



# Laser Congress 2005

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**3<sup>rd</sup> Congress of the European Society  
for Oral Laser Applications • ESOLA**

**VI Congreso de la Sociedad Española  
de Láser Odontostomatológico • SELO**

**4<sup>o</sup> Congresso della Società Italiana  
di Laser in Odontoiatria • SILO**

**Laser: a Standard Therapy in Dentistry  
Limits – Complications – Solutions**

**May 19 – 21, 2005 • Barcelona, Spain  
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## ABSTRACTS

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nostic methods as culture, gram stain, microscopy and others for bacterial identification and counting. Relevant reduction of different bacteria by laser irradiation could be found in comparison with the control.

Results: On average of all test persons bacterial reduction was gained as follows: Laser 1, program 1a – 99.44894% reduction of all bacteria. Program 1b – 99.98082% reduction. Laser 2, program 2a – 98.86363% reduction; program 2b – 99.92681% reduction; program 2c – 99.28569% reduction. Subdivision of bacteria show a reduction of undifferentiated streptococci from 98.8 up to 100% and of staphylococci from 79.7 up to 100%. The degree of destruction depended on bacterial subtype as well as on mode of irradiation.

Conclusions: The investigation shows considerable reduction of biofilm colonised bacteria on rough titanium surfaces by diode laser irradiation. More than wavelength the mode of irradiation seems to be relevant for the degree of bacterial reduction.

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#### **Histological study on the effects of laser scaling in comparison to mechanical scaling with ultrasonic instruments. (LM and SEM evaluation)**

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Purpose: The removal of calculus and plaque is an essential component of a therapeutic approach to control periodontal disease. Laser scaling was recently introduced as an alternative to conventional scaling procedures. In this histological study, the effects of laser instrumentation of diseased root surfaces are compared to mechanical removal of calculus with ultrasonic instruments.

Material and Method: Areas of subgingival calculus were identified on twenty freshly extracted human teeth. Regions of calculus were marked and randomly divided into 2 equal areas. Control sites were treated with an ultrasonic instrument and test sites were cleaned using an Er, Cr:YSGG laser [p=1 w, air = 65%, water = 55%]. For light microscopic investigation, a plastic embedding technique was used to cut the undecalcified roots. Then the thickness of each section, was reduced to 40  $\mu$  and was evaluated histometrically.

Results: LM evaluation results: In laser group 19 teeth (95%) had craters which was significantly more than 8 (40%) in ultrasonic group. As well as the number of crater on each tooth (3.2 in laser and 1.1 in ultrasonic group). Average of craters area: The average of craters area in laser and ultrasonic groups was 0.004939 mm<sup>2</sup> and 0.000754 mm<sup>2</sup>, respectively. So between them, noticed, significant difference. Average of craters depth: The average of craters depth on laser and ultrasonic groups was 0.02624 mm and 0.01435 mm, respectively. This difference was statistically, significant too.

In laser group 13 teeth (65%) and in ultrasonic group, 20 samples (100%) had crack. This difference was statistically significant. The average of cracks number in laser group, was 5.3 and was 8.5 in ultrasonic group. This difference wasn't statistically, significant. SEM evaluation results: The ultrasonic group had more cracks than the laser applied group the difference was statistically significant. We observed that the surface structure was similar to normal tooth surface structure with a view to roughness.

Conclusion: Considering the consequences in findings, although we observed more craters in laser scaling but there is much less cracks in comparison to ultrasonic scaling. And we reached an ideal root surface. So Er, Cr:YSGG laser scaling needs more studies and clinical evaluations too.

