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Prof. Dr Norbert Gutknecht

Save the date

Dear Colleagues, dear friends of laser technology,

Important events must be planned for the long term, but also announced early enough. To allow potential guests to schedule their appointments, "save the date" cards are send out, such as is made at weddings, anniversaries and honours.

Why are you receiving a "save the date" announcement today?

Next year, not only the 16th WFLD Congress and the 27th DGL Annual Congress, but also the 30th Anniversary of the ISLD/WFLD will take place and be celebrated. In order to give this historical and scientific event an adequate framework, the Aachen University Hospital in Germany was chosen as the venue. Let yourself be invited to an extraordinary event whose variety of programmes will certainly leave a positive memory for you. So, here's the announcement:

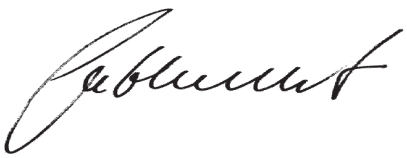
Save the date
WFLD World Congress
1 to 3 October 2018 in Aachen, Germany

Further information can be found on the following pages of this issue.

Looking back on the year 2017, one can say that there has been a positive turnaround in the use of lasers in dentistry. Not only that more and more laser-relevant topics are being presented at conventional dental congresses. Laser congresses are also enjoying an increasing number of participants, as was most clearly seen on the occasion of the European laser congress WFLD-ED in Thessaloniki, Greece.

For the feast days ahead and the New Year 2018, I wish you good luck, health and success, combined with the pleasure of welcoming you to the WFLD World Congress in Aachen, Germany.

Yours,



Prof. Dr Norbert Gutknecht
Organising Chairmen WFLD 2018, Aachen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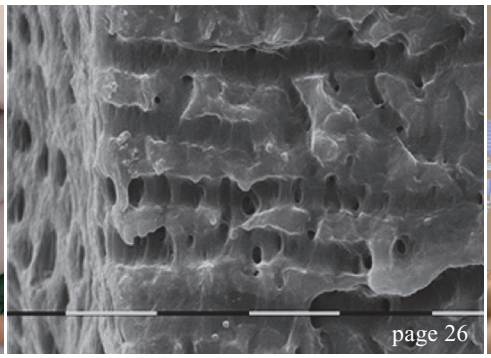
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Fig. 1

Er:YAG laser for peri-implantitis treatment

Author: Dr Fabrice Baudot, France

Fig. 1: Illustration of the photoacoustic and photoablative effects of lasers, "falling stone".

With the increasing popularity of dental implant treatments, the prevalence of peri-implantitis has continued to grow worldwide. In 2008, Esposito et al. admitted that "an optimal treatment protocol with suitable instruments has not yet been established".[1] This observation reflects actual global opinion that peri-implantitis is still a huge problem that the dental community has to deal with now and even more so in the future. In this article, and addressing the biological aspects of peri-implantitis, we would like to emphasise why the microablative and photoacoustic effects of the Er:YAG laser could be of great assistance in the treatment of this disease (Fig. 1).

Peri-implantitis

In 2015, Derks and Tomasi published one of the best meta-analyses to evaluate the prevalence of peri-implant disease.[2] From among 3,840 articles on this topic, they selected 15 articles describing 11 studies. Only longitudinal studies reporting on more than 100 implants were included. In these studies, peri-implant mucositis occurred in 43 % and peri-implantitis in 22 % of all cases. This means that statistically more than 60 % of implants placed could be a problem. It is thus urgent to recognise, as Renvert and Polyzois did in 2015, that "as with every disease, prevention is the best form of treatment, and peri-implantitis is no exception".[3]

While peri-implant mucositis is an inflammation of the peri-implant tissue, peri-implantitis results in bone loss around the implant. Both of those pathologies share similarities with periodontitis. The loss of the integrity of the surrounding peri-implant tissue is the main reason for the development of such

problems. The growing incidence of peri-implantitis is a global concept, not just a biological problem.

The most common risk factors for the development of peri-implantitis relate to the following:
- design and quality of the implant surface;
- insertion torque;
- quantity and quality of the bone;
- anatomy and physiology of the peri-implant soft tissue;
- tissular tension: management of peri-implant soft tissue;
- type of prosthetic load and quality of the restoration; and
- peri-implant care.

The biological problem appears mostly as a consequence of these risk factors. When the integrity of the peri-implant tissue is lost, microbial invasion, and the development of a mature and mineralised biofilm in very narrow spaces proceeds rapidly in the oral environment (Figs. 2–5).

Therapeutic strategies

Since Mombelli and Lang published their study on the management of peri-implantitis in 1998,[4] almost nothing has changed in the way this growing problem is treated. Mombelli and Lang established the fundamentals and outlined the prevention of peri-implantitis, including cleaning of the implants and the surrounding tissue. Today, we must recognise that there simply is no definitive solution for the treatment of peri-implantitis yet. We should take into consideration what Renvert and Polyzois wrote in 2015.[3] Concretely, this means that we must take into account all the risk factors in treating implant patients.

As for the biological aspect, we need to explain to our patients the importance of regular recalls to check the implants and set up peri-implant care programmes. The integrity of the peri-implant tissue and the biological stability around the implants are crucial to avoid further problems. When a problem occurs, the ability to clean the implants and the peri-implant tissue, particularly the bone, is fundamental.

There are three steps in the therapeutic strategy corresponding to the level of injury around the implants:
1. As already mentioned, prevention is a key factor to avoid any problem. Therefore, a peri-implant care programme should be set up for every implant immediately after implantation. This programme

Figs. 2–5: Although this case was performed by a French opinion leader in implantology, with a prosthetic reconstruction meeting the current quality criteria, the patient suffered a peri-implantitis at three out of five implants in the mandible ten years after his implant treatment. Causes identified were inadequate follow-up and probably bone heating during implant insertion.


Fig. 2


Fig. 3

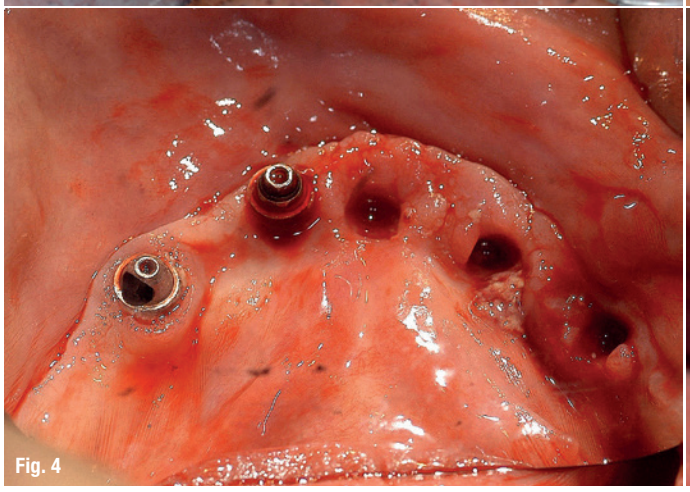
Fig. 4


Fig. 5

Figs. 6 & 7: The Er:YAG laser is a minimally invasive tool that enables practitioners to perform an anti-inflammatory and antiseptic treatment.

Fig. 6

should consist of checking the integrity of the implants and peri-implant tissue, and most of all the cleaning of the surfaces exposed to oral biofilm. The instrumentation used for cleaning should be efficient and gentle to avoid any damage to the fragile peri-implant tissue attachment.

2. Early peri-implantitis or peri-implant mucositis could be treated with a non-surgical approach. Cleaning ability seems to be the key point for success in controlling the inflammatory process. In order to prevent any damage and to preserve all the potential of the healing process, particularly vascularisation, we need to use tools that are efficient in very narrow spaces and we should respect the integrity of the tissue.
3. In the case of advanced peri-implantitis, the surgical approach is recommended when the prognosis of the implant has been determined in relation to the bone quality. All granulation tissue and sometimes also calculus around the implants must be removed without damage. Moreover, the nicked bone needs to be deeply cleaned while safeguarding the integrity of the vascularisation, which allows guided osseous regeneration.

Er:YAG laser compared with conventional instrumentation

Concerning peri-implantitis, the main problem is the development of biofilm on the implant surface. Biofilm can be very difficult to remove depending on the type of microstructure and macrostructure of the implant surface, the design of the implant and accessibility to lesions.

Cleaning the implant surface during peri-implantitis treatment is not the only problem that has to be solved. Peri-implantitis is in fact a wound opened to the oral microflora. In order to achieve healing of this wound, it must be cleaned at a histological level. All of the inflammatory tissue surrounding the wound is infiltrated with a large amount of enzymes and microbes responsible for the destruction of the peri-implant tissue. This granulation tissue around the implant must be removed to encourage healing.

The conventional tools for a mechanical approach to cleaning the implant surface, such as ultrasonic devices, polishers and air scalers have a certain proven efficacy. Air abrasion seems to be the best tool for removing plaque from a rough implant surface and can be used to treat peri-implantitis in a non-surgical approach, as shown by Sahm et al. in a randomised controlled clinical study.[5] However, we could also say that it is a dirty tool because it leaves a great deal of powder particles in the peri-implant spaces, and this could induce chronic inflammation.

Renvert et al. showed in a randomised clinical trial that the Er:YAG laser is equal to an air-abrasive device in the treatment of peri-implantitis.[6] We have shown in some videos that not only is the Er:YAG laser able to remove biofilm from the implant surface better than air abrasion can, but it does so without leaving any debris.

The major advantage of the Er:YAG laser compared with conventional instruments in the treatment of peri-implantitis lies not in the ability to clean the implant surface, but in the precise capacity to remove selectively all of the granulation tissue from the peri-implant lesions. By its physical properties, the Er:YAG laser is unique, and to the best of

our knowledge, no other instrument is able to remove granulation tissue better than this laser device can (Figs. 6 & 7).

Er:YAG laser wavelength compared with other laser wavelengths

The key point, compared with the other laser wavelengths used in the medical field, is that the Er:YAG laser has peak absorption in water and hydroxyapatite in the energy absorption spectrum curve. This physical property makes the Er:YAG a unique tool and the most versatile laser for use in dentistry.

Briefly, to understand the way this laser works on vital tissue, one could say that the energy delivered by the laser beam is absorbed by the tissue and produces biological effects. Vital tissue, particularly human tissue, is mainly composed of water in the case of soft tissue and a great amount of hydroxyapatite in the case of hard tissue (teeth and bone).

Massively absorbed, the Er:YAG wavelength causes an intense and extremely sudden increase in energy in the targeted tissue. The consequence is micro-explosions of the water and hydroxyapatite molecules that materialise macroscopically (when this phenomenon is repeated) by the microablative effect. Takasaki et al. found this effect to occur within 30 µ/s.[7]

Because of its peak absorption, the Er:YAG laser is a surface laser. As the energy is massively absorbed, the consequent increase in temperature is rapidly dispersed. The thermally affected layer is in the range of 20–50 µ, compared with deep-acting lasers, like the Nd:YAG and diode laser, which is some millimetres deep.

The wavelengths of other lasers are less absorbed, so the energy penetrates deeper into the tissue and produces an increase in temperature in many more layers than the Er:YAG does. This is the main reason that the Er:YAG laser is a very accurate tool, adapted to microsurgery. With it, one is able to sculpt the tissue in the microdimension under visual control when using optical aids and without any thermal effect over 50 µ.

Er:YAG microsurgery around implants

Tissue can be classified by the amount of hydric charge regarding the Er:YAG laser effects. The most hydrated tissue is ablated prior to the less hydrated tissue. Oral surgery and dental procedures are unique in that the whole range of tissue, from the less hydrated tissue of the organism (which is the enamel) to the most hydrated tissue (which is inflammatory tissue), is treated. The particularity of dentistry is that all of this tissue occurs in a very small space: in a few millimetres, the whole range of tissue can be found. Across a gradient of hydric charge, the Er:YAG laser works selectively from the most hydrated tissue to the less. It is crucial in dentistry and specifically around implants to use such a tool that works at the surface of the targeted tissue very precisely, selectively and with limited thermal effects.

The Er:YAG laser is a unique tool compared with conventional instruments. With it, the surgeon is able to remove granulation tissue with equal precision from the soft part of the peri-implant pocket, the cancellous bone and the implant, where it is also possible to remove calculus without contact.

Vascularisation of the remaining tissue is preserved, even stimulated, by the biostimulation effects of the laser, and the implant surface and surrounding bone are not overheated or damaged. In narrow spaces, which is often the case around implants, the Er:YAG laser is able to ablate granulation tissue at a distance.

Antibacterial effects of the Er:YAG laser

Laser irradiation of a targeted tissue produces two major effects: the photoablative effect, which is able to remove material, as explained; and the photoacoustic effect, which is a shock wave resulting from the first effect. In order to better understand these phenomena, one can liken a laser beam on a tissue to a stone falling into water. The impact on the water produces a series of waves that could represent the photoacoustic effect.

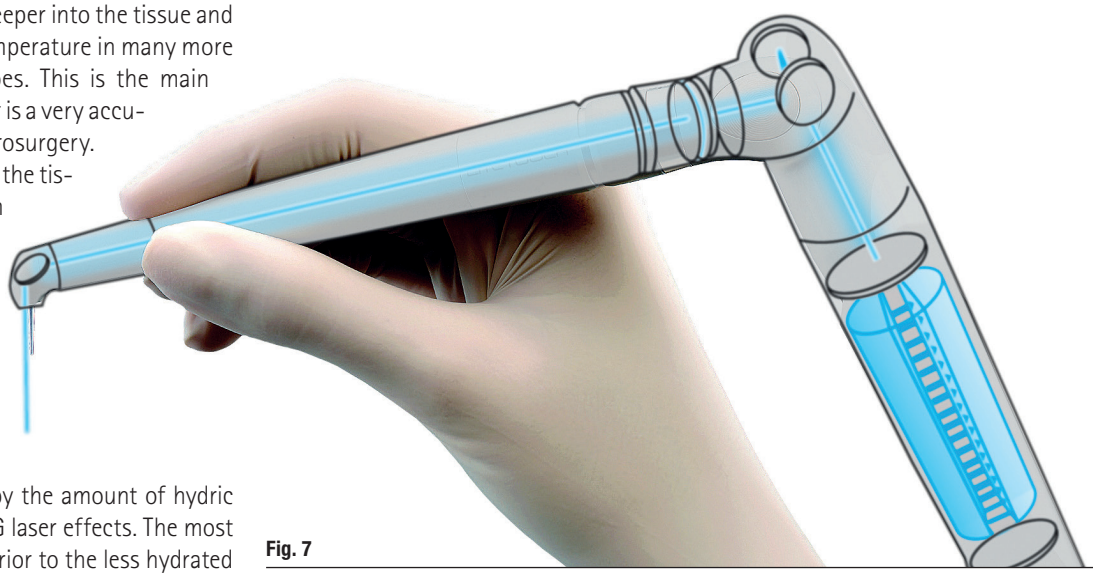

Fig. 7

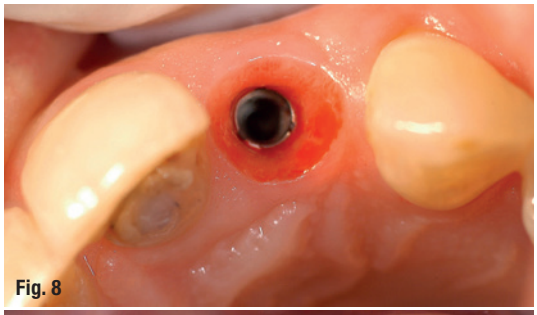
Fig. 8

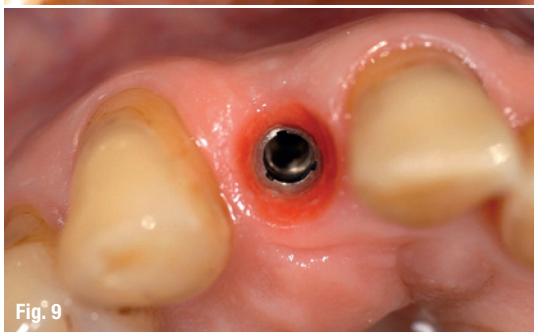
Fig. 9


Fig. 10

Fig. 8: This clinical situation reflects a good tissue integration of the prosthesis.
Fig. 9: Er:YAG laser for the subgingival part of the implant restoration is an adapted complement, particularly, when there is a pocket around the implant when ceramic or gold fused to metal has been used in UCLA-type restorations (Pilier UCLA).
Fig. 10: Laser application at the entrance of the sulcus irradiation in sweeping motion.

