

laser

international magazine of laser dentistry

4²⁰¹⁰



| research

Effect of low level laser therapy during Rapid Maxillary Expansion

| case report

Minimally invasive dentistry (MID) concepts for the caries treatment by Er:YAG laser

| meetings

A very successful 20th Annual Congress of the DGL in Berlin

0277113



When I bought my Fidelis my colleagues told me Fotona never stops innovating. They never stop pushing the boundaries of laser dentistry. How right they were! I've just started working with my new set of **Preciso endodontic and Varian periodontic** fiber tips. Both are fully compatible with the **AT/HT Fidelis Er:YAG laser**. I can now choose from almost 20 fiber tips to make my hard and soft tissue treatments less invasive, more effective and to reduce my patients' chair time.



Fotona user since 2000

NEW

Fotona
choose perfection

AT Fidelis Highest Performance in Dental Care

Revolutionizing Dentistry

The AT Fidelis is Fotona's newest generation in dental laser systems. With dentistry's two best lasers in one system, you can provide the ultimate in dental care! AT Fidelis' Er:YAG, the world's fastest drilling, hard tissue laser, features broadened soft tissue surgery capabilities with the finest low pulse, high repetition rates. Its top-of-the-line Nd:YAG laser provides trouble-free endodontic, surgical and aesthetic procedures. Both lasers feature VSP technology, enabling controlled and constant laser intensities, in an unprecedented five, selectable pulse duration modes.

Convenience and Safety First

The AT Fidelis includes the newest Comfort Mode touch screen navigation system. Its pre-set treatment programs and data storage facility offer ultimate treatment management. Selecting the right treatment settings has never been easier!

Its Advanced Mode enables users to quickly fine-tune procedures through its all-encompassing interface. The AT Fidelis offers the industry's only Tissue effect Graphical Interface (TeGI) which provides precise graphical representations of laser-tissue effects as treatment settings are changed. For improved user comfort, the AT Fidelis features a wireless footswitch. While ESC Technology allows you to perfect water and air spray mixes, the AT Fidelis does not require external air or water sources, making it uniquely mobile.

Unlimited Possibilities!

Apart from providing the widest range of hard and soft tissue dental treatments, you can also upgrade your system with aesthetic upgrade packages. This enables you to provide aesthetic treatments ranging from facial laser hair removal and rejuvenation treatments to facial vascular treatments.



The Highest Performance, Best Made Laser Systems in the World

Put a smile on your patients' faces!
Visit www.fotona.com now!

It is **Christmas** time



Prof Dr Norbert Gutknecht
Editor-in-Chief

Lights are shining in different colours in different wavelengths in different places almost all over the world.

In the past year 2010 we have been celebrating the 50th anniversary of lasers in dentistry which was the overall high light for the use of lasers in the different fields of dentistry. One flash-light during this highlight was the 12th WFLD (World Federation of Lasers Dentistry) Congress in Dubai being embedded in the largest Dental exhibition in the middle East. Further more a big number of high class national laser conferences around the world have been completing this shining impression. This has been reflected in a rising number of laser users due to the growing acceptance of this technology within the dental society.

The year 2010 was also filled with highlights of improved and new dental laser systems helping dedicated laser dentists to successfully improve their daily service towards their patients.

I wish all our dear laser users and laser interested colleagues a peacefull Christmas time and a bright shining New Year.

A handwritten signature in black ink, appearing to read 'Gutknecht', written in a cursive style.

Prof Dr Norbert Gutknecht
Editor-in-Chief



| editorial

- 03 It is **Christmas** time
| Prof Dr Norbert Gutknecht

| research

- 06 Salivary flow rate before and after **low level laser therapy**
| Sonja Pezelj-Ribari , Nataša Gržeti , Miranda Muhvi Urek, Irena Glazar, Davor Kuis
- 10 Effect of low level laser therapy during **Rapid Maxillary Expansion**
| Eyad Hamade, Rwaida Saimeh, Mina Mazandarani, Maziar Mir, Norbert Gutknecht

| case report

- 14 Minimally invasive dentistry (MID) concepts for the **caries treatment** by Er:YAG laser
| R. Kornblit, U. Romeo, A. Polimeni
- 18 Diode laser (810 nm) applications in **clinical Orthodontics**
| Dr Deepak Rai, Dr Gurkeerat Singh

| user report

- 24 Use of the Er,Cr:YSGG and Er:YAG lasers in **restorative dentistry**
| Prof Dr Giuseppe Iaria, Rolando Crippa, Giovanni Olivi, Matteo Iaria, Stefano Benedicenti
- 28 The use of lasers in **periodontal treatment**
| Howard Golan