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#### **Bacterial reduction in class II furcation after root debridement with or without Nd:YAG laser irradiation**

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The use of Nd:YAG laser for bacterial reduction as an adjuvant to non-surgical periodontal treatment has been approached in several studies. Furcation complex anatomy is responsible for comprised treatment results in this areas due to the lack of proper access for instrumentation showing the persistence of a pathogenic microbial flora. The purpose of this clinical trial, randomized, double-blinded was to evaluate the bacterial reduction achieved with the Nd:YAG laser associated to conventional treatment on furcation sites of 17 patients with chronic periodontitis. They received previous full mouth periodontal treatment except for the experimental sites. In a split mouth design study, 34 class II furcations were selected and divided in two groups. The 17 furcations of the control group underwent twice manual and ultrasonic

root debridement in weekly intervals. The test group received the same treatment as the control group followed by the Nd:YAG laser application (100 mJ/pulse, 1.5 W, 15 Hz, 60 sec.). The microbiological parameters – total number of anaerobic Colony Forming Units (CFU), Black pigmented CFU and the level of *A. actinomycetemcomitans*, *P. gingivalis* and *P. intermedia* – were determined at baseline, immediately and one month after the treatment. The results showed a significant reduction of total CFU for both groups immediately after treatment, but it was better for the test group. After one month the total CFU average increased but was still below pretreatment levels for both groups. The Black pigmented CFU and the level of *A. actinomycetemcomitans*, *P. gingivalis* and *P. intermedia* decreased significantly after the treatment but 30 days after, there was an increase almost equal to baseline levels for both groups. The Nd:YAG laser associated with conventional treatment promoted bacterial reduction on class II furcation immediately after its application.

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### Laser assisted periodontal tissue management and mucogingival therapy

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These case reports want to demonstrate the integration of former experiences in perio-and implantology with laser assisted soft tissue handling. The healing period is closely observed and documented radiographically.

**Materials and Methods:** As an alternative to traditional materials and methods, an Er, Cr:YSGG laser is used to cut soft tissue and decontaminate root surfaces and extraction sockets. In evidence based treatment approaches of the different periodontal GTR cases and in mucogingival therapy the laser now substitutes the scalpel blade, the periodontal hand instruments, root conditioning substances and the burr when hard tissues are involved.

**Results:** In mucogingival therapy which stands for the surgical and non surgical corrections of defects in morphology, position and/or the amount of soft tissue and underlying bone, the laser approach in these clinical cases results in shortened treatment time, uneventful healing, and early soft tissue stability and high patient acceptance. In traditional methods according to several studies it takes up from 6 to 12 months before final stability of the soft tissues is reached. A specific closed flap surgery approach for the laser crown lengthening procedure gives major control over the final alveolar crest position. While in several studies on traditional methods this desired result is hardly ever obtained. The laser's decontaminative capacities and reported biostimulation in periodontal regenerative treatments, accelerates the procedure itself and in the reported case report also the obtained bone augmentation documented radiographically. New attachment, however can only be identified histologically.

**Conclusion:** It is demonstrated that an Er, Cr:YSGG laser can be used as a substitute for the traditional instruments or an auxiliary device in mucogingival therapy and several periodontal treatment procedures. According to studies the laser approach in comparison to traditional treatments does not give any different clinical outcome. Though in these case reports the author observes shortened treatment time, patient comfort, stability of obtained result. A hypothetical advantage of the laser approach could be however demonstrated in case series with split mouth study model, as the a single case report in the hierarchy of evidence based medicine is on the lowest level of scientific significance.

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### Our experiences with a combination of diode laser decontamination and augmentation with ostim in the treatment of periimplantitis

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Over a period of 36 month 10 patients, which suffered by periimplantitis, were treated by a combination of Diode laser decontamination (wavelength 810 nm) and augmentation with OSTIM(R). After 6, 12, 18, 24 and 36 months x-rays, clinical indices and microbiological tests were done. The combination of laserlight application and OSTIM(R)-Augmentation of periimplantitis had a significant higher success rate than those received by conventional, not laser assisted methods. The clinical procedure is less difficult to learn and to apply than more complicated other augmentation and implant surface cleaning methods. In tow early cases problems were registered in the postoperative gingiva situation, this caused a discreet modification of the augmentation method.