The antibacterial properties of the laser come from those two effects. While the microablative effect is able to eliminate selectively granulation tissue and biofilm (very hydrated structure), the photoacoustic effect shakes the debris and isolated microorganisms to clean the treated spaces.

Biofilm is a protective niche for bacteria. The immune system is basically acting against the biofilm, to no effect, because immune cells are not able to reach the bacteria and other microorganisms inside this structure, which develops on the surface of the implant and the surrounding tissue. Laser irradiation is able to destroy biofilm and isolate microorganisms. In this way, the microorganisms can be reached by the immune system. We are virtually "assembling the players", as Page and Kornman explained in their famous article, in which they described the mechanisms of the immune response in periodontal infections.[8] The equilibrium for a healthy periodontal and peri-implant environment can be recovered.

Er:YAG laser irradiation on implant surfaces

As mentioned in a study by Galli et al., the Er:YAG laser produces no or minimal alteration of the microstructure of machined or sandblasted implants.[9] This laser works in the real dimension to clean the microroughness on a new implant's surface. The shock waves and microablative effect are efficient to clean very deeply the microanfractuousities of the implant surface. When used in the correct way, the Er:YAG laser does not generate a thermal effect and does not damage the titanium implant surface.

It has been found to have an antibacterial effect on titanium and many other materials because it has been observed that living cells like osteoblasts and fibroblasts grow on an implant surface irradiated with an Er:YAG laser, according to Schwarz et al.[10] Kreisler et al. showed that, on implant surfaces conditioned with an Er:YAG laser, the proliferation of the fibroblasts is better than when an air-abrasive device is used.[11] Friedman et al. observed a new attachment of osteoblasts after Er:YAG irradiation on sandblasted and acid-etched implant surfaces.[12]

Takasaki et al. observed better bone–implant contact on sandblasted and acid-etched implant surfaces after Er:YAG irradiation compared with curettage in open-flap surgery.[7] This finding confirms the observations of Schwarz et al., who found better results regarding re-osseointegration on contaminated titanium surfaces irradiated with an Er:YAG laser compared with conventional mechanical and chemical treatments.[10]

With regard to these studies, it could be said that the Er:YAG laser is safe when used to irradiate titanium surfaces. There is some antibacterial effect by its capacity to remove biofilm and a bactericidal effect. Moreover, it seems to stimulate the growth of cells for better healing around implants.

Clinical protocols

As mentioned, the Er:YAG laser has several properties that make it a key tool for treating peri-implantitis. The main goal in the treatment is to control the inflammatory and infectious processes around the implants in order to induce wound healing of the soft

tissue and to stop bone resorption. In some particular situations, such as in cases of angular lesions or crater-like lesions, bone regeneration is possible if the implant surface is cleaned very deeply.

The key factor in the management of peri-implantitis is obtaining and maintaining a hermetic seal of the surrounding tissue. Of course, it is a global concept, from the surgical step to the prosthetic procedures, but above all, the prognosis of the implant rehabilitation regarding peri-implantitis depends on the ability to control infection around the implant. By operating the laser correctly, by using the microablative and photoacoustic effects of the Er:YAG laser, we can successfully apply clinical strategies to prevent or treat peri-implantitis.

Prevention of peri-implantitis

The state-of-the-art must be observed in the surgical and implant prosthetic procedures, but it is not enough to guarantee the biological stability of restorations. We need to control the biofilm development around implant restorations without damaging the tissue. Good oral hygiene is a prerequisite, but regular recalls to clean the implant restorations are important as well (Fig. 8).

Air abrasion is efficient for cleaning supragingival parts, but the tissue is too delicate for subgingival use, even with a glycerine powder and adapted tips. It leaves powder in the peri-implant sulcus and could damage the very fragile soft-tissue connection to the implant. Some deep parts may not be accessible to the mechanical effects of the air-abrasive device.

It appears that using the Er:YAG laser for the subgingival part of the implant restoration is an adapted complement. This is particularly the case when there is a pocket around the implant when ceramic or gold fused to metal has been used in UCLA-type restorations (Fig. 9). When titanium and zirconia abutments have been seated at the time of surgery, it seems that no pockets exist around the implant; in those cases, prevention is easier.[13]

In order to prevent the development of biofilm subgingivally around implants, treatment needs to be both delicate and efficient. The Er:YAG laser is able to reach the biofilm structure at a distance and to destroy and emulsify bacteria. It is possible to do this just by placing the laser tip at the entrance of the sulcus. It is not necessary to go deeply around the implant.

A low power is sufficient for efficiency because the energy of the Er:YAG laser is massively absorbed by the biofilm structure. We recommend setting the Er:YAG laser below 1 W, by setting it at 50 mJ and 17 Hz with 70 % water cooling, for example. The application is about one minute per implant, working the tip around in a sweeping motion into the sulcus (Fig. 10). The frequency of application is crucial and must be adapted to the estimated risk factors. An Er:YAG laser prevention protocol should be followed twice a year on average.

Non-surgical approach

When an inflammatory problem such as peri-implant mucositis or early onset peri-implantitis with minimal bone resorption occurs, a minimally invasive approach can be applied. For moderate mucositis, repeated light applications of an Er:YAG laser twice a week using the same settings as for peri-implant maintenance are recommended.

If there is a large amount of granulation tissue, it is removed beforehand by microablation of the internal part of the pocket. The Er:YAG laser settings are as follows: 100–200 mJ, 20 Hz, 50 % water cooling. This first microsurgical intervention is followed by an intense peri-implant maintenance care protocol (as for moderate mucositis) twice a week until resolution of the problem.

In each case, the patient is advised to support this antibacterial protocol by applying curcumin essential oil once a day for several weeks to avoid bacteria of the red complex. If an anatomical problem (tension or thickness of the gingiva) is present, it must be corrected to achieve better stability of the results.[14]

Surgical approach

In the case of advanced lesions, the prognosis must be evaluated and the risk–benefit ratio must be considered to evaluate a conservative approach. Advanced peri-implant lesions are always a problem, have a poor long-term prognosis and are very difficult to maintain in cases in which the conservative approach is compromised. The patient must be informed of the consequences in terms of aesthetics and maintenance difficulties.

A surgical approach is necessary to clean the implant surface deeply, as well as bone lesions around the implant, under visual control. All of the granulation tissue is removed from the bone and implant surface. The recommended settings are 300 mJ, 20 Hz and 70 % water cooling in a defocused mode of 10 mm.

Calculus or foreign debris (cement) is often stuck to the implant surface and easy to remove with the Er:YAG laser's microablative effect without any damage. The bone lesion is deeply cleaned even within the bone trabeculae by the photoacoustic effect. To

the best of our knowledge, there is no better instrument to clean such lesions so profoundly and with complete safety.

The intervention is done after raising a full-thickness flap under magnifications. The tissular tension is eliminated by a partial-thickness dissection in order to close the flap after eventual bone filling of the lesions. The surgical approach is followed by a strict peri-implant maintenance care protocol, laser-assisted as mentioned in the case of early onset peri-implantitis.

Conclusion

As described, the Er:YAG laser produces some clinical effects that are unique compared with conventional tools. Owing to its antibacterial properties, it could be of interest in the control of biofilm development around implants. It is able to reach inaccessible areas by working at a distance around implants. It cleans the implant surfaces and the surrounding tissue very deeply and selectively removes granulation tissue.

The Er:YAG laser is a clean tool that leaves no debris around implants. Furthermore, it is a safe tool when the appropriate settings are used, and it is possible to work efficiently without thermal effects. It is useful as a microsurgical tool in both surgical and non-surgical approaches. Moreover, it is a tool for prevention with repeated applications of laser irradiation around implants very gently, with a frequency in accordance with a global concept to maintain the biological equilibrium and to preserve the integrity of the peri-implant tissue.

The Er:YAG laser deserves to be the object of multicentre double-blind and controlled studies to validate its efficiency in peri-implantitis treatment and to confirm the protocols and settings that we recommend. It should become a key tool in the therapeutic strategy for this growing problem._

contact

Dr Fabrice Baudot
65 impasse des 3 pointes
34980 Saint-Gély-du-Fesc, France
Tel.: +33 4 99060060
dr.baudot34@orange.fr
www.dr-baudot-fabrice-chirurgiens-dentistes.fr

Author details

Literature

Kurz & bündig

Mit der zunehmenden Beliebtheit von Zahnimplantatbehandlungen ist die Prävalenz von Periimplantitis weltweit weiter angestiegen. Im Jahr 2008 bekannten Esposito et al., dass „ein optimales Behandlungsprotokoll mit geeigneten Instrumenten noch nicht etabliert wurde".[1] Diese Beobachtung spiegelt die aktuelle globale Meinung wider, dass Periimplantitis immer noch ein großes Problem ist, mit dem die zahnärztliche Gemeinschaft jetzt und noch mehr in der Zukunft umgehen muss. In Anlehnung an die biologischen Aspekte der Periimplantitis hebt der Autor im Artikel hervor, warum die mikroablativen und photoakustischen Effekte des Er:YAG-Lasers eine große Hilfe bei der Behandlung dieser Krankheit sein können.

Der Er:YAG-Laser erzeugt einige klinische Effekte, die im Vergleich zu herkömmlichen Geräten einzigartig sind. Aufgrund seiner antibakteriellen Eigenschaften könnte er bei der Kontrolle der Biofilmentwicklung um Implantate von Interesse sein. Mittels Laser ist es dem Behandler möglich, unzugängliche Bereiche zu erreichen, Implantatoberflächen und das umgebende Gewebe sehr tief zu reinigen und selektiv Granulationsgewebe zu entfernen ohne Rückstände zu hinterlassen. Als mikrochirurgisches Werkzeug eignet er sich sowohl für chirurgische als auch für nichtchirurgische Verfahren.

Nach Meinung des Autors sollte der Er:YAG-Laser verstärkt Gegenstand von multizentrischen, doppelblinden und kontrollierten Studien werden, um seine Wirksamkeit bei der Periimplantitisbehandlung zu validieren. Er sollte ein Schlüsselinstrument in der therapeutischen Strategie für das wachsende Problem „Periimplantitis" werden.

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"No Anaesthesia" endodontics in children

Author: Dr Imneet Madan, UAE

"Laser Popping Sound" in dentistry for children is one of the best approaches that can help us to overcome the initial fear of the unknown when it comes to first treatment appointments in children. Its uniqueness lies in the fact that the need for numbing is completely exempted. Today's children like technology playing at its best. Lasers definitely meet that perception of technology.

The routine first visit appointments are usually not a concern as children do not anticipate any intervention. Since they are not in pain, their mindset of approach is not defensive. Rather when there is no pre-biased opinion or fear, there is a pleasant sense of adaptation that allows the smooth flow of the appointment. Any different kind of behavioural exhibit occurs only when kids are anticipating an intervention, when they had been in pain or when in general they come fatigued.

The discussion of needles is considered to be the most common subject just prior to the visit to the dentist. This discussion can become even more intense when there is already a perceived treatment need. Very young children can have the fear of the unknown, anxiety with strange and new places. The older ones develop extreme fear by talking to peers who have been to the dentist before. Some of them

might have had good and some others not so good experience. Sometimes, past unpleasant parental experience can distort the child's adaptability to the dental appointment. They enter the clinic with the pre-formed image of the dentist which is not very convincing and helpful to the child. These external experiences can lay the foundation of the child's coping ability in the dental chair.

How can lasers help?

Since laser is not commonly available at all practices, there could be a possibility that there had been no real discussion on the use of lasers in the treatment. Another possibility of having a good experience with lasers can change the perception of the child who is in for the first time.

When laser is introduced to the parents, they are informed about details on the functioning of laser and its benefits. While explaining euphemisms to the child, the laser is shown as "Popping Light". There is a significant number of children who go awe-inspired to come back and get there teeth fixed.

The whole mindset of the child changes when they are told that treatments do not involve any needles approach.

"No Anaesthesia"

Procedures that can be done without anaesthesia are:
- Restorations: Decays involving occlusal, labial, palatal, buccal or proximal surfaces of the teeth.
- Deep restorations on teeth with decays close to the pulp.
- Pulpotomies in primary teeth.
- Pulpectomies in primary teeth.
- Pulpectomies in primary teeth with abscess, fistula or swellings.

The term "No Anaesthesia" is a misnomer as the procedure is accomplished with few drops of anaesthesia in between, especially when endodontics is involved. The "No Anaesthesia" approach for enamel dentine restorations are the erbium laser Prep mode for restorative dentistry: MX7, 3.25 W, 25 Hz, air, water. There are two commercial settings that can be followed for the most acceptable cavity preparation:
- Rapid Prep: MX7, 5 W, 20 Hz, air 80, water 50. This setting is usually used for enamel caries removal as water content is lesser. Since there is less water in the enamel, higher power is needed for appropriate absorption of laser.
- Comfort Prep: MX7, 3.75 W, 25 Hz, air 60, water 30. This setting is usually advised when we have reached the level of the dentine as the water content in the dentine is higher in comparison to enamel.

Once complete excavation of the decay has been attempted with laser, gentle hand excavation, low speed excavation is attempted. This step should be followed with Bond prep: MX7, 3.25 W, 50 Hz, air 60, water 30. Following this step, the tooth is isolated and restored with composite (Figs. 1 & 2).

