

laser



international magazine of laser dentistry

2²⁰¹⁵



| research

Preventive approach in paediatric dentistry using Er:YAG laser

| case report

Conservative management of a large salivary calculus in the submandibular gland

| industry

The new BIOLASE: Practice growth 'assured'

027113

LiteTouch Er:YAG Laser-in-Handpiece Available now also with Low Energy Options

GENTLE TREATMENT

Energy settings: 20mJ or 40mJ, Frequencies of 10-50 Hz

- Access a larger spectrum of dental procedures
- Minimal ablation – resulting in enhanced tissue preservation
- Preventive treatments
- Extra selective treatments
- Fine coagulation of soft tissue and nerve ends (bleeding control)
- Reduced patient discomfort



LITE TOUCH™

Er:YAG Laser-in-Handpiece

Dentists' Choice for Hard & Soft Tissue Procedures

To learn more about our innovative technology solutions,
contact: dental@syneron.com, www.synerondental.com



Wavelengths



Prof. Dr Norbert Gutknecht
Editor-in-Chief

Dear readers,

As sunlight consists of different wavelengths and can only in this composition of wavelengths serve the vital biological requirements, future-oriented laser users have to learn that, although the application of a wavelength is important and good, the same wavelength cannot fulfil all biological and therapeutic demands. Based on this insight, the future of laser dentistry will be associated with the combination of specific wavelengths.

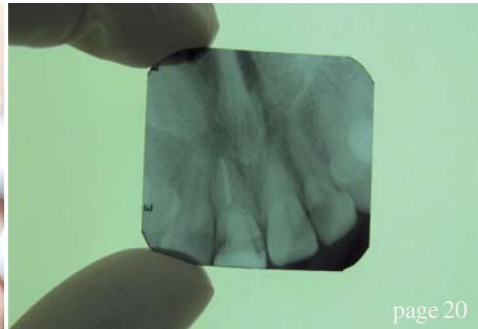
Success or failure of a laser treatment is inseparable from the selection of the correct wavelength. The better the biophysical knowledge of the laser user, the better he or she would be able to select the wavelength to target the intended tissue, triggering the desired interaction. Since there are different tissue types in the oral cavity—in areas of little space, such as in periodontal pockets—it may be necessary to involve two different wavelengths in the treatment planning. This knowledge is increasingly used by manufacturers of laser devices not only to extend the indication spectrum of their devices, but also to optimise specific treatment procedures by combining two or more wavelengths. The combination and application of different wavelengths will thus be one of the main themes at this year's international annual congress of the Deutsche Gesellschaft für Laserzahnheilkunde (German Society for Laser Dentistry) and will be reflected in lectures and workshops, as well as in the dental exhibition.

For the summer months ahead, I wish you much pleasure in enjoying the different wavelengths of sunlight.

Kind regards,

A handwritten signature in black ink, reading "Norbert Gutknecht".

Prof. Norbert Gutknecht
Editor-in-Chief



| editorial

- 03 Wavelengths
| Prof. Dr Norbert Gutknecht

| research

- 06 Preventive approach in paediatric dentistry
using **Er:YAG laser**
| Ani Belcheva *et al.*

| case report

- 16 **Conservative management** of a **large salivary calculus** in
the submandibular gland
| Dr Habib Zarifeh *et al.*
- 20 **Laser-assisted** osseointegration with a **diode laser** in
Type I implant placement
| Dr Maziar Mir *et al.*
- 24 **Treatment** of mucocoele with the **Er:YAG laser**
| Foteini Papanastasopoulou

| industry

- 28 The **new BIOLASE**: Practice **growth 'assured'**
| Sierra Rendon

| practice management

- 30 Gain **power** at your **laser** clinics!
Process
| Dr Anna Maria Yiannikos

| events

- 34 **Biggest IDS** of all time in Cologne
| Koelnmesse
- 38 The **DGL** invites to its
24th International Annual Meeting

| news

- 26 **Manufacturer** News international
- 40 **News** international

| DGL

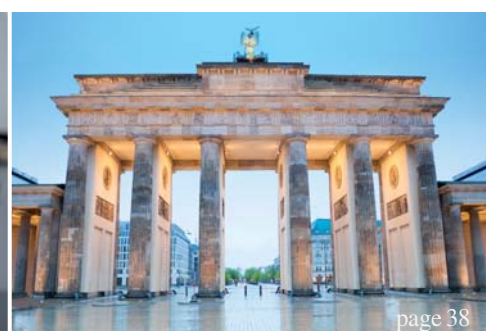
- 43 Wellenlängen
| Prof. Dr. Norbert Gutknecht
- 44 **Manufacturer** News germany
- 36 Die **DGL** lädt ein zur **24. Internationalen Jahrestagung**
- 48 **News** germany

