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### 3031 In-vivo Occlusal Caries Prevention by Pulsed-CO<sub>2</sub>-Laser and Fluoride Varnish Treatment

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*Location: Ballroom Cataratas I (Bourbon Hotel)*

*Presentation Type: Oral Session*

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High caries prevalence in occlusal pits and fissures warrants novel prevention methods. In-vivo 86% reduction in smooth surface demineralization following short-pulsed 9.6 $\mu$ m CO<sub>2</sub>-laser irradiation was recently reported (Rechmann et al 2008, 2010).

**Objectives:** ", To conduct a blinded 12-month pilot clinical trial of occlusal pit and fissure caries inhibition using the same CO<sub>2</sub>-laser irradiation conditions.

**Methods:** ", 20 subjects, average age 14 years (range 12–16), were recruited. At baseline, second molars were randomized into test and control groups, assessed by International Caries Detection & Assessment System (ICDAS-II) and SOPROLIFE Light-Induced Fluorescence Evaluator in daylight and blue-fluorescence mode (SOPROLIFE) (SOPRO-Acteon, La Ciotat, France). An independent investigator irradiated test molars with a CO<sub>2</sub>-laser, Pulse System Inc. (Model #LPS-500, Los Alamos, New Mexico), wavelength 9.6 $\mu$ m, pulse duration 20 $\mu$ s, pulse repetition rate 20Hz, beam diameter 800 $\mu$ m, average fluence 4.5 $\pm$ 0.5J/cm<sup>2</sup>, 20 laser pulses per spot, contra-angle handpiece. At 3-, 6- and 12-month recall, teeth were assessed by ICDAS and SOPROLIFE. All subjects received fluoride varnish applications at baseline and 6-month recall.

**Results:** ", All subjects completed 3-month, 19 6-month and 16 12-month recalls. ICDAS: At 3-month, average ICDAS score changes (mean $\pm$ SE) were for test -0.10 $\pm$ 0.14 and control molars 0.30 $\pm$ 0.18, for 6-month test -0.26 $\pm$ 0.13 and control 0.47 $\pm$ 0.16, and at 12-month -0.31 $\pm$ 0.15 and 0.75 $\pm$ 0.17, respectively. The results showed statistically significant differences for 6 and 12-month (P=0.001 and P<0.0001, Student t-test). SOPROLIFE: SOPROLIFE blue-fluorescence revealed (area of interest better/same/worse [+1/0/-1]) at 3-month statistically significant differences of average changes (mean $\pm$ SE) for test -0.55 $\pm$ 0.15 and for control molars 0.10 $\pm$ 0.16 (P=0.006, Student t-test); for SOPROLIFE daylight at all recalls mean changes were statistically significantly different (P between 0.009 and 0.02).

**Conclusion:** ", Specific CO<sub>2</sub>-pulsed-laser irradiation markedly inhibits caries progression in pits and fissures in comparison to fluoride varnish alone over 12 months. SOPROLIFE evaluations confirmed those ICDAS results. Supported by NIH/NIDCR grant DE09958.

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**Keywords:** Caries, Demineralization, Fluoride, Lasers and Remineralization

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