- 32 **Photosensitizers** in dentistry
| Dr D. Koteeswaran, Dr C. Pravda, Dr Ekta Ingle

| meetings

- 34 A **very successful** 20th Annual Congress of the **DGL** in Berlin
| Dr Georg Bach, Leon Vanweersch
- 38 **First year of AALZ** Greece full of activities!
| Dimitris Strakas
- 40 **“Light Time—Good Time”**
| Giada Gonnelli
- 42 **Revolutionary laser system** was presented in Israel
| Georg Isbaner
- 44 **International events 2011/2012**

| laser

- 46 **“Lasers in Dentistry”**
| Leon Vanweersch, Dominique Vanweersch

| news

- 48 **Manufacturer** News

| about the publisher

- 47 | submission guidelines
- 50 | imprint





Just 115 x 90 x 28 mm: the claros pico®

“elexxion’s latest development is absolutely brilliant.

It’s exactly what practitioners like us need!”

It’s here! elexxion, the global technology leader for high-quality dental lasers, is presenting the claros pico® for professionals.

The claros pico® is an absolutely full-featured, professional-standard dental laser that comfortably fits in one hand. With its lithium ion technology, it offers all the mobility that modern practices demand.

What does that mean for you on the front line? With the claros pico® you’ll be getting a diode laser that opens up new treatment possibilities in endodontics, periodontics and soft tissue surgery at the “push of a button”. You’ll be able to treat numerous indications more effectively - and give your practice a new competitive edge in the process. And, needless to say it boasts a laser bleaching function that your assistants can use on their own.

For more information about the brand new claros pico® please visit our website.

elexxion AG
Schützenstrasse 84
78315 Radolfzell
Germany

www.elexxion.com

elexxion AG

Dental-Laser

Salivary flow rate before and after low level laser therapy

Authors_Sonja Pezelj-Ribari , Nataša Gržeti , Miranda Muhvi Urek, Irena Glažar, Davor Kuiš, Croatia

_Introduction

The therapy performed with lasers is often called low level laser therapy (LLLT) or just laser therapy. Several other names have been given to these lasers, such as soft laser and low intensity level laser whereas the therapy has been referred to as bio-stimulation. Low level laser therapy is a non-invasive, painless and athermal therapy, based on biological stimulative-regenerative, anti-inflammatory and analgesic effects. LLLT also appears to have a virustatic and bacteriostatic effect. Some explanation of analgesic effect of LLLT are: it increases ATP production, improves local microcirculation, increases lymphatic flow, increased serotonin and endorphins, increased anti-inflammatory effects through reduced prostaglandin synthesis.¹

In vitro data suggest that LLLT facilitates collagen synthesis, keratinocyte cell motility, and growth factor release and transforms fibroblasts to myofibroblasts.¹⁻⁴

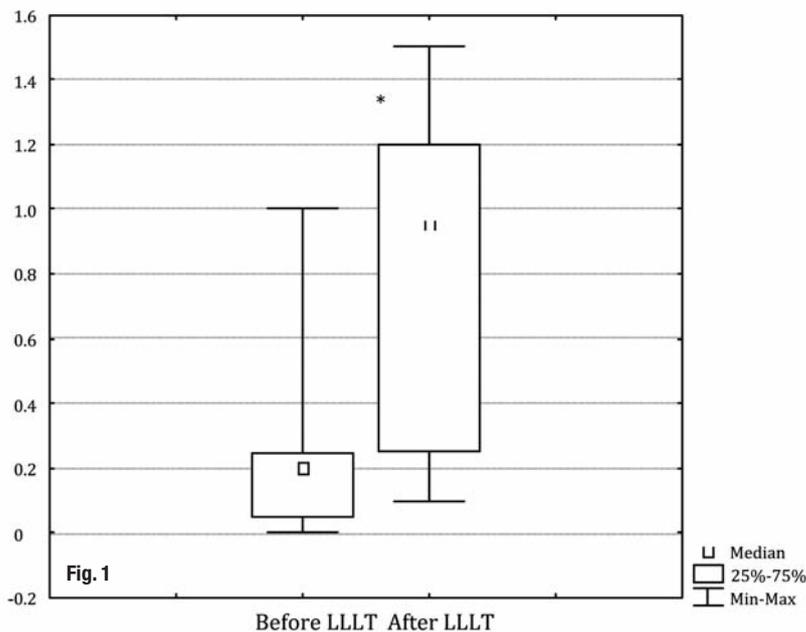
Low level laser light is compressed light of a wavelength from the cold, red part of the spectrum of electromagnetic radiation. It is different from natural light in that it is one precise color; it is coherent, monochromatic and polarized. These properties allow laser light to penetrate the surface of the skin or mucosa with no heating effect and no damage. The most commercially available lasers are the helium-neon (He-Ne), emitting wavelengths of 632.8 nm, and the semiconductor diodes, such as gallium-arsenide (GaAs) and gallium-aluminum-arsenide (GaAlAs), emitting wavelengths of 650 and 830 nm, respectively.⁵