| about the publisher

- 50 | imprint



Cover image courtesy of BIOLASE Europe GmbH,
www.biolase.com
Original Background: © Oriontrail
Artwork by Sarah Fuhrmann, OEMUS MEDIA AG.



NEW

The Essential Addition for Your Successful Practice



The WaterLase iPlus version 2.0, from the global leader in dental lasers, expands and enhances the treatments you can offer your patients, reflecting the almost universal interest in practice growth.

- ★ Delight patients with gentle, minimally-invasive procedures
- ★ Expand your treatment offerings with REPAIR™
- ★ Enable faster healing times and improved comfort*
- ★ All-new SureFire™ YSGG Delivery System, the new gold standard in all-tissue laser delivery systems

WaterLase is the all-tissue laser trusted by the most dentists worldwide, with over 27,300,000* patients treated. Its unrivaled clinical versatility – with the ability to treat hard tissue, soft tissue and bone – gives you unmatched results in treatment outcomes and outstanding ROI... making it the essential addition for your successful practice.

*Data on file.

REPAIR

Regenerative Er,Cr:YSGG Periodontitis Regimen



Courtesy of Dr. Rana Al-Falaki

Introducing
the New and Improved
WaterLase[®] iPlus[™]
Version 2.0

SureFire[®]

REPAIR



Grow your practice with WaterLase.
Contact your BIOLASE distributor today.

THE NEW
BIOLASE
Global Leadership in Lasers

Practice Growth. Assured.

BIOLASE Europe GmbH Paintweg 10A, 92856, Floss, Germany • +0049 9603 8080 • biolase.com

Preventive approach in paediatric dentistry using Er:YAG laser

Author Ani Belcheva, Maria Shindova & Georgi Tomov, Bulgaria

Modern dentistry has focused on preventive methods and conservative techniques to apply less-invasive procedures to tooth structure.¹ Awareness towards the importance of preserving tooth tissue combined with a patient-friendly approach is becoming self-evident. It has been shown that operative dental treatment often leads to an increasing scale of more surgical and invasive treatments. Whenever possible, tissue should be preserved, and invasive treatment should be kept to a minimum. The best way to ensure maximum life for the natural tooth is to respect the healthy tissue and protect it from being damaged by using minimally-invasive techniques in restorative dentistry.²

Preventive dentistry

Preventive dentistry is a branch of dentistry that deals with the preservation of healthy teeth and gingiva and the prevention of dental and oral disease. The field involves dental procedures, materials and programmes

that prevent the occurrence of oral diseases or retard their further progression. There are three levels of preventions:

Level 1: Primary prevention

The pre-pathogenic stage employs measures that forestall the onset of the disease to reverse the progress of the initial stage, or to arrest the disease process before treatments become necessary.

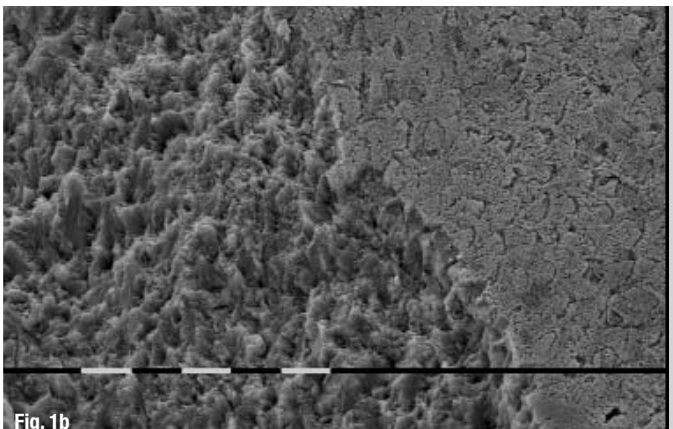
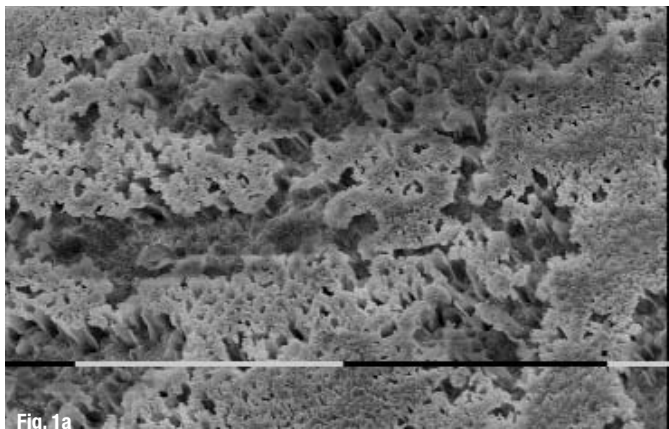
Level 2: Secondary prevention

