

<sup>5</sup>Neurophysiology Research Center, School of Medicine, Shahid Beheshti University of Medical Sciences, ; Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, (Tehran - Islamic Republic of Iran)

<sup>6</sup>Institute of Biomedical Research, University of Tehran (Tehran - Islamic Republic of Iran)

Nerve tissue injuries may occur during various dental & routine surgical procedures and inferior alveolar nerve (IAN) is the most affected nerve in this area, considering the limitations of conventional treatments and encouraging results of previous studies on the effect of photobiomodulation (PBM) on nerve injuries, we aimed to assess the photobiomodulation effect of 810 nm diode laser on neurosensory recovery of crushed inferior alveolar nerve in rats by behavioral analysis. 36 male wistar rats were enrolled in the study in 3 groups of: IAN injury+laser treatment, IAN injury+sham laser and IAN without injury. before surgery neurosensory threshold of IAN in each group was recorded with von-frey filaments test. in groups of 1 and 2: IAN was exposed and crushed and in group 3: the rats had the sham surgery without injury. one day after surgery, laser therapy with 810 nm laser was done every other day in laser group and sensory thresholds of the nerve in all groups were monitored in one month period after surgery. after IAN injury in group of 1 and 2 we had the increase in the neurosensory threshold of the nerve that in laser group was recovered to the baseline in maximum of 15 days postsurgery, while in untreated IAN injury group we didn't observe complete recovery after 1 month post-surgery. PMB with 810 nm diode laser significantly enhanced neurosensory recovery of injured IAN in rats. According to the encouraging results of this study, PBM can be proposed as a novel and noninvasive treatment modality in neurosensory disturbances.

#### EVALUATION OF THE DEPTH OF CEMENTUM ABLATION BY Er:YAG LASER CAUSED BY DIFFERENT ENERGY LEVELS: A PRELIMINARY IN VITRO STUDY

Houeis Saad,<sup>1</sup> Heysselaer Daniel,<sup>1</sup> Nahas Paul,<sup>2</sup> Zeinoun Toni,<sup>3</sup> and Nammour Samir

<sup>1</sup>Dept. of Dental Science, Faculty of Medicine, University of Liege, Belgium

<sup>2</sup>Department of Restorative and Esthetic Dentistry, Lebanese University, Campus Rafic Hariri, Hadath, Beirut, Lebanon

<sup>3</sup>Department of Oral and Maxillo-Facial Surgery, Lebanese University, Campus Rafic Hariri, Hadath, Beirut, Lebanon

**Objective:** Evaluation of the depth of cementum ablation caused by different energy levels of the Er:YAG laser.

**Materials and methods:** 48 roots decay free, of upper and lower molars of human adults were used. The roots were scaled preliminary to the study by an ultrasound device, and randomly distributed to be analyzed after different energies levels delivered by Er-YAG laser (Fortona).

A chiseled tip was used under water irrigation and air cooling at a ratio of 70 to 30 as indicated by the manufacturer. The energies per pulse used were 80 mJ, 90 mJ, 100 mJ, and 120 mJ. The repetition rate was 15 Hz, and with an inclination of 15 to 30 degrees. One single passage was performed, at a speed of 1 mm per second.

**Results:** The energy higher than 120 mJ provoked the entire removal of the cementum layer.

**Conclusions:** The energy used for a superficial removal of the cementum has to be lower than 100 mJ.

#### THE USE OF THE ELECTROMAGNETIC FIELD AND LED LIGHT THERAPY IN REGENERATION OF PERIAPICAL BONE STRUCTURES OF THE TEETH IN THE ENDODONTIC TREATMENT

Jedlinski Maciej\*<sup>1</sup> and Lietz-Kijak Danuta<sup>2</sup>

<sup>1</sup>Pomeranian Medical University, Szczecin, Poland - ORCID 0000\_0003\_3446\_6119

<sup>2</sup>Independent Unit of Propaedeutic and Dental Physical Diagnostics, Faculty of Medicine and Dentistry, Pomeranian Medical University, Szczecin, Poland

Chronic periapical tissue inflammation is a disease characterized by a slow, long-lasting course. Despite the growing knowledge, the choice of treatment for chronic periapical inflammation, remains problematic. The aim of the study was to evaluate the effect of the combined physiotherapeutic method, including extremely low frequency electric and magnetic field (ELF-EMF) with high-energy LEDs to accelerate the regeneration of periapical tissues.