LLLT has also been used to stimulate bone formation by increasing osteoblastic activity, vascularization, organization of collagenous fibers and ATP levels.⁵

In recent studies, many authors have reported significant pain reduction with LLLT in acute and chronic musculoskeletal pain and also many authors have reported significant pain and symptoms of inflammation reduction with LLLT in radiotherapy-induced oral mucositis and xerostomia in oral cancer patients, and severe pain in patients submitted to hematopoietic stem cell transplantation.^{6,7}

In our previous research we investigated therapeutic response by determining the level of proinflammatory cytokines TNF-alpha and IL-6 in whole unstimulated saliva in patients with denture stomatitis before and after LLLT.⁷

Fig. 1 Salivary flow rate before and after LLLT. * Denotes significant difference between groups $P < 0.001$. LLLT—low level laser therapy.



Xerostomia is frequently associated with decrease in the flow rate of saliva. The measurement of salivary flow is basic to understanding of the process of secretion and to our assesment of conditions and disease which lead to salivary hypo-function.⁸ Xerostomia is not a disease, but it may be a symptom of various medical conditions, a side effect of a radiation to the head and neck, or a side effect of a wide variety of medications. It may or may not be associated with decreased salivary gland function. Xerostomia is often a contributing factor for both minor and serious health problems. It can affect nutrition and dental, as well as psychological, health. Some common problems associated with xerostomia include a constant sore throat, burning sensation, difficulty speaking and swallowing, hoarseness and/or dry nasal passages.⁹ The management of xerostomia will include the identification of the underlying cause. For many patients little can be done to alter the underlying cause. For those whose xerostomia is related to medication use, effective symptomatic treatment may be important to maintain compliance with their medication regime. Symptomatic treatment typically includes four areas: increasing existing saliva flow, replacing lost secretions, control of dental caries and specific measures such as treatment of infections.¹⁰

Some investigators had effect of LLLT on mucositis and temporomandibular joint dysfunction.^{11,12} LLLT may also have an effect on salivary glands so it is important to know the effects of this therapy on parotid and submandibular gland tissues.

The aim of this study was to investigate is it LLLT able to increase salivary flow rate.

_Materials and methods

A sample consisting of 20 consecutive subjects were selected on a voluntary basis from patients who presented for diagnosis and treatment of xerostomia at the Oral Medicine Unit of the Medical Faculty University of Rijeka. All subjects were in-

formed of the aims and procedures of the research, as well as of the fact that their medical data would be later used in the analysis. The Ethics Committee of Medical Faculty of Rijeka (University of Rijeka) approved this study protocol. Only those subjects who have given a written permission in form of an informed consent were included. Each subject completed a questionnaire for demographic and health information.

The clinical examination was performed according to the standard clinical criteria. We mesured the whole saliva.

After initial evaluation and diagnosis, the patients were divided in two groups:
Group 1: before receiving LLLT
Group 2: after receiving LLLT

Xerostomia may be diagnosed with the aid of salivary collection tests (sialometry). Salivary flow rate should be measured by standardized techniques. As salivary secretion fluctuates between minimal and maximal rates during the day, it is important to assess the salivary secretion consistently at an established time of the day, in order to properly examine the evolution of the condition and its treatment in every patient. Whole saliva can be collected by spitting, blotting, suctioning or draining the oral fluid. The normal flow rate for unstimulated, "resting" whole saliva is 0.3 to 0.5 ml/min.; for stimulated saliva, 1 to 2 ml/min. Values less than 0.1 ml/min. are typically considered xerostomic, although reduced flow may not always be associated with complaints of dryness.⁹ We measured the whole saliva.

The whole unstimulated saliva was collected between 9:00 and 11:00 am using standard techniques described by Navazesh.¹³ Participants were refrained from eating, drinking, using chewing gum, etc, for at least 1,5 hours prior to evaluation. Saliva specimens were collected from each participant in sitting position, before and after LLLT. Samples were obtained by requesting subjects to swallow first, tilt their head forward, and expectorate all

Tab. 1 _Descriptive statistics of salivary flow rate before and after LLLT. (S.D.—standard deviation; LLLT—low level laser therapy)