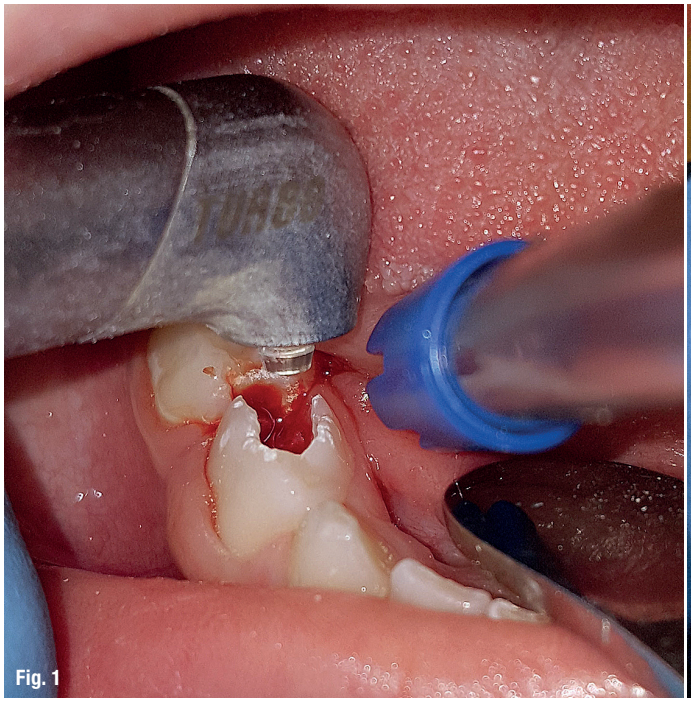
Fig. 1

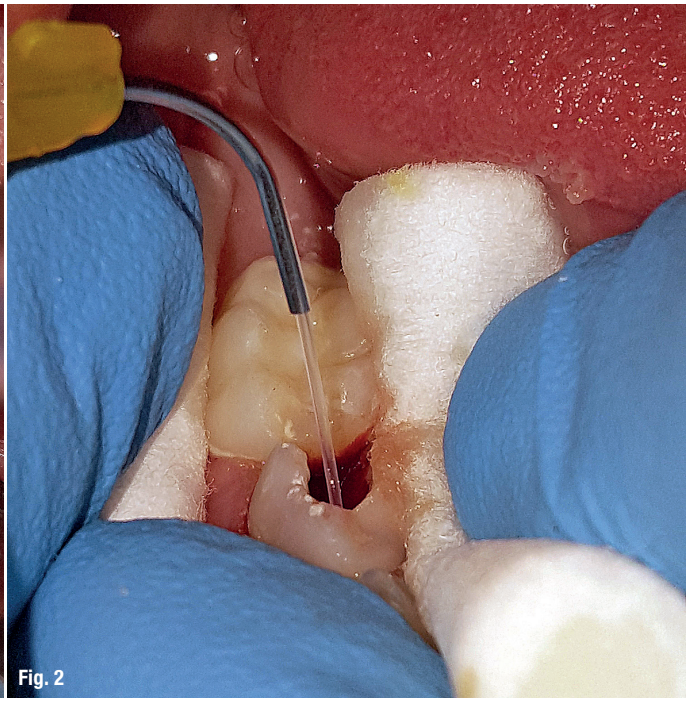
Fig. 2

Figs. 1 & 2: The laser is a helpful tool in the dental treatment of children that can be used for various procedures.

Pulpotomy procedure with erbium laser

When the carious decay is found deep and in close proximity to pulp, exposure of the pulp canals can happen while removing this decay. In such situations, exposed pulp needs to be treated by removing the affected coronal pulp contents. This procedure is referred to as Pulpotomy.

Deep caries are excavated with pre-adjusted rapid prep settings: MX7, 5 W, 20 Hz, air 80, water 50; and then comfort prep settings: MX7, 3.75 W, 25 Hz, air 60, water 30 are used as we approach deep into the dentinal caries. As soon as there is pin point pulp exposure, few drops of Lignospan are dropped inside the coronal pulp chamber. This step is followed by opening partial access into the coronal pulp chamber. As we go further deep into the coronal chamber, more anaesthetic intrapulpal infilteration is used followed by complete laser access opening.

After removing the coronal pulp contents, the chamber is irrigated and dried followed by diode laser sterilisation and coronal pulp filling with zinc oxide eugenol. The tooth is then filled with base Fuji IX and final restoration is done with composite or stainless steel crown.

Pulpectomy procedure with erbium laser

Teeth that have chronic profound caries, active signs and symptoms, and radiographical signs of pulp involvement, are indicated for Pulpectomy. Pulpectomy involves the removal of both coronal and radicular pulp contents.

When the tooth is indicated for pulpectomy or root canal procedure, deep caries are excavated with pre-adjusted rapid prep settings: MX7, 5 W, 20 Hz, air 80, water 50; and then comfort prep settings: MX7, 3.75 W, 25 Hz, air 60, water 30 are used as we approach deep into the dentinal caries. As soon as there is pin point pulp exposure, few drops of Lignospan are dropped inside the coronal pulp chamber. This step is followed by opening partial access into the coronal pulp chamber.

As we go further deep into the coronal chamber, more anaesthetic intrapulpal infilteration is used followed by complete laser access opening. Once access has been done with laser, coronal pulp contents are removed. Before gaining access into radicular pulp chamber, few more drops of anaesthesia are dropped in. Complete extirpation of radicular pulp contents is done with rotary instruments.

Continuous copious irrigation is done with saline and chlorhexidine. Canal measurement is done, and as a final step before obturation, both the erbium and diode laser are used for sterilisation. Final step is zinc oxide eugenol obturation, Fuji IX base filling and composite restoration.

Pulpectomy procedure in primary tooth with abscess or fistula

In cases where there are long standing infections or chronic irreversible pulpitis, it becomes invariable to use both diode and erbium laser sterilisation after the laser assisted access and further steps as described above.

Until the point that canals are found completely dry, obturation is deferred. Usually it takes one or two visits to complete the final step of obturation in teeth with abscess or fistula. The entire treatment is completed with intrapulpal drops of anaesthesia when required. No infiltrations or blocks are used in the entire procedure.

This procedure has been practiced as an alternate to pre-times extraction of primary teeth that has to be then replaced with a space maintainer. Most of the parents prefer this approach when compared to extraction, as they do understand that having the natural tooth as the space maintainer is indeed the best approach.

Benefits of "No Anaesthesia" dentistry

- No risk of children having traumatic bite after the procedure is completed. The times when anaesthesia in children was a common practice, it was imperative to let the child and parents know about the numbing effect that would stay for few hours after the procedure. Cotton roll is given to bite on so that it serves as a reminder for the child.
- Despite all these precautions, children may still land up in biting there lip or cheek. Once there is a traumatic bite, there is nothing much that can be done as the traumatized tissue has to self-heal. This can be quite painful for the child, thereby defeating the entire purpose of pain free dental approach.
- Multi-quadrant dentistry can be practiced on the same day, same appointment.
- There is actual saving of chairside time, as there is no waiting period for local anaesthesia to work.
- Children can eat a few minutes after the procedure, which is not the case with dental local anaesthesia.

Conclusion

Practicing contemporary dentistry in children with the appropriate usage of technology and the key tools, is the way forward. The benefits of the "No Anaesthesia" erbium approach far outweighs the existing alternatives. This kind of professional approach can certainly become the gold standard for dentistry in children in the very near future._

contact

Dr Imneet Madan
Specialist Pediatric Dentist
MSc Lasers Dentistry (Germany)
MDS Pediatric Dentistry
MBA (Hospital Management)
Children's Dental Center, Dubai
Villa 1020 Al Wasl Road
Umm Suqeim 1, Dubai
United Arab Emirates
Tel.: +971 506823462
imneet.madan@yahoo.com
www.drmichaels.com

Author details

Kurz & bündig

Für die zahnärztliche Behandlung von Kindern wird oft eine Vollnarkose durchgeführt. Kinder fürchten den Schmerz beim Zahnarzt, den sie entweder selbst oder durch Erzählungen anderer erlebt haben. Mittels Laser sind weitgehend schmerzfreie Behandlungen ohne Narkose möglich. Ein neuer Ansatz in der laserbasierten Kinderzahnheilkunde ist „No Anaesthesia". Hierbei wird ohne Narkose mit nur wenigen Tropfen eines Anaesthetikums gearbeitet. Folgende Prozeduren lassen sich ohne bzw. mit geringer Betäubung unter Anwendung eines Erbium-Lasers ausführen:

- Restaurationen aufgrund von Zahnfäule an okklusalen, labialen, palatinalen, bukkalen oder proximalen Zahnoberflächen.
- Tiefer gehende Restaurationen aufgrund von Karies an der Zahnpulpa.
- Pulpotomie und Pulpektomie bei Milchzähnen.
- Pulpektomie bei Milchzähnen mit Abszess, Fistel oder Schwellung.

Mittels zwei unterschiedlicher Settings im Prep-Modus lässt sich Karies an Zahnschmelz und Dentin effektiv beseitigen. Während der Behandlung werden dabei wenige Tropfen eines Anaesthetikums in das zu behandelnde Areal gegeben. Der „No Anaesthesia"-Ansatz vermindert zudem das Risiko eines traumatischen Bisses nach der Behandlung, der für das Kind sehr schmerzhaft ist und seine Abneigung gegenüber einer Zahnarztbehandlung noch verstärkt. Aufgrund der vielen Vorteile wird sich dieser Ansatz in Zukunft sicherlich zum Goldstandard in der Kinderzahnheilkunde entwickeln.

Laser restoration of maxillary incisors

Author: Dr Marta Roszkiewicz, Poland

In the conservative treatment of teeth in the anterior segment, especially in the case of Class IV cavities, we constantly run into the dilemma of how to combine the mechanical requirements for restoration with the aesthetics of the work, while minimising the reduction of the tooth's healthy tissue. We are often forced to reduce healthy tissue in order to increase retention. This retention depends not only on the size, but also on the surface quality. Preparation of the surface by means of an Er:YAG laser avoids the production of a smear layer, keeping the dentinal tubules open. The prepared tissue surface also allows for greater retention and marginal seal without macroscopic reduction of healthy tissue. Similar preparation of the enamel surface outside the cavity margins makes it easy to mask the preparation margin, significantly facilitating achievement of an aesthetic restoration.

Another benefit resulting from the replacement of rotary tools with the Er:YAG laser is the elimination of vibrations accompanying the preparation.

Fig. 1

Fig. 1: The cavity before the first visit. Delicate translucency of the pulp through the thin layer of dentine in the projection of the pulp horn.

Case study

A 15-year-old patient presented to our clinic because he had damaged his mandibular incisors while playing football. Despite greater sensitivity of the teeth when consuming cold beverages, the patient did not report alignments. In the clinical examination, a partial loss of crown #21 was found, covering the distal wall, distal incisal angle and two-thirds of the incisal edge, as well as a part of crown #22, covering the medial wall towards the gingival level and the incisal angle, and two-thirds of the incisal edge (Figs. 1).

There was a delicate pulp translucency visible in the pulp horns on the surface of the exposed dentine; however, there was no pulp exposure. The damage corresponded to an Ellis Class II fracture. No excessive palpation sensitivity was found with teeth #21 and 22; therefore, they were suited for conservative composite restoration. In order to minimise the scope of the necessary intervention and improve the marginal seal and integrity of the restoration, it was decided that, instead of rotary tools, the Er:YAG laser should be applied for preparation of the cavity (LightWalker, Fotona, 2,940 nm).

In order to carry out the treatment, the H14 contact contra-angle with a cylindrical tip (Ø 1.3 mm) was used. The laser parameters used are shown in Figure 2. There was no need to anaesthetise the patient for the surgery, since the patient had not reported any pain accompanying the preparation of the tissue, even in the pulp horn of tooth #22. The treatment consisted of cleaning and laser preparation of the enamel and dentine surfaces (Fig. 3). The tip end was guided at some distance from it (about 1 mm from the tissue surface).

The prepared surface was matt white, appearing almost frozen—which is not a sign of chemical etching, but the reflection of light on the prepared surface of the tissue (Fig. 4). The projection of a pulp horn in

Fig. 2

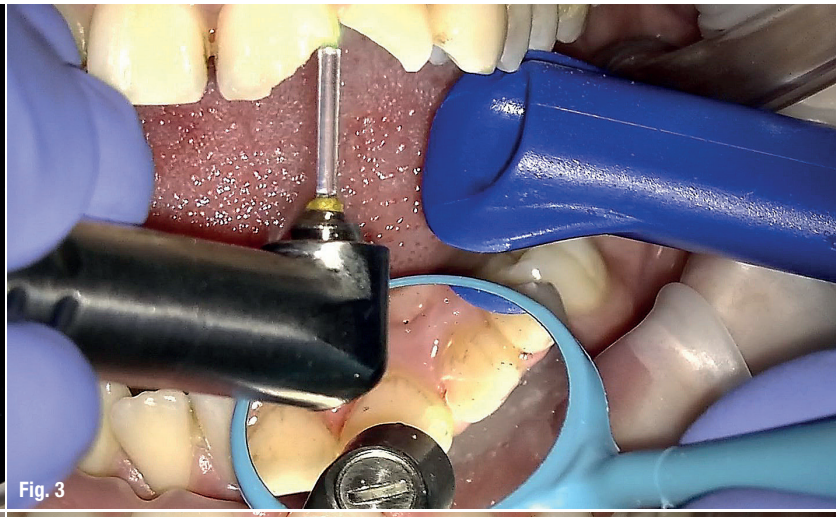
Fig. 3


Fig. 4


Fig. 5

tooth #22 was secured with a liner (Ultra-Blend, Ultradent). Then, using Adhese Universal adhesive and IPS Empress Direct composite (Ivoclar Vivadent), the restoration was performed (Fig. 5).

Conclusion

The Er:YAG laser allows for effective and safe preparation of cavities. Minimally invasive tissue preparation goes hand in hand with a very good retentive structure of the surface and the resulting high-quality bonding. Reduced vibrations and pain, which normally accompany the preparation of the tissue, are further benefits that improve the patient's comfort._

contact

Dr Marta Roszkiewicz
Brzozowa 41
05-080 Laski
Poland
Tel.: +48 609 416012
marta.roszkiewicz.plus@gmail.com

Fig. 2: Laser parameters used during the procedure.
Fig. 3: Guiding the contact contra-angle during the procedure; a small space between the laser tip and prepared surface is visible.
Fig. 4: The matt white surface of the tissue after laser preparation.
Fig. 5: After the final restoration.

Kurz & bündig

Bei der Restauration von Schneidezähnen müssen die mechanischen Anforderungen mit einem ästhetischen Ergebnis verbunden werden bei gleichzeitig weitgehender Erhaltung von gesundem Gewebe. Zur Erhöhung der Retention muss der Behandler jedoch oftmals gesundes Gewebe abnehmen. Hier bietet sich der Laser als eine minimalinvasive Lösung an. Die Autorin beschreibt den Fall eines 15 Jahre alten Patienten, dem beim Sport ein Teil der Krone an Zahn 21 und 22 abgebrochen war. Der Schaden entsprach einer Ellis Klasse II-Fraktur, d. h. Zahnschmelz- und Dentinfraktur ohne freigelegte Pulpa. Da keine übermäßige Pulpasensitivität festgestellt werden konnte, wurde eine konservative Kompositrestauration durchgeführt. Statt rotierender Instrumente wurde der Er:YAG-Laser für die Präparation der Kavität verwendet. Hierdurch konnte der Umfang der nötigen Interventionen minimiert und Randdichte sowie Integrität der Restauration verbessert werden. Die Therapie beinhaltete die Reinigung und Behandlung von Zahnschmelz und Dentinoberfläche mittels Er:YAG-Laser. Bei der Behandlung war keine Narkose notwendig.