The pathogenic stage employs treatments methods, to terminate a disease process and to restore tissues as near normal as possible.

Level 3: Tertiary prevention

At this level, prevention employs measures that are necessary to replace much tissue and to rehabilitate patients to the point that functionality resembles its natural condition, as much as possible, after the failure of the secondary preventions.

Figs. 1a & b Acid etching of hypoplastic enamel showed patchy loss of surface tooth structure without evidence of uniform etching patterns (a). The laser treated surfaces showed that Er:YAG radiation caused an uniform roughness of the enamel for HE (b) teeth (magnification x 3,000).



In recent years, the development of new technologies made it possible to prevent complications and to conduct treatments with minimal intervention. Laser treatment with its considerable variety of biological actions and high therapeutic effectiveness is used widely both in medicine and dentistry. Erbium lasers could be used in large array of both hard and soft tissue procedures performed in paediatric dentistry.³ Many of these procedures may be treatments that require a specialist. However, when Er:YAG lasers are being used their efficacy and special characteristics allow general practitioners to perform and complete a wide range of these procedures. The advantages of Er:YAG laser are associated with a process of ablation, decontamination, minimal invasion and analgesia, thus providing clinical solutions to what once was attribute solely to experts. The purpose of this study is to describe the scientific approaches to prevention by using Er:YAG lasers.

Er:YAG laser characteristics and advantages

Ablation

Er:YAG laser has a wavelength of 2.94 μm , which matches exactly the absorption peak of water and which is also absorbed by hydroxyapatite. Erbium laser radiation is very efficient in removing both dentin and enamel, limiting the laser effect on these tissues to a superficial layer of a few micrometres. The overheated water abruptly vaporises and the so released vapour carries away surrounding broken tissue fragments in a thermo-mechanical ablation process.^{4,5}

In general, there is a linear relationship between crater depth or removed volume and applied energy density.¹⁵ Water mist is needed to avoid thermal side effects and for pain control.⁶ The way to remove hard tissues with Er:YAG without overheating prevents the pulp. Er:YAG laser ablation works in a minimally-invasive way, removing only the damaged tissues. It prevents destruction of sound structures and gives opportunity for a fast healing process.

Decontamination

The bactericidal effect of laser light was advanced to be one of its beneficial effects. The wavelengths well-absorbed in water have a good bactericidal effect even at low-energy density output levels, starting at 0.3 J/cm², without excessive temperature elevation.⁷ Due to its bactericidal effect combined with the reduced pain sensation during its application, the Er:YAG laser was a very promising tool for cavity preparation in Paediatric Dentistry and in Dentistry in general. Antimicrobial resistance or drug resistance is a problem spread and discussed worldwide. It is a major concern of the WHO. The ability of Er:YAG laser to establish decontamination is a solution for effective treatment and prevention of future complications.



Fig. 2a



Fig. 2b



Fig. 2c

Analgetic effect and pain perception

As Er:YAG lasers can be used to prepare cavities without thermal damage and the systems availability on the market offers a high ablation efficiency, it was of interest to investigate the patients' subjective perception of this treatment method: Cavity preparation with the help of Er:YAG laser was found to be more comfortable in the patients perception than mechanical treatment in at least 80 per cent of the cases.^{10, 11}

One of the parameters partly explaining the absence of pain perception is the difference in tooth vibration

Figs. 2a–c_ Maxillary frenectomy with LiteTouch, Er:YAG laser.