Group	Mean (ml /5 min.)	S.D. (ml /5 min.)	Median (ml /5 min.)	Minimum (ml /5 min.)	Maximum (ml /5 min.)	Lower Quartile (ml /5 min.)	Upper Quartile (ml /5 min.)
Before LLLT	0.235	0.272	0.20	0.0	1.0	0.05	0.25
After LLLT	0.825	0.504	0.95	0.1	1.5	0.25	1.2

saliva into 50 ml tubes for 5 min. without swallowing. The final volume and flow rate of saliva were determined gravimetrically (Analytical Balance, Model WTS-6001, Sartorius Corp., Long Island, NY, USA). Entire procedure was repeated after the final treatment, after four weeks. 20 subjects were treated five days in week for four consecutive weeks with a 685 nm GaAlAs (gallium-aluminium-arsenide) diode laser (Medio LASER Combi Dental, Iskra Medical, Ljubljana, Slovenia). The output of the laser was measured in 7 minutes and found to be practically constant. The laser outputs were controlled weekly using analogue power meters provided by the manufacturers. During each session, the laser treatment was delivered to the tissue by a straight optical fiber with a 1.2 mm spot size. The treatment areas, each one being a 1 cm² surface. Laser applied on parotid glands with 10 minutes (685 nm, continuous wave, 30 mW output power, 3.0 J/cm²). The treatment time (t) for each application point was given by the equation: $t(\text{sec}) = \frac{\text{energy (J/cm}^2) \times \text{surface (cm}^2)}{\text{Power (W)}}$. The average energy density delivered to the treatment areas was 3.0 J/cm². The effect of laser light was evaluated after the final treatment.

Results

The sample included 20 patients (15 women and 5 men), mean age 60.25±6.27.

Salivary flow rate were measured before and after LLLT and the results are presented in table 1. Salivary flow rate after LLLT were significantly greater than salivary flow before LLLT ($P < 0.001$) (Fig. 1).

Statistical analysis

Statistical analysis of data was performed using Statistica for Windows, release 6.1 (StatSoft, Inc., Tulsa, OK). The Kolmogorov-Smirnov normality test was applied to our data. The results were compared using nonparametric Wilcoxon signed-rank test. Statistically significant difference was defined at $P < 0.05$.

Discussion

LLLT is a non-invasive light source treatment that generates a single wavelength of light. It emits no heat, sound or vibration. Lasers with different wavelengths, varying from 632 to 904 nm, are used in the treatment of musculoskeletal disorders. This non-invasive nature of laser biostimulation has made lasers a choice of therapy. In our previous investigation we investigated the effect of LLLT on patients with denture stomatitis.⁷ We found a statistically significant reduction in the salivary levels of proinflammatory cytokines, TNF-alpha and IL-6

in patients with DS following treatment for 4 weeks with LLLT. This results may suggest that LLLT may be an efficacious choice of therapy in patients with DS. Simoes A et al.¹⁴ made a clinical case study report on dry mouth symptoms in a patient with Sjogren's syndrome. The patient was treated with LLLT. A diode laser (780 nm, 3.8 J/cm², 15 mW) was used to irradiate the parotid, submandibular, and sublingual glands. The salivary flow rate and xerostomia symptoms were measured before, during, and after LLLT. Dry mouth symptoms improved during LLLT. In this study we found that the incidence in xerostomia is significantly reduced in patients treated with LLLT.

Xerostomia is not a disease but can be a symptom of certain diseases. It can produce serious negative effects on the patients quality of life. Saliva is necessary for carrying out the normal functions of the oral cavity, such as taste, speech, and swallowing. Depending on duration and extent of salivary deficiency, severe changes of the oral mucosa and teeth will develop. Treatment of xerostomia may be performed causally (withdrawal or exchange of drugs inhibiting salivary secretion) but will often only be possible as a symptomatic therapy. For this purpose there are available today saliva surrogate solutions ('artificial saliva') and substances that stimulate the secretion of the still intact salivary gland parenchyma. In this preliminary study, with a small sample size, we found a statistically significant improvement in the salivary flow rate after the therapy with low level laser.

Conclusion

Treatment with LLLT was an effective method to improve the quality of life of patient with xerostomia as an noninvasive, quick, safe, non-pharmaceutical intervention.

Editorial note: The literature list can be requested from the author.

_contact

laser

Prof Sonja Pezelj-Ribari, PhD, DDS
 Department of Oral Pathology and Periodontology
 School of Dentistry, Medical Faculty
 University of Rijeka
 Croatia
 Bra e Branchetta 20
 E-mail: sonja.pezelj-ribaric@medri.hr
 Tel.: +385 51 345-645
 Fax: +385 51 345-630

sirona.

Notice:

Say goodbye
to stress!

Laser dentistry
with Sirona.

OK

Newcomers welcome.
The new SIROLaser Xtend

Relaxed patients. Easy treatment. Improved post-operative healing. Is this all just wishful thinking? Actually, it's stress-free – and at your fingertips. Both the SIROLaser Advance and the upgrade-ready SIROLaser Xtend offer you all the benefits of modern laser dentistry. For periodontology, endodontics, surgery ... the list goes on! **Enjoy every day. With Sirona.**

Laser Stop

www.sirona.com

The Dental Company

sirona.