The study involved 69 patients with osteolytic lesions in the course of chronic periapical tissue inflammation. The subjects were of both sexes, aged from 16 to 82, divided into two groups: L- study group of 38 patients (45 teeth), treated with additional ELF-EMF and LED diodes therapy and K- control group, 31 people (38 teeth) treated without physical therapy.

The analysis revealed that an average of 36 physical procedures should be performed to achieve a satisfactory effect. The smallest number of procedures (29) required lesions in the lateral part of the maxilla, while in the lateral part of the mandible 31. The type of endodontic treatment had no effect on the final result. The fastest completed reconstructive process were observed in people under 35 y.o. In L group, the mean time to obtain bone regeneration was 8.5 weeks, when in the K group it was 44 weeks.

The research confirmed the effectiveness of physical therapy in the elimination of osteolytic foci.

ELF-EMF and high-energy LEDs is an auxiliary procedure useful in all age groups with the effect to accelerate the healing of osteolytic lesions caused by chronic inflammation of periapical tissues.

#### IN VITRO DETERMINATION OF THE CRITICAL pH DEMINERALIZATION OF HUMAN DENTAL ENAMEL IRRADIATED WITH Nd:YAG LASER ASSOCIATED WITH FLUORIDATED PRODUCT

Juvino Amanda Caramel,\* Zamataro Claudia Bianchi, Rabelo Thais Freitas, Kuchar Nielsen Grosko, Zanini Nathalia, Castro Pedro, and Zezell Denise

Center of Laser Application, IPEN/USP, São Paulo, Brazil

The use of fluoride products associated with high intensity laser irradiation are beneficial for dental caries prevention because it increases the surface area, improving the formation of fluorapatite (FA), which gives greater acid-resistance of enamel against bacterial acids. The objective of this study is to determine the critical pH of dental enamel treated with acid fluoride phosphate 12,300 µF/g (APF) and Nd:YAG laser 84 J/cm<sup>2</sup>, as there is no precedent to determine this pH. The study consisted of 4 groups (n=15): G1: Negative Control; G2: APF; G3: Nd:YAG; G4: APF + Nd:YAG. Each group was randomized into three subgroups (n=5) for pH cycling. The cycling was designed to simulate three conditions: below critical pH of enamel hydroxyapatite (pH 5.0); pH below critical for hydroxyapatite and fluorapatite (pH 4.5); condition further below the critical situation to investigate extent of acid resistance of the enamel (pH 4.0). The samples were

analyzed by scanning electron microscopy (SEM), Fourier infrared spectroscopy (FTIR) and solutions were quantified fluoride (specific ion electrode) and phosphate (colorimetric method). In SEM and FTIR (phosphate band) at pH 5, only the APF and APF + Nd:YAG groups did not present demineralization. At pH 4.5, only the APF + Nd:YAG group was integrated. At pH 4, APF + Nd:YAG showed signs of mild demineralization while the other groups showed aggressive signals. It is concluded that the irradiated fluorapatite has critical dissolution pH different from fluorapatite formed only with the application of fluorine.

### RESEARCH-BASED FUTURE WITH Nd:YAG AND Er:YAG LASERS IN INFLAMED PERIODONTAL TISSUE

Grzech-Leśniak Kinga\*

Dept. of Oral Surgery, University of Wrocław, Poland

Periodontal disease represents oral inflammatory infections initiated by oral pathogens and their endotoxins which cause destruction to tooth supportive tissues. Conventional non-surgical methods in the treatment of periodontal pockets have their limitations, including difficulties in access of manual or ultrasonic instruments to deep pockets, furcations or grooves. Additional use of laser treatment has been advocated as an efficient supplement to non-surgical treatment. Several types of lasers offer new technical modalities for the decontamination of periodontal pockets and root surfaces in nonsurgical treatment for effective ablation and strong bactericidal and detoxificative effects. Among laser types, erbium-doped:yttrium-aluminium-garnet (Er:YAG) laser and neodymium-doped:yttrium-aluminium-garnet (Nd:YAG) laser appear to be the most suitable to be used in periodontal treatment. Nd:YAG can eradicate periopathogens and can cause significantly higher reduction of the gingival index, probing pocket depth and clinical attachment level when used as an adjunct to conventional debridement. Er:YAG laser removes deposits and biofilm thoroughly, creating biocompatible surfaces more conducive for re-attachment than those obtained with conventional methods and can be effectively used to reduce the number of bacteria residing in biofilms. Literature has shown that treatment with high-power lasers can result in regeneration of the cementum and bone and new connective tissue attachment. The concept of periodontal laser treatment is based on reducing bacterial penetration in the infected periodontal pocket. Biological effects including bactericidal and detoxification effects with laser therapy may help accelerate wound healing and tissue regeneration.