Treatment of gingival hyperpigmentation

Authors: Ioannis Papadimitriou & Dr Petros Almagout, Germany & Greece

An attractive smile has always been at the centre of people's attention in perfecting their aesthetic appearance. In the modern age, aesthetics has become a very important aspect of dental practice and doctors must confront both the attainment of acceptable gum aesthetics and the management of biological and functional problems.

The gingiva is the most frequently affected intraoral tissue that can lead to an unsatisfactory appearance. The gingival colour plays a very important and central role in every perception of aesthetics and varies between different individuals, from pale pink to deep bluish-violet hue. The hue depends on several different factors. The vascular supply of the gingiva, the degree of keratinisation, the epithelial thickness, and the presence of pigmented cells are the most important components that can change the gingival colour.

Fig. 1: Diode laser 810 nm (Ceralas D15/810 nm, Biolitec).

Introduction

The oral hyperpigmentation is the discolouration of the mucosa or the gingiva. Gum melanin pigmentation (GMP) is a widespread form that can occur in all races.[1,2] Regardless of age and gender, it is seen predominantly as a genetic feature of some populations. It has been reported that the prevalence of melanin pigmentation varies among different populations between 0 to 88 %, regarding ethnic factors and smoking habits.[1–4]

It is permanent, usually symmetrical and is therefore called physiological or racial gingival pigmentation.[2,4] This appearance is predominantly observed in the form of a deep, diffuse dark brownish to blackish gingival colour and is characterised by a normal gingival appearance. Complaints of "black gums" are common and demands for depigmentation are normally made for aesthetic reasons.[1,2,4]

Oral melanin pigmentation is associated with a variety of etiological factors. Endogenous factors in systemic diseases such as von Recklinghausen's disease, Addison's disease, McCune-Albright's syndrome, Peutz-Jeghers' syndrome and lentigo labialis, as well as exogenous factors such as amalgam tattooing, or chronic intoxications (lead, quicksilver, bismuth poisoning), smokers melanosis, malaria drugs or antidepressants leading to an oral pigmentation.[4–7]

Most pigmentations are caused by five major pigments: melanin, oxyhaemoglobin, melanoid, carotene, and reduced haemoglobin. Iron and bilirubin are further cofactors.[2,4]


Fig. 2


Fig. 3

Melanin, a brown pigment, is located in the basal and suprabasal layer of the gingival epithelium. The melanocytes have a higher activity and an excessive melanin production is associated with the hyperactivity. Even three hours after birth, melanin enters the oral mucosa, and in some cases it is the only pigmentation mark on the entire body.[2,4] Melanin, is the most common cause of endogenous gum discolouration and is the most prevalent gingival pigmentation.

The brownish or blackish discolouration of the oral mucosa, localised in certain gums or as a generalised appearance, is presented more as an aesthetic rather as a medical issue.[4] This problem is aggravated in patients with a "gummy smile". Gum depigmentation is a perio-plastic surgical treatment in which gingival black discolouration is reduced and completely removed by various techniques.[8–11]

A) Method for excision of the pigmented portion:
- scalpel surgery
- cryosurgery
- chemicals (95 % alcohol and 90 % phenol)
- electrosurgery
- Gingivectomy using a diamond bur
- Laser:
  a) Nd:YAG (Neodymium:yttrium-aluminium-garnet) laser
  b) Er:YAG (erbium:yttrium-aluminium-garnet) laser
  c) CO_2 lasers
  d) diode laser

B) Methods for covering the pigmented gingiva with transplants of less pigmented areas:
- free gingival graft
- acellular skin transplants

Laser depigmentation is becoming more and more popular as the preferred treatment method for oral hyperpigmentation. The dental lasers have been used in dental medicine since the early 1980s. The diode laser has been introduced into the dental field within the last two decades. It is a semiconductor laser constructed with a combination of galium (Ga), arsenic (Ar) and other elements such as aluminium (Al) and

Fig. 2: Clinical situation at the first presentation of the patient with generalised gingival hyperpigmentation.
Fig. 3: Pre-op situation of gingival melanin pigmentation.

Fig. 4: 810 nm diode laser.
Fig. 5: Immediate post-op situation in the 1st quadrant.
Fig. 6: Postoperative situation directly after the depigmentation in the 4th quadrant.

Fig. 4


Fig. 5


Fig. 6

Fig. 7: Four days post-op: stage-appropriate wound healing with aesthetically pleasing depigmented gum.
Fig. 8: Postoperative situation four days after surgery in the 1st quadrant.
Fig. 9: Immediate post-op situation in the 2nd quadrant.
Fig. 10: Situation directly after the surgery.
Fig. 11: Two weeks after surgery: aesthetically pleasing depigmented gum.
Fig. 12: Postoperative view after two weeks: depigmented maxilla.

indium (In). It has a very wide range of indications that can be perfectly integrated into the dental treatment spectrum.

Diode laser has energy and wavelength properties that are specifically targeted to the soft tissue. It has a great affinity to haemoglobin and melanin, and is more efficient and better for the removal of deep soft tissue problems. With the diode laser (Fig. 1), there is the possibility of a minimally invasive treatment for the removal of unaesthetic gingival melanin discolourations, a periodontal dressing is not required postoperatively.[9] By its application one can achieve a very simple gum contour.

Further advantages of the diode laser are the reduced demand local anaesthesia, easy handling, excellent haemostasis, as well as minimal thermal damage to deeper soft tissue combined with a decontaminating and sterilising effect, as well as negligible postoperative complaints and pain. In addition, there is scientific evidence in the literature that the application of the diode laser for depigmentation is a more effective treatment method, with very low recurrence rate compared to the mechanical method.[9, 11, 13–15]

Case presentations

In the following, there are presented clinical cases of localised and generalised gingival hyperpigmentation. Furthermore, the management and the operative depigmentation using the diode laser will be explained, the phases of the operation and the postoperative wound healing of the patients. The study was performed in the Department of Dentistry of the General Hospital Western Attica, in Athens, Greece, and in patients with gum hyperpigmentation. For the operations, the Ceralas D15/810 nm (Biolitec; Fig. 1), a 810 nm diode laser, was used.

Case 1

The 27-year-old female patient was introduced to our department for dental examination. She found the generalised blackish pigmentation of the gingiva in the upper as well as the lower jaw very disturbing. The "blackish" tooth was psychologically stressful for her. Apart from an allergy to pollen, the patient was generally healthy. She said that she is an occasional smoker. Furthermore, the patient mentioned that she was teased in her childhood because of her gum colour.

The sufficient conservative and prosthetic restored mouth had a moderate oral hygiene. The clinical examination showed a healthy gingiva without any signs of inflammation. There was a generalised hyperpigmentation in the area of the maxillary and mandibular facial "attached" gingiva. The dental panoramic radiograph showed no vertical and horizontal bone loss. The clinical diagnosis of a generalised gingival melanin hyperpigmentation was made (Figs. 2 & 3).

The patient's desire was an aesthetic gum correction. Moreover, she mentioned being very sensitive to pain and was afraid of a possible haemorrhage after the operation. In order to take the concerns of the patient into consideration, we suggested two methods: the diode laser as well as the conventional depigmentation with scalpel or diamond drills. The patient decided the minimally invasive laser treatment.

For the gingival depigmentation the Ceralas D15/810 nm (Fig. 4) with a setting of 2.5 W in continuous wave mode (cw) and 400 µm fiber was used without contact with the soft tissue. The operation took place in two sessions. In the first session the depigmentation of the 1st and 4th quadrant was carried out. For local surface anaesthesia, Emla Creme 5 % (AstraZeneca) was applied circularly around the tissue which would be depigmented. Then the patient and the treatment team were equipped with appropriate laser goggles. Afterwards, the hyperpigmented tissue was excised.

Initially, the fibre was placed approximately 8–10 mm in distance from the operating area and then approached until a visible response of the tissue from the laser light was started. Simultaneously, the treatment was continued with simple varnish-like movements and in non-contact with the soft tissue (Figs. 5 & 6). After the operation, the patient was instructed to cool and protect the operating area. In addition, the patient received a prescription for painkillers, if necessary, and an appointment was made on the fourth postoperative day for a regular wound control and continuation of the second session.

In the operating area, a proper wound healing was observed, with a significant colour difference, in the area of the facial gingiva of the 1st and 4th quadrant (Figs. 7 & 8). Furthermore, the depigmentation of the 2nd and 3rd jaw regions took place in a similar way (Figs. 9 & 10). One week postsurgical, the patient presented again for control in our department. There was no evidence of postoperative infections or scarring in the operating area. The healing process was very good and painless, and there was no restriction on the intake of food. In addition to that, the attached gingiva appeared pink with normal appearance. The patient was very satisfied with the end result (Figs. 11 & 12).

Case 2

A 40-year-old male patient was introduced to our department on February 2015, due to an isolated brownish-black discolouration in the upper jaw (Fig. 13). The patient was healthy and had no allergies. Intraorally there were no periodontal pockets or recessions. He showed a good oral hygiene. The patient prosthetic restorations were sufficient. Extraorally, there could not be detected external signs of internal diseases (healthy skin colour).

There were no pathological facial asymmetries and the lip closure was competent. The patient had an average laugh line. There was a localised hyperpigmentation interdental of the maxillary facial gingiva in region 21/11. The desire of the patient was a minimally invasive and possibly painless elimination of this gingival decolouration. Therefore, diode laser treatment was offered. The patient agreed with this treatment method.

For the excision of the localised melanin pigmentation, the Ceralas D15/810 nm (Fig. 14) with a setting of 2.5 W in continuous wave mode (cw) and 400 µm fiber was used, without contact with the soft tissue. For local surface anaesthesia, Emla Creme 5 % (AstraZeneca) was applied circularly around region 21/22. Afterwards, the patient and the treatment team were equipped with appropriate laser goggles and we performed the excision of the black gingival discolouration. First, the fibre was placed approximately

Fig. 13: Initial view at the first presentation of the patient: noticeable discolouration in the interdental area of the maxillary front tooth region.
Fig. 14: Postoperative view directly after the excision of the gingival pigmentation.
Fig. 15: One day after surgery: optimal wound healing.


Fig. 13


Fig. 14


Fig. 15


Fig. 16


Fig. 17

Fig. 16: One day after surgery: optimal wound healing.
Fig. 17: Complete healing, no scar and discolouration can be detected.

8–10 mm away from the operative area and then approached until it started a visible reaction of the tissue from the laser light. The treatment was continued in non-contact with the soft tissue.

The patient presented a week after the surgery for regular wound control in our department (Fig. 15). In the operating area we had a proper wound healing. The patient was very happy with the end result and very surprised that he had no postoperative pain (Figs. 16 & 17).

Discussion and conclusion

Smile is the mirror of self-confidence and joy. The British philosopher John Ray said: "Beauty is power, a smile is its sword". A perfect smile is not only about the tooth position, form and colour, but also about the gingival harmony and contour. Excessive gingiva display and gingival hyperpigmentation has become a major concern for a large number of patients. Doctors have to deal with the attainment of acceptable gum aesthetics as well as the treatment of biological and functional problems.[1,3,4]

Although several depigmentation techniques are currently used, a one-step laser treatment is usually sufficient to eliminate the pigmented zones. The diode laser depigmentation is a relatively safe, minimally invasive, convenient and effective treatment method.[5,8,9,11] Despite this, the selection of the appropriate depigmentation method should be based on the clinical experience of the operator and the individual preferences.[12–15]_

contact

Ioannis Papadimitriou
St. Lukas Hospital
Department of Oral and
Maxillofacial Surgery
Schwanenstraße 132
42697 Solingen, Germany
giannis.papadimitriou_4@hotmail.com

Author details

Dr Petros Almagout
General Hospital Western Attica
"Agia Varvara"
Department of Conservative
Dentistry and Oral Surgery
Dodekanisou 1
12351 Athens, Greece
Tel.: +30 210 5613572

Author details

Kurz & bündig

Die Gingivafarbe spielt eine sehr wichtige Rolle in der Wahrnehmung der Ästhetik und variiert zwischen Individuen von blassrosa bis zu einem tiefblau-violetten Farbton. Dabei hängt der Farbton von verschiedenen Faktoren ab: u. a. von der vaskulären Versorgung der Gingiva, dem Grad der Keratinisierung, der Epitheldicke und dem Vorhandensein pigmentierter Zellen. Die orale Hyperpigmentierung ist eine weit verbreitete Form der Verfärbung der Schleimhaut oder Gingiva. Dabei ist Melanin verantwortlich für die meisten gingivalen Pigmentierungen. Zur Behandlung der zumeist bräunlichen Verfärbungen gibt es verschiedene Methoden. Diese reichen von der Entfernung mit Skalpel, Elektrochirurgie und Gingivektomie bis hin zur Abdeckung betroffener Stellen mit pigmentierten Gingivatransplantaten. Eine zunehmend beliebtere Methode stellt die Behandlung mittels Laser dar. Hier eignet sich vor allem der Diodenlaser, da seine Eigenschaften bezüglich Energie und Wellenlänge speziell auf Weichgewebe abgestimmt sind. Im Artikel schildern die Autoren zwei Patientenfälle mit einer lokalisierten und mit einer generalisierten Hyperpigmentierung. In beiden Fällen wurde ein 810 nm-Diodenlaser zur Beseitigung der Verfärbungen verwendet. Das Ergebnis in beiden Fällen war sehr positiv für Behandler und Patient. Auf minimalinvasivem Wege konnte eine zufriedenstellende Farbe der Gingiva hergestellt werden.

Literature

16TH WORLD CONGRESS
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dgl. laser

AALZ
World Academy for Laser Education in Dentistry

The 16th Congress of the World Federation for Laser Dentistry (WFLD)

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High ranked international keynote speaker lectures
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CONTACT
Headquarters WFLD 2018 Aachen
Mr. Leon Vanweersch
Vice-Organizing Chairman
Phone: +49 151 50610781
headquarters@wfld-aachen2018.com
www.wfld-aachen2018.com

Laser-enhanced endodontic treatment

Author: Dr Gregori M. Kurtzman, USA

Endodontic success is predicated on the ability to debride and clean the canal system. That canal system is a complex array of accessory and lateral canals, fins and other anatomical areas inaccessible to endodontic files (Fig. 1). As practitioners, we are able to clean the main canals with files, either hand or rotary. But they cannot mechanically remove pulpal tissue and debris from the canal anatomy present adjacent to the main canals.

Treatment success requires elimination of the pulpal tissue and associated bacteria from this anatomy, so that it can be sealed during the obturation phase of treatment. As only one thing can occupy a space at a time, obturation material cannot fill areas still occupied by pulpal tissue. Success is dependent on disinfection and debridement of the canal system so that it may be sealed during obturation. Irrigation has long been accepted as a key factor of treatment to achieve those goals.