Fig. 3a



Fig. 3b



Fig. 3c

Figs. 3a–c Lingual frenectomy of 7-year-old boy with Lite Touch, Er:YAG laser.

speed caused by Er:YAG laser versus high-speed drill. Mean vibration speed during laser cavity preparation reaches $166 \pm 28 \mu\text{m}/\text{second}$, at a characteristic frequency of 230 Hz, whereas the high-speed drill induces a 100 times higher vibration speed of $65 \pm 48 \text{ mm}/\text{second}$, at 5 kHz. In addition, this much higher frequency has its spectrum near the peak sensitivity of hearing, as a potential factor of discomfort and pain provocation.¹²

A patient may suffer progression of oral disease if treatment is not provided on time because of age, behaviour, inability to co-operate, disability, or medical

status. Postponement of dental care can result in unnecessary pain, discomfort, increased treatment needs and costs, unfavourable treatment experiences, and diminished oral health outcomes. Using Er:YAG laser in patients with fear or phobia of dental treatment is a real opportunity to treat them and show an alternative well-accepted method to overcome the barrier of dental care. With the help of Er:YAG laser, patients realise that there is a way to preserve their teeth without pain, which will encourage them to take care of their oral health more frequently and at the end only for prevention.

Application of Er:YAG laser in hard tissues

Primary Caries Prevention

Laser is becoming common in clinical dental care and is one of the promising new modalities used for caries management. In many studies was investigated the possibility of sub-ablative energies to increase the acid resistance and the micro-hardness of enamel surface and to reduce enamel solubility by increasing caries resistance without severe alterations of the enamel.¹³ Laser-fluoride effect on enamel found that low-energy Er:YAG laser irradiation coupled with fluoride treatment could inhibit enamel demineralisation through increased fluoride deposition on the surface and formation of fluoridated hydroxyapatite.¹⁴ In one recent study, silver diamine fluoride (SDF) application followed by sub-ablative low-energy Er:YAG laser irradiation on dentine rendered the dentine surfaces more resistant to caries development, both chemically and mechanically.¹⁵ Lasers have also been used to prevent the enamel demineralization caused by dental caries and have shown good results.^{16,17} The Er:YAG laser has been shown to reduce or prevent the demineralization of tooth enamel.¹⁸ In some studies, when associated with fluoride,^{19,20} it leads to a reduction in mineral surface loss.

Sealants reduce the risk of caries in susceptible pits and fissures of primary and permanent teeth.¹³ The enamel surface prior to the placement of the sealant can be pre-treated in different ways. Non-invasive techniques include only etching with 37 per cent orthophosphoric acid or air abrasion and acid etching. Invasive techniques use burs for opening the deep and narrow fissures and then acid etching. Preparing the enamel surface with Er:YAG laser with subsequent acid etching is considered as non-invasive technique for pre-treatment of pits and fissures. This laser wavelength has special uses in the domain of primary and secondary prevention which include sealing of pits and fissures and cavity preparation.¹⁴ This technology makes the enamel more resistant to caries attack, and also the need to acid etching procedure is eliminated, or reduced.^{14,15} The use of laser gives the dentist the ability to clean and sterilise enamel fissures. The bactericidal effect of Er:YAG laser irradiation could boost the inter-



Master of Science (M.Sc.) in Lasers in Dentistry

Next Start: **21st September 2015**
Aachen, Germany
4 semesters



Become part of the International Dental Elite

- Create new economic potential for your practice
- Two year career-accompanying postgraduate programme at the University of Excellence RWTH Aachen
- Combination of lectures, skill training sessions, live ops, tutorials, and practical workshops
- Internationally accepted and accredited by the German Government, the European Union, the Washington Accord and the Bologna Process
- Science-based and practice-orientated on highest national and international level
- Increased patient satisfaction: minimal contact reduced vibration and pain



**RWTH INTERNATIONAL
ACADEMY
AACHEN UNIVERSITY**

RWTH International Academy
Kackertstraße 10 | 52072 Aachen | Germany
phone +49 241 80 23543 | fax +49 241 80 92525
info@academy.rwth-aachen.de
www.academy.rwth-aachen.de

PROFESSIONAL EDUCATION PROGRAMMES

AALZ

Aachen Dental Laser Center

AALZ GmbH
Pauwelsstraße 17 | 52074 Aachen | Germany
phone +49 241 47 57 13 10 | fax +49 241 47 57 13 29
info@aalz.de
www.aalz.de