods:** Bovine enamel-dentin disks adapted to artificial pulp chambers were randomly assigned to bleaching with ( $n = 8$ /group): NC (negative control), NP, HP6, HP6 + LT, HP6 + NP, HP6 + NP + LT, HP35, HP35 + LT, HP35 + NP, HP35 + NP + LT, and commercial HP35 gel (COM). Color ( $\Delta E_{00}$ ) and whiteness index ( $\Delta WI_D$ ) changes were measured before and 14 days after bleaching. The extracts (culture medium + diffused gel components) collected after the first session were applied to odontoblast-like MDPC-23 cells, which were assessed concerning their viability, oxidative stress, and morphology. The amount of HP diffused through the disks was determined. Data were analyzed by one-way ANOVA/Tukey or Welch's ANOVA/Games-Howell Tests ( $\alpha = 5\%$ ).

**Results:** HP6 presented the lowest  $\Delta E_{00}$  and  $\Delta WI_D$ . HP6 + LT, HP6 + NP, HP6 + NP + LT, and HP35 groups promoted similar  $\Delta E_{00}$  and  $\Delta WI_D$  ( $p > 0.05$ ). HP6 + NP + LT exhibited  $\Delta WI_D$  higher than HP6 ( $p < 0.05$ ), the lowest HP diffusion, and the highest cell viability (%) among bleached groups, preserving the number of living cells similar to NC and NP. HP6 + LT, HP6 + NP, and HP6 + NP + LT exhibited the lowest cell oxidative stress among bleached groups ( $p < 0.05$ ). HP6 + NP + LT presented oxidative stress similar to NC ( $p < 0.05$ ). HP35, HP35 + LT, and HP35 (COM) displayed the lowest cell viability. Only HP6-containing groups showed MDPC-23 cells with wide cytoplasm, similar to that found in NC and NP groups.

**Conclusions:** Incorporation of the nanoparticles not only increased the efficacy of HP6 gel with light, but also reduced the cytotoxicity caused by the standard in-office bleaching gel concentration. This approach holds the promise to clinically render optimal esthetic outcomes while potentially reducing the tooth sensitivity.

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2

Chemical and biological insights into the safety of intraoral appliances

J Wezgowiec <sup>\*1</sup>, H Czapor-Irzabek <sup>1</sup>, A Malysa <sup>1</sup>, J Kulbacka <sup>1,2</sup>, M Wieckiewicz <sup>1</sup>

<sup>1</sup> *Wroclaw Medical University, Wroclaw, Poland*

<sup>2</sup> *State Research Institute Centre for Innovative Medicine, Vilnius, Lithuania*

**Purpose / Aim:** 3D printing provides a convenient method of customized manufacturing of various complex objects, which could be particularly useful in many disciplines of dentistry. However, in the case of intraoral devices encountering a challenging environment