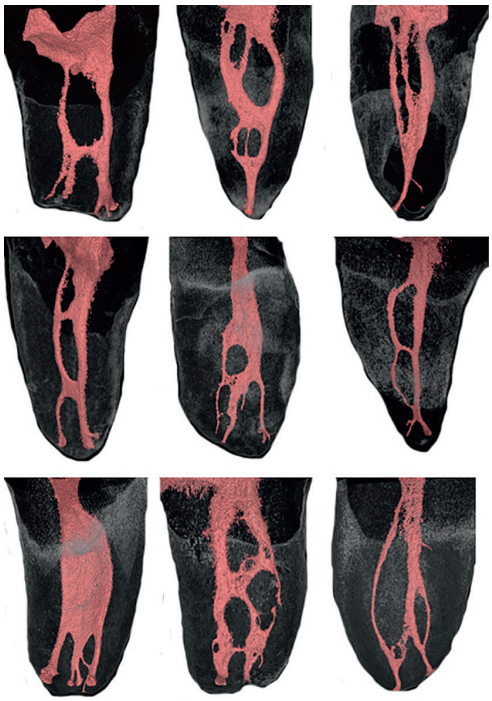

Fig. 1: Anatomy of the canal system demonstrating accessory canals, fins and lateral canals which are not accessible with endodontic files as shown in cleared teeth.

Yet, complete clearing of residual bacteria especially in the apical portion of the canal system has been difficult to achieve with traditional methods using even sodium hypochlorite (NaOCl) solutions (Fig. 2). Studies have demonstrated that the additional use of an Er:YAG laser to activate the irrigation solution greatly enhances not only the efficiency of the irrigation solutions advocated (NaOCl and EDTA) but also improves disinfection of the canal system, clearing accessory so that it may be sealed during obturation (Figs. 3 & 4).

Irrigation the key to endodontic success

Although, instrumentation with files is important to enlarging the canals and ready them to be obturated, debris consisting of pulpal tissue and associated bacteria is not effectively removed by files. Irrigation with an appropriate solution is required to remove that debris from the canal walls. NaOCl is still the accepted irrigant due to its tissue dissolving ability and antibacterial nature. Yet, it cannot effectively reach far beyond the main canals to remove the residual tissue. Tissue dissolution can be enhanced to more effectively remove pulpal tissue/bacteria and also reach further into the accessory anatomy to allow better sealing of the canal system improving treatment success.

Smear layer within the canal system plays a factor in success in endodontic treatment. The smear layer contains bacteria which when left within the canal anatomy may lead to reoccurrence of infection endodontically. When compared to traditional irrigation methods, laser enhanced irrigation has demonstrated better intracanal smear layer removal.[1] As *Enterococcus faecalis* has been routinely linked to endodontic failures, and is a common occupant of the oral cavity, elimination of this bacteria is critical to prevention of reinfection of the canal system. NaOCl as an irrigant has not shown to be effective in elimination of *E. faecalis*, yet when combined with laser enhanced irrigation with NaOCl this bacteria has been eliminated in the canal anatomy.[2]

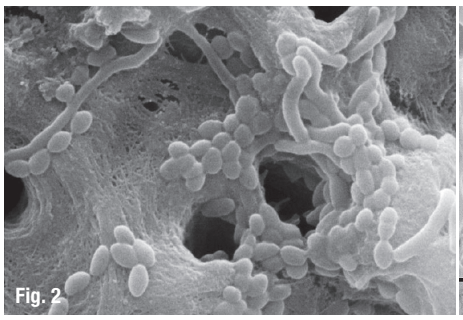
Fig. 2

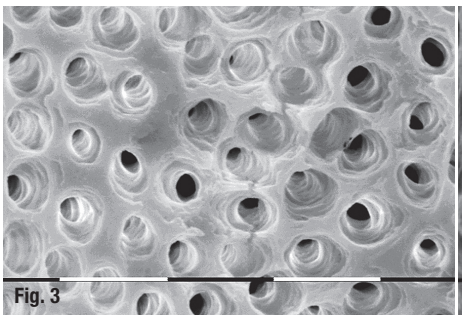
Fig. 3

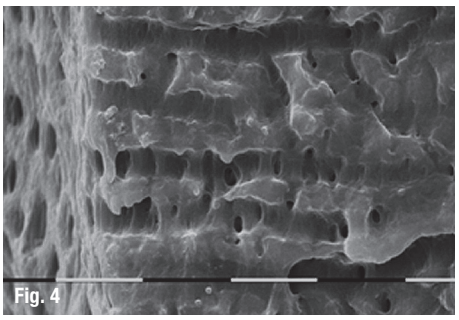
Fig. 4

Laser-enhanced irrigation

Laser energy has been documented to enhance the known effects of NaOCl irrigation through both heating the solution within the canal system and its distant antibacterial effects. But not all laser wavelengths have demonstrated to be equal in effectiveness. The best effects are when NaOCl is combined with an Er:YAG laser as compared to NaOCl alone or when utilised with other laser types.[3] Antibacterial effects were reported to be the best with this combination of irrigant and laser.[4] The higher wavelength of the Er:YAG compared to the Nd:YAG or diode was more effective in smear layer removal, hence, better at bacterial elimination within the canal system.[5] Utilisation of a EDTA as an irrigant alternated with NaOCl provides the best debridement of the canal system with enhancement with a Er:YAG laser, as these two solutions have a synergistic effect complimenting each other's effects in the canal anatomy.[6]

Additionally, the Er:YAG laser (LiteTouch™, AMD LASERS) creates hydrodynamic pressure following cavitation bubble expansion and collapse when the irrigation solution is activated in the chamber.[7–9] Placement of the laser tip does not require entry into the canals to achieve the desired effects and activation of the irrigation solution in the chamber is sufficient to affect the entire canal system. The LiteTouch™ Er:YAG laser energy is set at a sub-ablative power level which allows its use without structural changes to the hard tissue within the tooth. This eliminates the risks of ledging and perforation of the pulpal floor allowing safe usage within the tooth.

When the Er:YAG laser is activated, a heat pulse is generated by the laser radiation delivered via a sapphire tip into an absorbing liquid (irrigant). This results in tensile stress with cavitation being induced in the liquid in front of the sapphire tip at a distance far below the optical penetration depth of the laser radiation. Bubble expansion and collapse cause the surrounding fluid to flow at a speed of up to 12 m/s travelling throughout the canal system. This causes rapid displacement of intracanal fluid via radial and longitudinal pressures sufficient to drive irrigants into the canal anatomy and clean the dentinal tubules significantly. This photomechanical activation of the irrigants includes a temperature rise in the irrigant increasing its effectiveness in debridement of dentinal walls and its tubules and increases the chemical properties of the irrigants.

LiteTouch-Induced Photomechanical Irrigation (LT-IPI)

Endodontic treatment is initiated with access to the pulp chamber, which may be performed by traditional methods using burs or by ablation of the enamel and dentine with the LiteTouch™ Er:YAG laser. As the laser is ineffective in removal of ceramics and metals, such as those used in fixed prosthetics and also amalgam, carbides and diamonds are needed create access through these materials. Once dentine has been reached the laser may be utilised to unroof the pulp chamber (hard tissue mode). An additional benefit of the Er:YAG laser to access the pulp chamber is that it provides decontamination and removal of bacterial debris and pulpal tissue to yield a cleaner chamber aiding it identification of the canal orifices (soft tissue mode).

Once the canal orifices are identified, hand files are utilised to establish a glide path to the apical working length in each canal. Canals are then enlarged to the desired ISO canal size with either hand or rotary files (Fig. 5a). Laser-assisted canal irrigation requires canal preparation to an apical preparation ISO 25/30 at a minimum. A canal taper of .04 or .06 for the final instrumentation is recommended. Sodium hypochlorite (NaOCl) is utilised within the chamber and canals during instrumentation both as a pulpal tissue dissolvent and to lubricate the files within the canal, de-

Fig. 2: SEM showing bacteria and pulpal debris in the apical 1/3 that was not removed fully using standard irrigation protocol.
Fig. 3: SEM showing complete removal of bacteria and pulpal tissue in the apical 1/3 after irrigation using the LT-IPI™ protocol.
Fig. 4: SEM cross-section showing complete removal of bacteria and pulpal tissue in the apical 1/3 after irrigation using the LT-IPI™ protocol leaving dentine tubules open.
(All pictures © Prof. Georgi Tomov, Plovdiv, Bulgaria)


Fig. 5a


Fig. 5b

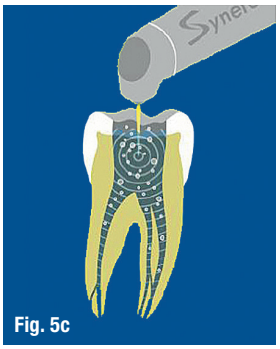
Fig. 5c

Figs. 5a–c: LiteTouch-Induced Photomechanical Irrigation protocol (LT-IPI).

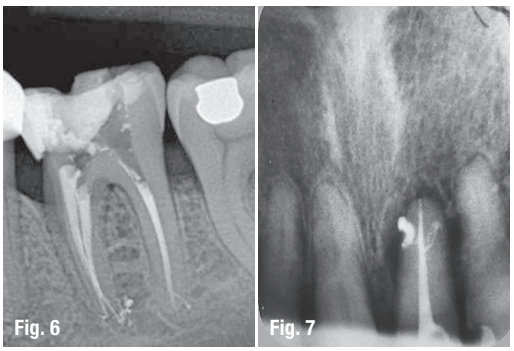

Fig. 6: Accessory anatomy evident in the apical that has been filled with sealer accessible due to use of the LiteTouch Er:YAG laser. *(© Dr David Guex, Lyon, France)*
Fig. 7: Accessory apical anatomy filled with sealer due to use of the LiteTouch™ Er:YAG laser. *(© Prof. Georgi Tomov, Plovdiv, Bulgaria)*

creasing the potential of file separation that can occur when instrumenting a dry canal (Fig. 5b).

Photo-activation of the irrigant within the canal system is performed using the Er:YAG laser with a 0.4/17 or 0.6/17 mm tip which assists in removal of the debris created by the files. Between each rotary file, the chamber is filled with NaOCl and the tip of the laser is placed into the chamber and the solution activated with the laser at 40 mJ at 10 Hz with an average power of only 0.5 W for 20 seconds (Fig. 5c). The chamber is suctioned and fresh NaOCl is placed into the tooth and the next file is used for instrumentation. It is unnecessary to place the lasers tip into the canals themselves, as activation of the solution within the chamber transmits down the irrigant into the canals to the apical aspect of the roots. Laser activation may also be performed with 17 % EDTA solution alternated with NaOCl. The benefit of EDTA solution is its chelation effect opening canal anatomy so that the next round of NaOCl can reach more pulpal tissue not accessible to the files in fins, as well as accessory and lateral canals.

Following final instrumentation of the canals with rotary files, the chamber is filled with NaOCl and the Er:YAG tip is placed into the chamber again and activated for a minimum of 60 seconds. This allows the photo-activated irrigant to clear debris and remaining pulpal tissue from the complete canal system. The irrigation solution is suctioned from the chamber and fresh irrigant placed and photo-activation repeated until no visible debris (cloudiness) is noted in the chamber fluid. This indicated that all accessible debris has been removed from the canal system. Any remaining solution is suctioned from the tooth and the canals are dried with paper points. Obturation is then accomplished using the practitioners preferred method and materials allowing obturation of anatomy inaccessible by instrumentation with files (Figs. 6 & 7).

Conclusion

The key to endodontic success is two pronged, cleaning the system and sealing it. Although, rotary files have improved the efficiency of instrumentation they are unable to reach any more of the anatomy that handfiles are able to reach. Cleaning of the canal system is keyed to irrigation of the canal system to improve debris removal in anatomy that the files are unable to contact. When anatomy is not fully cleaned, sealer is unable to fill this leaving bacteria to inhabit those areas which may lead to endodontic failure over time. Laser enhanced activation of endodontic irrigants cleans more anatomy adjacent to the main canals so that a more complete obturation of the canal system can occur. An added benefit is that the laser has an antibacterial effect, killing bacteria within the canal anatomy as well as distant to where the irrigation solution may reach essentially sterilising the entire tooth to the periodontal ligament._

contact

Author details

Dr Gregori M. Kurtzman
Implant Cosmetic Dental Center
3801 International Drive 102
Silver Spring, MD 20906, USA
Tel.: +1 301 5983500
dr_kurtzman@maryland-implants.com
www.maryland-implants.com

Literature

Kurz & bündig

Der Schlüssel für eine erfolgreiche Endodontie liegt einerseits in der gründlichen Reinigung des Wurzelkanalsystems und andererseits in dessen Versiegelung. Obwohl rotierende Feilen die Effizienz der Instrumentierung verbessert haben, kann der Behandler feine und verästelte Nebenkanäle mechanisch nur schwer erreichen. Um bakterielle Ablagerungen an schwer zugänglichen Stellen zu beseitigen, erfolgt die Reinigung des Kanalsystems daher mittels Natriumhypochloritlösungen. Doch auch unter Einsatz von Spüllösungen lassen sich nicht alle Bakterien entfernen. Studien haben gezeigt, dass die zusätzliche Anwendung eines Er:YAG-Lasers die Effizienz dieser Lösungen verstärkt und die Desinfektion im Wurzelkanalsystem verbessert. Neben den Hauptkanälen können durch Laseranwendung auch die stark verzweigten Nebenkanäle und andere schwer zugängliche Bereiche gesäubert werden, sodass eine vollständige Obturation des Kanalsystems stattfinden kann. Ein zusätzlicher Vorteil ist die antibakterielle Wirkung des Lasers; hierdurch werden Bakterien innerhalb der Kanalanatomie abgetötet und der gesamte Zahn bis hin zum parodontalen Ligament sterilisiert.

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History and development of the WFLD

Author: Prof. Kenji Yoshida, Japan

In 1988, the first International Congress of Laser in Dentistry hosted by Prof. Hajime Yamamoto, took place in Tokyo in Japan (Fig. 1). This was the first world-wide meeting of clinicians and scientists in the area of laser dentistry. People from around the world in total 16 countries and 400 participants came to this conference to discuss the application of lasers in research and clinical practice in the dental field. Owing to the high-quality presentations, the event was a huge success. Thus, it was decided to hold an international conference once every two years. Out of this intention, the International Society for Lasers in Dentistry (ISLD) was born (Fig. 2).

Later, the ISLD was renamed to "World Federation for Laser Dentistry" (WFLD). The objective of the association has always been to serve as a non-profit medium for the exchange, advancement and dissemination of scientific knowledge related to the use of lasers for application and research in the oral and dental environment.