### LLLT AND BURNING MOUTH SYNDROME

Marino Sonia, Porrini Massimo, Rossi Margherita, Bosotti Moreno, Bossi Eleonora, and Spadari Francesco

Department of Biomedical, Surgical, and Dental Sciences-University of Milan-Unit of Oral Pathology and Medicine-Maxillo-Facial and Odontostomatology Unit-Ospedale Policlinico, Fondazione IRCCS Ca'Granda.

Burning Mouth Syndrome (BMS) is considered an oral disease with uncertain etiology. It is characterized by oral burning symptomatology, without clinical signs. Pathogenetical hypotheses would indicate a possible neuropathic suffering as a potential cause. However, psycho-allogenic disorders are increasingly considered. To date, therapeutic indication for chronic oral burning are still unclear. From January to October 2017, at the oral pathology and medicine unit of University Hospital of Milan, a monocentric clinical

case-control study was conducted to evaluate the effectiveness of Low Level Laser Therapy LLLT in patients with chronic BMS.

Fifty-two BMS patients, were randomly divided into 2 groups: a test group, that received real LLLT therapies (300 mW power, 635 nm wavelength); a control group, that received inactive/placebo laser treatments. Effectiveness was assessed with Numerical Rating Scale (NRS), McGill Pain Questionnaire-Short Form (MGPQ-SF), Hamilton Anxiety Test (HAM-A) and Hamilton Depression Test (HAM-D).

Pain and anxiety scores at NRS, MGPQ and HAM-A showed to be significantly lower in treatment group according with Independent Sample tTest,  $p < 0.05$ .

Patients were followed-up over the following 12 months and improvements on average kept statistically unchanged.

Based on our preliminary experience, we can state LLLT should be considered an effective tool in relieving from oral burning over time and healing peripheral neuropathic pains.

### DIFFERENT PROTOCOLS OF PHOTOBIMODULATION FOR MEDICATION-RELATED OSTEONECROSIS OF THE JAW

Mohsen Ahmed,\* Tenore Gianluca, Palaia Gaspare, Montori Alessandra, Rocchetti Federica, Aprea Leandra, Del Vecchio Alessandro, and Romeo Umberto

Department of Oral Sciences and Maxillofacial Surgery, Sapienza University of Rome - Master Laser in Dentistry in partnership with EMDOLA (Director. U. Romeo), Rome, Italy

**Background:** Medication-related osteonecrosis of the jaw (MRONJ) is still without consensus on a standard treatment since the first report in 2003. The clinical management of MRONJ is comprised of medical, surgical approach or combined.

**Objective:** This study aims to present our treatment protocols of Photo-biomodulation (PBM) as an adjunct to the management of patients with MRONJ.

**Materials and methods:** A multidiodic laser (Lumix C.P.S. Dental, FISIOLINE, Verduno, Cuneo, Italy) emitting 650 nm, 810 nm, and 910 nm wavelengths simultaneously was used with power of 0.6W and spot diameter of 8 mm in scanning mode for 15 mins (per session). After a confirmed diagnosis of MRONJ, PBM was applied in three different aspects with antibiotic coverage. In treatment modality (a), PBM (5 sessions per cycle) was applied as an analgesic and anti-inflammatory as the surgical approach was not feasible. In treatment modality (b), it was applied as an adjunct (4 sessions per cycle) to the surgical approach with L-Platelet-Rich Fibrin (PRF). In treatment modality (c), the PBM (8 sessions per cycle) was applied in patients with osteonecrosis and bone exposure to support spontaneous sequestration.

**Results:** In modality A, a significant reduction of pain and inflammation was observed. In modality B, most of the patients showed complete healing after the surgical approach with L-PRF. In modality C, in some patients spontaneous sequestration occurred with complete healing without the need for surgical intervention.

**Conclusions:** The utilization of PBM in different ways according to the patient clinical situation may be a promising adjunctive modality for treating this challenging disease.

### LASER TREATMENT OF ORAL LEUKOPLAKIA. WHERE ARE WE NOW?

Monteiro Luís

Oral Surgery and Oral Medicine Department, Post-graduation Programme in Oral Laser Applications Department, University Institute of Health Sciences, CESPU, Gandra—Paredes, Portugal