Transitioning from ISLD to WFLD

In 2006, there was an important transition period in the WFLDs history. At the tenth ISLD congress in Berlin in Germany (Figs. 3 & 4) the executive board agreed on several changes. Although the ISLD had already met for the tenth time and could record many achievements in the development of laser dentistry to that date, it was still weak on an organisational level. Thus, the board considered how to form the associa-

Fig. 1: International Congress of Laser in Dentistry in Tokyo in 1988.
Fig. 2: First executive meeting in Tokyo in 1988.
Figs. 3 & 4: Organisational changes were discussed at the ISLD executive board meeting in Berlin in Germany in 2006.

Fig. 1


Fig. 2


Fig. 3


Fig. 4

tion into a more powerful academic body. Significant changes were made that also affected the association's legislative.

1. Reformation of the organisational structure

The organisation was grouped into five divisions: The North American Division, the South American Division, the Middle East and Africa Division, the Asian Pacific Division and the European Division. For each division, one board director was elected. In addition to the director of the newsletter and website and the already existing directors, that resulted in a total of 13 board directors.

2. Renaming the organisation

In the course of restructuring, the executive board decided on renaming the ISLD. To reflect the organisation's worldwide reach and importance, they agreed on the new name "World Federation for Laser Dentistry" (WFLD).

3. Adapting the annual membership fee

After the restructuring had been approved at the executive board meeting, it was again discussed at the country representative meeting. After a partial revision, approval for the proposal was reached at the general assembly meeting. In the course of this, the annual membership fee was also adapted.

Based on these approved changes, the reformation of the organisation was launched by Prof. Samir Nammour, who was president from 2006 to 2008. The ISLD/WFLD has gone from strength to strength owing to the expert guidance of its engaged presidents (Fig. 5).

Present WFLD activities

Nowadays, the WFLD is a powerful academic association in which each board member contributes to the organisation's success according to his or her respective role. The current board consists of 11 members headed by Prof. Kenji Yoshida as the president (Tab. 1). Furthermore, 14 associations in the area of laser dentistry from all over the world are registered as affiliate society members of the organisation (Tab. 2). In each of the five divisions, they perform academic activities, such as lectures, trainings and seminars. For example, the European Division has held six WFLD division conferences so far.

Besides its academic activities, the WFLD is involved in two professional publications. In its official journal *Photomedicine and Laser Surgery* (published by Mary Ann Liebert), it publishes current papers dealing with phototherapy and the use of lasers in various fields of medicine, including dentistry. The journal has an impact factor of 1.680. Additionally, the WFLD publishes *laser–international magazine of laser dentistry* (published by OEMUS MEDIA AG) in cooperation with the German Association for Laser Dentistry (DGL). This bilingual (English/German)

1988–1990 **Hajime Yamamoto** Japan

1990–1992 **Jacques Melcer** France

1992–2000 **Lynn Powell** USA

2000–2002 **John Frame** UK

2002–2004 **Loh Hong Sai** Singapore

2004–2006 **Isao Ishikawa** Japan

2006–2008 **Samir Nammour** Belgium

2008–2010 **Norbert Gutknecht** Germany

2010–2012 **Jean-Paul Rocca** France

2012–2016 **Aldo Brugnera Junior** Brazil

Fig. 5: Past Presidents of ISLD/WFLD.

Fig. 6


Fig. 7

magazine provides regular updates on international laser dentistry in the form of user-oriented case studies, scientific reports and product information focusing on the international and German laser market. Additionally, the magazine includes reports from international scientific congresses and symposia. The WFLD is also planning to publish a book titled *Laser Dentistry: Current Clinical Applications* with Profs. Aldo Brugnera Jr. and Samir Nammour as editors. Over more than 700 pages, the book will deal extensively with the latest findings from laser dentistry, presented by professionals from all over the world.

The WFLDs activities as an academic organisation are noteworthy. After the organisational restructuring of the WFLD, the official website, www.wfldlaser.com, was launched. Here, members can obtain the latest information on the organisation and upcoming events.

Past and future congresses

The last congress of the WFLD was held from 17 to 19 July 2016 in Nagoya in Japan, under the theme "Light to brighten the future" (Fig. 6). With this theme, the aim of the 15th congress was to move ahead from existing laser dentistry and dental health, seeking new developments through extensively incorporating "light" into the diagnosis and treatment of patients. Approximately, 510 participants from

WFLD executive committee 2016–2018

Kenji Yoshida (Japan)	President
Toni Zeinoun (Lebanon)	President-elect
Sajee Sattayut (Thailand)	General Secretary
Umberto Romeo (Italy)	Treasurer
Ambrose Chan (Australia)	Chairman of Asian & Pacific Division and Website Editor
Melissa Andreia Marchesan (USA)	Chairman of North American Division
Dimitris Strakas (Greece)	Chairman of European Division
Aldo Brugnera Junior (Brazil)	Chairman of North American Division, Immediate past President
Roger Bassit (Lebanon)	Chairman of Middle East & North African Division
Samir Nammour (Belgium)	Chairman of WFLD Legal affairs and international
Norbert Gutknecht (Germany)	Chairman of WFLD Headquarter & Governmental affairs

Tab. 1


Fig. 8

Fig. 6: WFLD President Prof. Kenji Yoshida was Chairman of the 15th WFLD congress in Nagoya in 2016.
Fig. 7: Industry exhibition at the 15th WFLD congress presenting the latest developments in dental laser technology.
Fig. 8: WFLD executive board meeting in Berlin in June 2017.

40 countries came to this forward-looking congress. In total, 174 papers were presented by speakers from all around the world. Furthermore, participants were able to visit the impressive industry exhibition presenting the latest developments in dental laser technology (Fig. 7). In addition, WFLD Basic Laser Certification Courses were held on 16 July 2016 by eight overseas speakers with 69 attendees.

In 2018, the ISLD/WFLD is now celebrating its 30th anniversary. This event will take place alongside the 16th World Congress in Laser Dentistry in Aachen in Germany. The congress will be held from 1 to 3 October 2018 in conjunction with the 27th annual meeting of the DGL. The Chairman of the congress organising comittee Prof. Norbert Gutknecht (RWTH Aachen University hospital, Germany) and the German team have already planned projects for the upcoming joint congress. The planning was already discussed at the WFLD executive committee meeting in June 2017 (Fig. 8). We hope for many interesting lectures and lively participation that will make this special congress a great success. Finally, we strongly hope for happiness, peace and harmony, contributing to the future of the WFLD and oral health promotion._

contact

Prof. Kenji Yoshida
President of the WFLD
Department of Oral and Maxillofacial Surgery
School of Dentistry
Aichi Gakuin University, Nagoya, Japan
kenji@dpc.aichi-gakuin.ac.jp

WFLD Affiliation

Belgian Academy of Laser Therapy in Dental Medicine
Brazilien Association for Laser Dentistry
Bulgarian Denal Laser Society (BDLS)
Dental Laser Academy
German Society for Laser Dentistry (DGL)
Greek Society for Laser Dentistry (GDSL)
Indian Dental Association
Israel Society of Laser in Dentistry
Italien Society of Laser Dentistry
Iranian Medical Laser Association
Japanese Society for Laser Dentistry (JSLD)
Polish Society for Laser Dentistry
Spanish Society of Laser an Light Therapy in Dentistry (SELO)
Ukrainian Society of Laser Dentistry

Tab. 2

Successful communication in your daily practice

Part IV: Promoting a new service

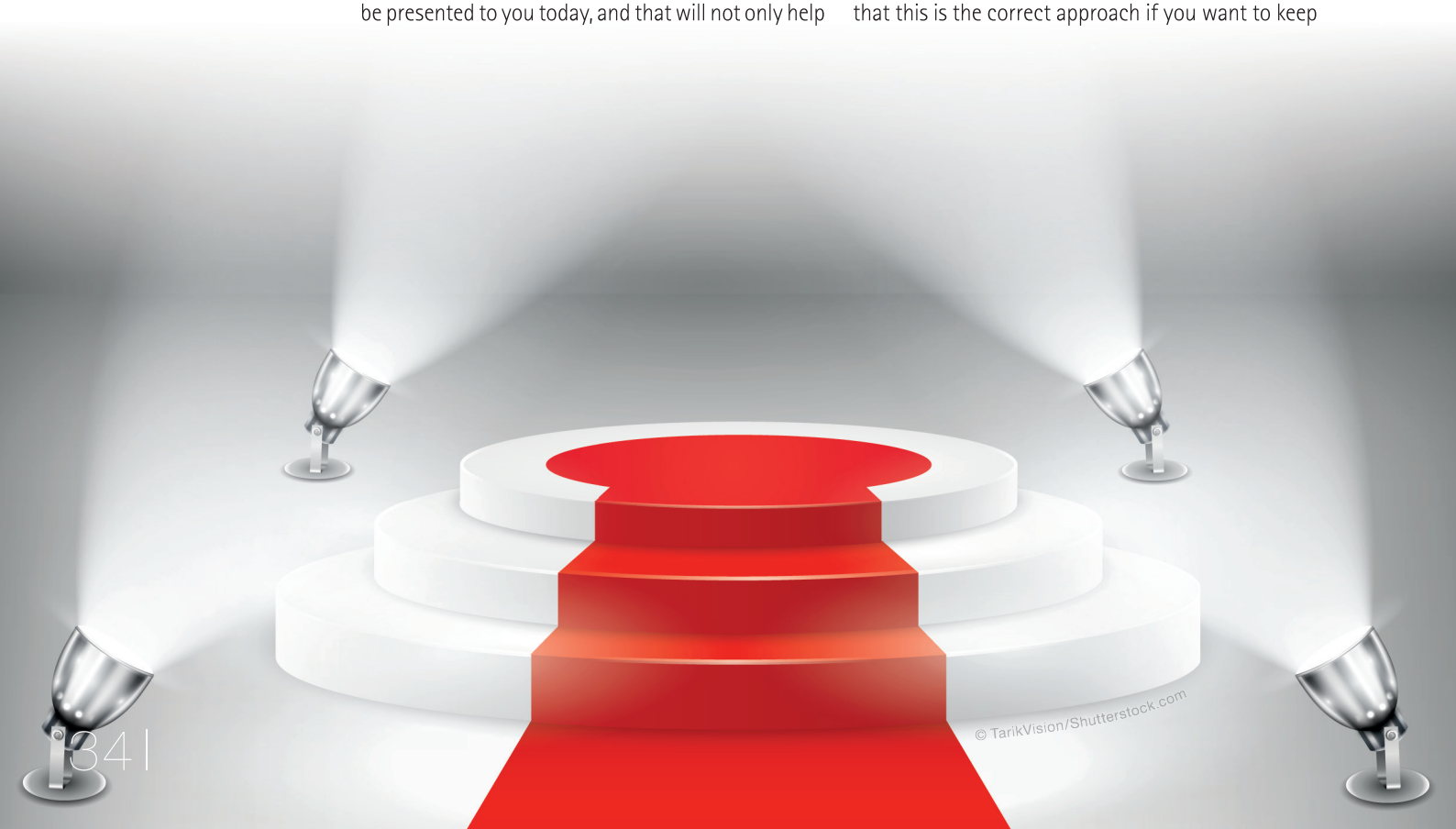
Author: Dr Anna Maria Yiannikos, Germany & Cyprus

My dear readers, be cordially welcomed again to the series "Successful communication in your daily practice". I am Dr Anna Maria Yiannikos, and I am in the happy position to present you the 4th part of this series filled with helpful communication protocols. This series includes the most popular and challenging scenarios that might occur at your dental practice, and how you can deal with them so that your patients always leave your practice feeling: "My dentist is THE BEST!"

The specialised communication protocol that will be presented to you today, and that will not only help you to solve your clinics communication problems but also to increase your revenues, is... how to promote a service or technology before you apply it. In the following, I will be describing 5 unique steps that will guarantee the increase of your patients' interest!

Promoting a new service

Over the years, you will have the urge to buy new equipment, to launch new technologies or a new service at your clinic (like for example laser, CAD/CAM technology or implant treatment). Everyone knows that this is the correct approach if you want to keep



ahead from competition and have a constant improve to the quality of your services.

Your concern of course is how you will inform your patients as soon as possible about this new development in order to have the desirable impact and results. You want to boost their interest in your new service so that they will accept it immediately when you propose it to them for the first time.

5 steps to promote a new service

Congratulation! You have decided on widening your portfolio to another great service or technology! After having implemented the new service, take a second to think of what you are expecting from it. Do you expect to gain an increase on sales, on profits, and an immediate ROI (Return On Investment)? Just picture yourself receiving the above results successfully by using only the following 5 essential steps.

Step 1: Clarify your patients' interests

Before you are going to apply the unique new technology in your dental clinic (although you have already ordered it from your supplier), make a short patient survey in which you should ask the following questions:

"Tick the most desirable new technology that you find essential for your dental treatment." (Technologies listed below)

or

"In case that we have this new service, would you choose it?"

or

"Would you share the information of this new technology or service that you have heard of we are offering at our clinic?"

Be sure that your patients already know about the benefits of the new technology you want to apply in your practice. Otherwise, rephrase the question. In case of buying a laser device, the question could be for example:

"Would you be interested to get a filling without pain, drill, and anaesthesia with our latest laser technology equipment?"

After having clarified your patients' interests, proceed with step 2. But, you should be careful with the following step! Although, you probably might already know that you are going to implement a certain new service, you should be 100% sure of this before starting a promotional campaign to educate your patients. Otherwise, you might lose them. Once a desire is initially raised, they might try to find a similar service elsewhere, and switch to one of your colleagues/competitors instead.

Step 2: Educate your patients

Start educating your patients through your blog, articles on your Facebook page, and your website. Be sure to thoroughly explain to them the WIIFM (What's In It For Me) concept—the actual benefits for them! Otherwise, I will guarantee you that they will not pay any attention to what you are saying or doing.

Step 3: Talk personally

Talk personally with your patients regarding the upcoming technology when you have them on spot. When talking to them, you should use phrases like:

"Because you are one of the most valuable patients we have, I would like you to be one of the first to know that we will soon have this unique service at our clinic..."

Step 4: Use opinion leaders

Another crucial step in order to promote your new service is to talk about it when you are in social gatherings. You should treat this "news" like it was gossip, as if you are informing your close friends about the latest trend they need to know all about. Grab the opportunity when you go out with friends and talk about the new thing at your clinic that you are so excited about. Remember: Always explain the benefits!

Furthermore, you can educate the public by making your own VIP seminars at your clinic. This is a very powerful promotion tool that I can highly encourage you to use.

Step 5: Be the expert

It does not matter whether other practices offer the technology or technique you have recently implemented to your practice as well. What is crucial is to demonstrate and emphasise those points that differentiates your service from others. Differentiation points could be your unique specialisation in this certain subject, or remarkable courses that you attended in order to gain expertise. Don't be shy to inform the public of how well-educated you are in this special new service or technology.

Just do it!

Isn't that easy? In applying these 5 steps, you will be well-prepared when launching the actual new service or technology. Your patients will already await your new service and will be excited about it. Imagine that they will wait in line for your latest service to be applied at them! I always implement the above 5 steps when I have a new service to introduce to my patients.

These strategy is definitely working, which I can tell you from my own experiences. When I bought my first laser device 15 years ago for example, investment costs were actually covered within six months. You think that this is too difficult? Not at all! You only have to focus, be prepared, and use the 5 steps strategically!

In the next issue of laser magazine, I will present to you the fifth part of this unique series of communication concepts. In this, I will teach you how to deal with a bad online review from a stranger. I will help you to discover the 5 fantastic tips that you will just love!

Until then, remember that you are not only the dentist of your clinic, but also the manager and leader. You can always send me your questions and request for more information and guidance at dba@yiannikosdental.com or via our website www.dbamastership.com. Looking forward to our next trip of business growth and educational development!_

Author details

contact

Dr Anna Maria Yiannikos
Adjunct Faculty Member of AALZ
at RWTH Aachen
University Campus, Germany
DDS, LSO, MSc, MBA
dba@yiannikosdental.com
www.dbamastership.com

Kurz & bündig

Im vierten Teil der Serie „Erfolgreiche Kommunikation im Praxisalltag" verrät die Autorin, wie Zahnärzte Neuerungen in der Praxis erfolgreich bewerben. 5 Schritte sollen dabei helfen. Im ersten Schritt wird zunächst eine kleine Umfrage gestartet, um das generelle Interesse der Patienten an der angedachten Neuerung auszuloten. Ist sich der Zahnarzt zu 100 % sicher, diesen neuen Service einzuführen, geht es in Schritt zwei daran, die Patienten darüber aufzuklären. Dies geschieht beispielsweise über die eigene Website, Facebook-Seite und den Blog. In allen Beiträgen sollte dabei der Nutzen der Neuerung für den Patienten deutlich herausgestellt werden. Über die direkte Ansprache wird in Schritt drei der neue Service auf einer persönlichen Ebene an den Patienten kommuniziert. Im vierten Schritt schlägt die Autorin vor, die „Neuigkeit" wie Klatsch und Tratsch im Rahmen von gesellschaftlichen Ereignissen weiterzugeben. Fünftens und letztens ist es wichtig, die durch Ausbildung gewonnene Expertise des Zahnarztes innerhalb des neuen Services herauszustellen. Damit grenzt sich die Praxis von Mitbewerbern ab und schafft perfekte Voraussetzungen für die erfolgreiche Einführung des neuen Angebots.

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c/o Universitätsklinikum Aachen
Klinik für Zahnerhaltung
Pauwelsstraße 30
52074 Aachen, Germany

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BIC: AACSDE 33

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Surname: _____

Date of birth: _____

Approbation: _____

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ZIP/city: _____ Fax: _____

Country: _____ E-Mail: _____

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☐ I am employed at the practice _____

☐ I am employed at the University _____

I apply for membership in the German Association of Laser Dentistry (Deutsche Gesellschaft für Laserzahnheilkunde e.V.)

_____

Place, date Signature

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Signature of account holder This declaration is valid until written notice of its revocation

Uniting the dental laser world

Author: Dr Dimitris Strakas, Greece

On 22 and 23 September, the 6th European Division Congress of the World Federation for Laser Dentistry (WFLD-ED) took place in Thessaloniki, Greece. Although, the congress has closed its doors long since, the taste left to all is unforgettable. The congress was unanimously characterised as maybe the most successful event in laser dentistry during the last years.

With more than 400 participants from 34 countries, about 100 oral presentations in two main halls and four satellite rooms, 30 e-poster presentations, eight workshops and 23 sponsors in a 500 m² exhibition area, the event was a total success. The sunny and lively city of Thessaloniki, and the incomparable location of the five-star venue of Makedonia Palace hotel, aided also to the success of our congress.

It was a two-year work that led to this great event, and we are proud that many new dentists have entered the world of laser dentistry through this. The scientific and social programmes were meticulously planned and executed in order to have a balanced and

Fig. 1: Scientific committee of the 6th WFLD-ED congress.

Fig. 2

Fig. 2: Dr Dimitris Strakas opened the 6th WFLD-ED congress in Thessaloniki, Greece. – **Fig. 3:** More than 400 participants came to the congress on 22 and 23 September 2017. – **Fig. 4:** Participants had the opportunity to discover new laser devices and technological improvements at the exhibition.

a full-speed rhythm throughout the congress. World opinion leaders, clinicians and young researchers presented their work and the audience was packing the halls to absorb as much information as they could.

Moreover, new laser devices and technological improvements in all available wavelengths in dentistry were exhibited, and everybody had the opportunity to discuss, learn and test these devices with the representatives of the companies.

We are delighted that the "Laser Party" we had planned was a success as well, and a new network has been created with many parts involved. The goal was always one: To unite the dental laser world, and to elevate the level of such congresses in a way that almost all participants will be eager to anticipate the next event.

As the Chairman of WFLD-ED, I would once more like to thank all of those who have witnessed and been part of the 6th congress in Thessaloniki, and I urge you to expect more of the upcoming World Congress of WFLD held next year from 1 to 3 October 2018 in Aachen, Germany._


Fig. 3


Fig. 4

contact

WFLD-ED
World Federation for Laser Dentistry
secretariat@wfld-thessaloniki2017.com
www.wfld-thessaloniki2017.com

16th World Congress of the WFLD

Authors: Prof. Dr Norbert Gutknecht, Dr Dimitris Strakas, Leon Vanweersch & Dr Stefan Grümer, Greece & Germany

After the huge success of the WFLD-European Division congress in Thessaloniki, Greece, just some weeks ago, the preparations for the upcoming 16th World Congress of the WFLD in Aachen, Germany, are running at full speed. The local organising team with Prof. Dr Norbert Gutknecht as Chairman and Dr Dimitris Strakas, Leon Vanweersch and additionally Dr Stefan Grümer from the German Association of Laser Dentistry (DGL) as Vice Chairmen, is hard working to make this congress the best visited in the history of the WFLD.

The World Federation for Laser Dentistry (ISLD before 2006) has been founded in 2008 and its aim is to serve as a non-profit medium for the exchange, advancement and dissemination of scientific knowledge, related to the use of lasers for application and research in the oral and dental environment. Since many years, the WFLD is the most important international society in the field of lasers in dentistry. Their congresses are held every two years, and attract international delegates from around the world. The German DGL is the sec-

WFLD
The World Federation for Laser Dentistry

dgl Deutsche Gesellschaft für laser Zahnheilkunde e.V.

AALZ
World Academy for Laser Education in Dentistry

ond oldest dental laser society worldwide and was founded in 1991. The already 27th annual meeting of the DGL will be held as a joined meeting with the WFLD. The same counts for the 6th International WALED (World Academy for Laser Education & Research in Dentistry) Congress, the alumni association of the Mastership and MSc programmes in Lasers in Dentistry of the RWTH Aachen University.

For many laser dentists worldwide, this WFLD World Congress will be a "coming back home to Aachen", and therefore the organisation expects a big amount of participants even up to more than 500. Beside the "laser dentists", the scientific board also expects a good number of participants who will have a first contact with Laser Dentistry, being future users of lasers, because the new set up of the scientific programme will be highly attractive for this group of participants.

Organising this congress in the RWTH Aachen University Hospital will give the organisation the unique possibility to upgrade the congress structure with life patient demonstrations during keynote lectures and during workshops. This will underline the new structure of this world congress, making it a much more clinical orientated congress.

The congress will integrate science and practical experience on different levels of presentations and demonstrations, like:
- high ranked international keynote speaker lectures
- on stage life patient demonstrations
- oral presentations combined with clinical relevant skill training sessions
- interactive poster presentations
- short presentations of latest research findings
- clinical case presentations
- rotating company supporting workshops, gaining continuous education certificates
- certification workshops before, during and after the congress.

Of course, the local organisation will ensure outstanding social events in Aachen during the congress days. On Monday 1 October after the first congress day, a very promising get-together meeting will be organised, and the WFLD dinner party will be on Wednesday 3 October in the "Schloss Rahe" castle, of course with several special surprising acts. The fees for this congress will be very affordable for a greater amount of dentists worldwide. Additionally, there will be very interesting package offers for societies and companies.

Beside the congress, for many visitors it will be a pleasure to visit Aachen, the city of Charlemagne (Carl the Great). Housing one of the most significant cultural monuments of the world, Aachen is the most westerly city in Germany. In the 1st to 4th century AD, the Romans were already building baths and temples on its hot springs. From 790 AD, construction work began on the palace chapel and when Charlemagne dies in 814 AD, he was buried there. Aachen is full charm. Let it captivate you! A wide variety of shops, quaint streets and welcoming cafes, typical of the central area around the Cathedral, invite to linger.

16TH WORLD CONGRESS
WFLD 2018
AACHEN
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1 – 3 OCTOBER 2018
RWTH AACHEN UNIVERSITY
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Before or after the congress visitors can easily organise additional trips to the capitols of surrounding countries, like Brussels (45 min. per train) within 120 km, Amsterdam (2 hours per train) within 200 km, Paris (2,5 hours per Thalys train) within 400 km, or even London within 500 km (4 hours per Thalys/Eurostar train or 45 min. flight). Old historical cities in Germany, like Cologne or Düsseldorf, are within 100 km (45 min. per train) distance from Aachen.

The local organising committee believes that the participants of the 16th WFLD World Congress will have a very successful time in the European city of Charlemagne.

Looking forward to welcome you this time in Aachen, the heart of Europe!_

contact

World Federation for Laser Dentistry
University Hospital Aachen
Pauwelsstraße 30
52074 Aachen, Germany
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www.wfldlaser.com

Fotona

Laser-based periodontal therapy

A study recently published in the *Journal of the Laser and Health Academy* on periodontal tissue regeneration following Fotona Twinlight® Er:YAG and Nd:YAG Periodontal Therapy has revealed the ability of the combined TwinLight® laser treatment of chronic periodontitis to promote bone regeneration. Four private dental practices conducted a retrospective case series analysis of the before and after radiographic images of patients who received Fotona TwinLight® Periodontal Treatments.

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The analysed images provide evidence of periodontal tissue regeneration following the combined Fotona TwinLight® treatment. This evidence is in addition to the previously published evidence of probing depth reduction and clinical attachment level gain in medium deep periodontal pockets. The non-surgical Fotona TwinLight® Periodontal Treatment with the complementary effects of the Er:YAG and Nd:YAG laser thus promises to become a preferred alternative treatment for moderate-to-severe chronic periodontitis.

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Dentists can benefit from the innovative Gemini 810 + 980 diode laser as it increases the quality and comfort of soft tissue surgery and with this achieves a higher patient satisfaction.

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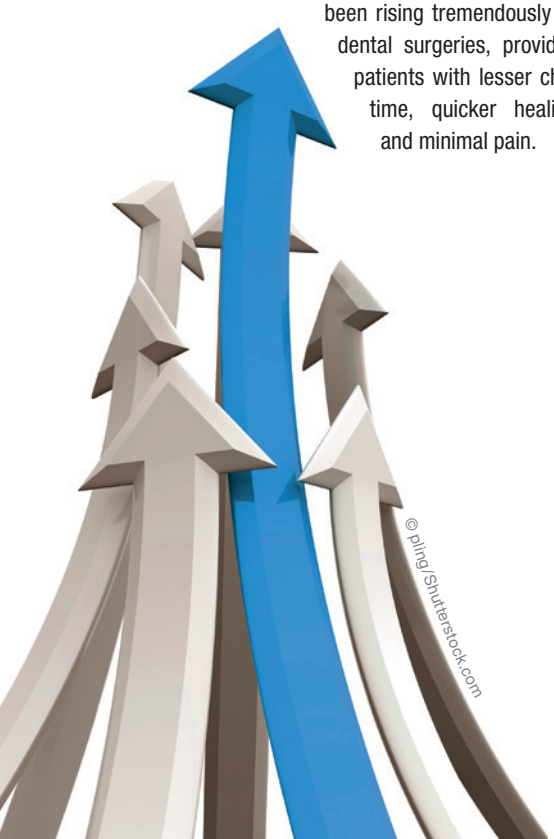
Increased growth rate forecast for

Global dental lasers market

The global dental lasers market is projected to register a staggering compound annual growth rate (CAGR) throughout the forecast period 2017 to 2022. Global revenues from the market are anticipated to exceed US$600 Mn by the of the forecast period. Increasing disposable income of people across economies including Germany, France, the US, the UK, Italy, and Spain, has driven adoption of expensive procedures of cosmetic dentistry, such as dental lasers. This factor is expected to fuel demand for new innovative technologies as well as products associated with dental lasers.

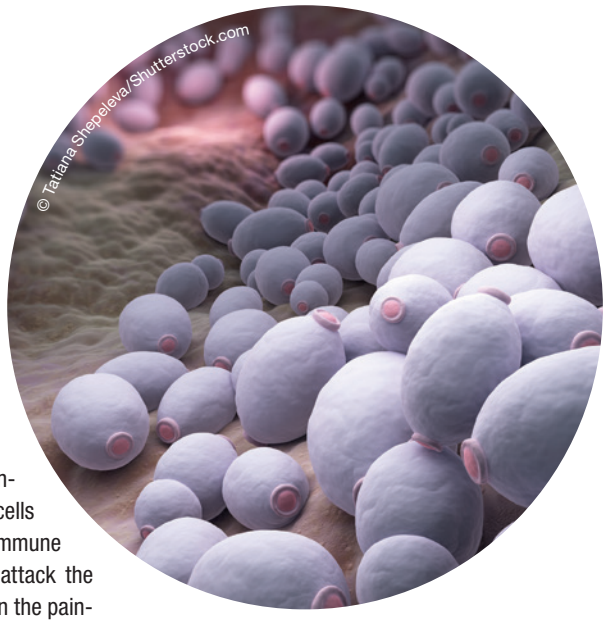
Dental Clinics are estimated to remain the largest end-users of dental lasers in the global market. Factors such as the rise in use of handheld, portable, and handpiece lasers equipped with hybrid functions, and rapid adoption of advanced technologies are expected to favour demand for dental lasers in dental clinics.

North America is poised to remain the most lucrative market for dental lasers, with sales projected to exhibit a double-digit CAGR over the forecast period. The incidences of dental problems, along with the growing geriatric population have surged significantly in the region. Moreover, adoption of lasers has been rising tremendously for dental surgeries, providing patients with lesser chair time, quicker healing, and minimal pain.



Mechanism behind

Oral candidiasis discovered



A recently discovered peptide toxin has been identified by a team of UK and US researchers as the cause of the development of oral candidiasis, also known as oral thrush. The substance, called "Candidalysin", which is produced by the *Candida albicans* fungus, was found to punch a hole into cells lining the mouth, thus triggering the immune response. Helper immune cells then attack the otherwise harmless fungus, resulting in the painful infection.

In their study, the researchers used a combination of human oral epithelial cells cultured in laboratory dishes and mice infected orally with Candida, to show the central importance of Candidalysin. Discovered in 2016 by Prof. Julian Naglik of King's College London in the UK, the toxin is the first peptide toxin identified in any fungus that was found to infect humans. Understanding its role in the infection mechanism in the mouth could eventually lead to better treatments for the condition and other fungal infections, the scientists said. They added that, despite millions of fungal infections worldwide, there are no commercially available anti-fungal vaccines.

Using near-infrared light to

Identify high-risk arterial plaques

Patients at risk of heart attacks and strokes may be spotted earlier thanks to a diagnosis tool that uses near-infrared light to identify high-risk arterial plaques, according to research carried out at WMG, University of Warwick, the Baker Institute and Monash University. The scientists observed that when they increased the wavelength of the light currently used to visualise the fatty build-up found in arteries (atherosclerotic plaques) they could selectively identify the rupture-prone deposits, which commonly lead to blood clots, heart attacks and strokes.

While some fatty deposits or plaques can remain stable for years, other high-risk cases develop complications, such as bleeding into the plaque, which leads to the formation of cracks and rupture of the fatty plaque. This can result in blockages in the blood vessels causing a heart attack or stroke. Current imaging techniques are able to identify some characteristics of high-risk plaques but none are generally accepted as reliable methods for selectively detecting the dangerous plaques.

After further investigation with clinical trials this method of imaging technique with laser light could be used to assess unstable fatty arterial plaques and could be used to monitor the effectiveness of the drugs used to prevent heart attacks or strokes.

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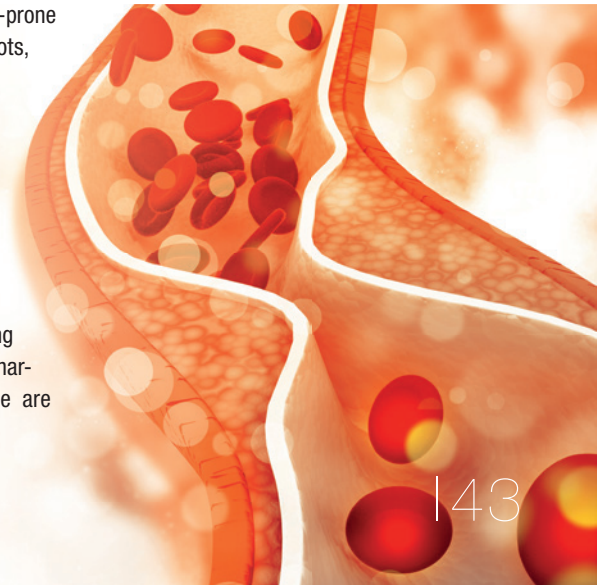

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Prof. Dr. Norbert Gutknecht

Save the date

Liebe Kolleginnen und Kollegen, liebe Freunde der Lasertechnologie,

wichtige Ereignisse müssen langfristig geplant, aber auch frühzeitig genug angekündigt werden. Um potenziellen Gästen eine persönliche Terminplanung zu ermöglichen, verschickt man eine „Save the date"-Karte, wie es z. B. bei Hochzeiten, Jubiläen und Ehrungen gemacht wird.

Warum erhalten Sie heute eine „Save the date"-Ankündigung?

Im nächsten Jahr wird nicht nur der 16. WFLD-Kongress, die 27. Jahrestagung der DGL sondern auch das 30-jährige Jubiläum der ISLD/WFLD stattfinden und gefeiert werden. Um diesem historischen und wissenschaftlichen Ereignis einen adäquaten Rahmen zu geben, wurde das Universitätsklinikum Aachen als Veranstaltungsort ausgewählt. Lassen Sie sich zu einem außergewöhnlichen Event einladen, dessen Programmvielfalt mit Sicherheit auch bei Ihnen eine positive Erinnerung hinterlassen wird. Deshalb hier die Ankündigung:

Save the date
WFLD World Congress
1. bis 3. Oktober 2018 in Aachen

Weiterführende Informationen finden Sie auf den folgenden Seiten dieser Ausgabe.

Rückblickend auf das Jahr 2017 darf man sagen, dass sich eine positive Trendwende hinsichtlich der Nutzung von Lasern in der Zahnheilkunde abgezeichnet hat. Nicht nur, dass immer mehr laserrelevante Themen auf konventionellen zahnärztlichen Kongressen vorgetragen werden, sondern auch, dass sich Laserkongresse einer steigenden Anzahl von Teilnehmern erfreuen, wie es am deutlichsten anlässlich des europäischen Laserkongresses WFLD-ED in Thessaloniki zu sehen war.

Für die vor uns liegenden Festtage und das neue Jahr 2018 darf ich Ihnen viel Glück, Gesundheit und Erfolg wünschen, verbunden mit der Freude, Sie zum WFLD-Weltkongress in Aachen begrüßen zu dürfen.

Ihr,

Prof. Dr. Norbert Gutknecht
Organisierender Vorsitzender WFLD 2018, Aachen

WFLD- und DGL-Kongress in Aachen

Autoren: Prof. Dr. Norbert Gutknecht, Dr. Dimitris Strakas, Leon Vanweersch & Dr. Stefan Grümer

Nach dem großen Erfolg des WFLD-European Division-Kongresses in Thessaloniki (Griechenland) vor einigen Wochen laufen die Vorbereitungen für den bevorstehenden 16. Weltkongress der WFLD in Aachen auf Hochtouren. Das lokale Organisationsteam mit Prof. Dr. Norbert Gutknecht als Vorsitzendem und Dr. Dimitris Strakas, Leon Vanweersch und Dr. Stefan Grümer von der Deutschen Gesellschaft für Laserzahnmedizin (DGL) als stellvertretende Vorsitzende arbeitet hart daran, diesen Kongress zu dem am besten besuchten Kongress in der Geschichte der WFLD zu machen.

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RWTH AACHEN UNIVERSITY
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Der Weltverband für Laserzahnheilkunde WFLD (ISLD vor 2006) wurde 2008 gegründet, mit dem Ziel, als gemeinnütziges Medium für den Austausch, die Weiterentwicklung und Verbreitung wissenschaftlicher Erkenntnisse im Zusammenhang mit der Verwendung von Lasern für die Anwendung und Forschung in der Zahnmedizin zu fungieren. Seit vielen Jahren ist die WFLD die wichtigste internationale Gesellschaft im Bereich Laser in der Zahnmedizin. Ihre Kongresse finden alle zwei Jahre statt und ziehen internationale Delegierte aus der ganzen Welt an.

Die Deutsche Gesellschaft für Laserzahnheilkunde (DGL) ist die zweitälteste zahnmedizinische Lasergesellschaft weltweit und wurde 1991 gegründet. Die bereits 27. Jahrestagung der DGL wird als gemeinsa-

WFLD The World Federation for Laser Dentistry

dgl. Deutsche Gesellschaft für laser Zahnheilkunde e.V.

AALZ World Academy for Laser Education in Dentistry

mes Treffen mit der WFLD stattfinden. Gleiches gilt für den 6. Internationalen WALED-Kongress (World Academy for Laser Education & Research in Dentistry), den Alumni-Verein der Master- und MSc-Programme für Laser in der Zahnmedizin der RWTH Aachen.

Neugestaltetes Kongressprogramm

Für viele Laserzahnärzte weltweit wird dieser WFLD-Weltkongress eine „Heimkehr nach Aachen" sein. Daher erwartet die Organisation mehr als 500 Teilnehmer. Neben den „Laserzahnärzten" erwartet der wissenschaftliche Beirat auch eine Vielzahl von Teilnehmern, die erstmalig Kontakt mit der Laserzahnmedizin haben werden. Für diese zukünftigen Laseranwender wird das neugestaltete wissenschaftliche Programm äußerst attraktiv sein.

Als Veranstaltungsort bietet das Universitätsklinikum der RWTH Aachen den Organisatoren die einmalige Möglichkeit, die Kongressstruktur in Vorträgen und während der Workshops mit Live-Patientenvorführungen aufzuwerten. Dies wird die neue Struktur des Weltkongresses unterstreichen und ihn zu einer klinisch orientierten Veranstaltung machen.

Der Kongress wird wissenschaftliche und praktische Erfahrungen auf verschiedenen Ebenen von Präsentationen und Demonstrationen integrieren, wie:
- Vorträge von hochrangigen, internationalen Keynote Speakern,
- Live-Demonstrationen am Patienten,
- mündliche Präsentationen kombiniert mit klinisch relevanten Trainingseinheiten,
- interaktive Posterpräsentationen,
- kurze Präsentationen der neuesten Forschungsergebnisse,
- klinische Falldarstellungen,
- firmenunterstützte Workshops zum Erwerb fortlaufender Ausbildungszertifikate,
- Zertifizierungsworkshops vor, während und nach dem Kongress.

Soziales Rahmenprogramm

Selbstverständlich wird das lokale Organisationsteam während der Kongresstage auch für herausragende, gesellschaftliche Veranstaltungen in Aachen sorgen. Am Montag, dem 1. Oktober wird nach dem ersten Kongresstag ein vielversprechendes Get-together organisiert. Die WFLD-Dinnerparty findet am Mittwoch, dem 3. Oktober im Schloss Rahe in Aachen statt, natürlich mit einigen überraschenden Aktionen. Die Gebühren für diesen Kongress werden für eine größere Anzahl von Zahnärzten weltweit erschwinglich sein. Darüber hinaus wird es sehr interessante Paketangebote für Gesellschaften und Unternehmen geben.

Neben dem Kongress wird es für viele Besucher eine Freude sein, Aachen, die Stadt Karls des Großen, zu besuchen. Aachen ist eines der bedeutendsten Kulturdenkmäler der Welt und die westlichste Stadt Deutschlands. Im 1. bis 4. Jahrhundert bauten die Römer bereits Bäder und Tempel an den heißen Quellen der Stadt. Von 790 n. Chr. an begannen die Bauarbeiten an der Palastkapelle. Als Karl der Große 814 n. Chr. starb, wurde er dort begraben. Aachen ist voller Charme. Lassen Sie sich verzaubern! Eine große Auswahl an Geschäften, malerischen Straßen und einladenden Cafés, die typisch für die zentrale Gegend rund um die Kathedrale sind, laden zum Verweilen ein.

Vor oder nach dem Kongress können die Besucher zusätzliche Ausflüge zu den Hauptstädten der umliegenden Länder unternehmen, wie Brüssel (120 km entfernt; 45 Minuten mit dem Zug), Amsterdam (200 km entfernt; zwei Stunden mit dem Zug), Paris (400 km entfernt; 2,5 Stunden mit dem Thalys Zug) oder sogar London (500 km; vier Stunden mit dem Thalys/Eurostar Zug oder 45 Minuten Flug). Alte historische Städte in Deutschland, wie Köln oder Düsseldorf, sind lediglich 100 km (45 Minuten mit dem Zug) von Aachen entfernt.

Als Organisationskomitee sind wir überzeugt, dass die Teilnehmer des 16. WFLD-Weltkongresses eine interessante und erfolgreiche Zeit in der europäischen Stadt von Karl dem Großen haben werden.

Wir freuen uns darauf, Sie dieses Mal in Aachen, dem Herzen Europas, begrüßen zu dürfen!_

Kontakt

World Federation for Laser Dentistry
Universitätsklinik Aachen
Pauwelsstraße 30
52074 Aachen
membership@wfldlaser.com
www.wfldlaser.com

Fachlich up-to-date mit dem

Spezialisten-Newsletter Laserzahnmedizin

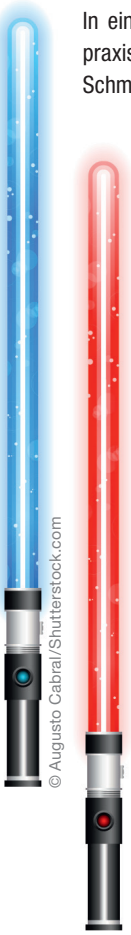
Für Spezialisten im Bereich der Laserzahnmedizin ist es unausweichlich, im eigenen Tätigkeitsschwerpunkt immer auf dem aktuellsten Stand zu sein. Die Informationsbeschaffung und -selektion ist im normalen Praxisalltag angesichts der allgemeinen Informationsflut jedoch nicht immer ganz so einfach.

Hier setzt der Spezialisten-Newsletter Laserzahnmedizin von ZWP online an, der seit mehr als vier Jahren zusätzlich zu dem bereits bestehenden Newsletter-Portfolio erscheint und sich bei den Lesern großer Beliebtheit erfreut. Im Newsletter erhalten Leser neben News, Fachbeiträgen und Webinaren ein thematisches Video sowie das E-Paper zur aktuellen Ausgabe der Publikation *laser – international magazine of laser dentistry* der OEMUS MEDIA AG. Holen Sie sich Ihr monatliches News-Update aus der Laserzahnmedizin unter www.zwp-online.info/newsletter-abonnieren.

Quelle: OEMUS MEDIA AG

Star Wars in der

Lasertherapie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In einer weit, weit entfernten Zahnarztpraxis – es herrschen Bohrgeräusche, Schmerzen und ängstliche Patienten – ist ein Zahnarzt in dentaler Mission unterwegs, um seinen Patienten die Angst vor der Wurzelkanalbehandlung zu nehmen.

Dr. Steve Abernathy aus Arkansas, USA, hat sich für seine Patienten eine ganz besondere Methode ausgedacht, um ihnen die Angst vor einer Wurzelkanalbehandlung zu nehmen. Mithilfe modernster Technik hat sich der amerikanische Zahnarzt in Videoausschnitte der Star Wars-Reihe gebeamt und ist dort in dentaler Mission unterwegs.

Mit dem Video möchte er seinen Patienten zeigen, dass eine Wurzelkanalbehandlung auch schmerzfrei ablaufen kann. Denn Laser sind nicht nur als Waffe wie in der berühmten „Krieg der Sterne"-Filmreihe einsetzbar, sondern auch in der Zahnarztpraxis.

Quelle: Abernathy Dental

Teilnehmerrekord bei

ZWP Designpreis 2017

Seit nunmehr 15 Jahren bewerben sich alljährlich Praxisinhaber, Architekten, Designer, Dentaldepots und Möbelhersteller aus Deutschland und dem umliegenden Europa um den ZWP Designpreis. Dabei konnte die Ausschreibung in diesem Jahr einen Teilnehmerrekord verzeichnen. Genau 72 Praxen sind um den Titel „Deutschlands schönste Zahnarztpraxis 2017" ins Rennen gegangen.

Die Zahnärzte Dr. Sabine Ripka & Kollegen im Stuttgarter Europaviertel konnten die Jury mit ihrer in hochwertiger Schlichtheit gestalteten Praxis, die zudem ein Objekt aufweist, das man eher selten im zahnmedizinischen Kontext antrifft, überzeugen. Die Praxis im Europe Plaza präsentiert auf ihrer „Piazza" einen echten Olivenbaum und vermittelt so ein außergewöhnliches Ambiente für Behandler, Mitarbeiter und Patienten.

Der Einsendeschluss für den ZWP Designpreis 2018 ist der 1. Juli 2018. Unter www.designpreis.org finden Sie ausführliche Informationen zum Wettbewerb sowie alle ZWP Designpreis-Ausgaben der vergangenen Jahre.

Quelle: OEMUS MEDIA AG

ZWP Designpreis

E-Paper ZWP spezial

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WFLD Headquarters
University of Aachen Medical Faculty
Clinic of Conservative Dentistry
Pauwelsstr. 30, 52074 Aachen, Germany
Tel.: +49 241 808964
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