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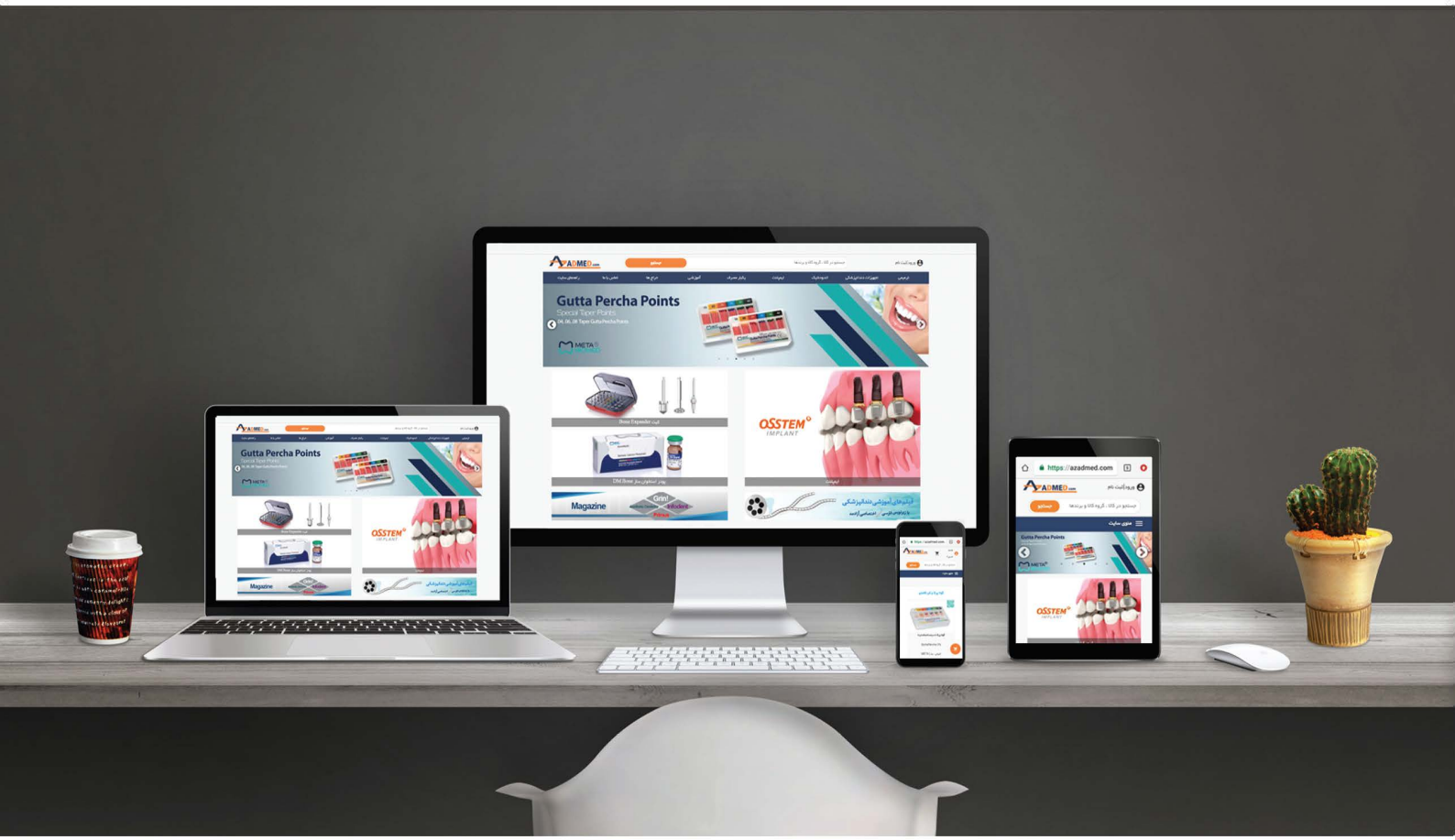

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Prof Dr Norbert Gutknecht

Dear colleagues, dear friends,

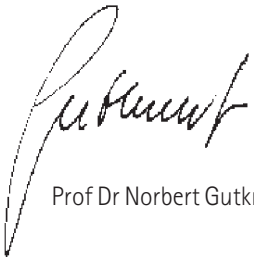
_**Sometimes we wonder** about the content of discussions about the use of lasers between universities and private offices. For decades we have had to listen to arguments such as "if you use a laser you will carbonize the enamel" or "you will overheat and necrotize the soft tissue or pulpal tissue" or "you will destroy root canal structures" or "you will produce micro cracks on root surfaces" and so on. All of these arguments have been investigated seriously and for many years we have gained a lot of evidence on the beneficial effects of lasers used on different types of tissues.

In-vitro studies, clinical studies and scientific case reports have been presented on various conferences, seminars and congresses on all of the five continents. And still there is an insufficiently reflected resistance against this technology. I can understand that a certain kind of pride is hard to overcome and admitting that, although one might be a good dentist, one has no idea of an appropriate use of lasers in dentistry must be equally difficult. Another reason could be the fear of not having enough background information on physics and biophysics to understand how lasers are operated on the tissues found in the oral cavity.

It is actually a shame that we are ready to see an ophthalmologist who uses a laser to improve our sight knowing that we have only two eyes, none of which can be replaced if this laser treatment fails—still we don't believe that there should be a possibility to treat other kinds of tissues in the same way or an equally eloquent way as we believe an ophthalmologist treats our eye.

I am proud of all colleagues around the world who have taken the challenge to submit themselves to an education and are now successfully using lasers in their various dental treatments. You all can be proud to use this technology—and you should be proud by telling other, non-laser users, about your knowledge and success.

Multiple wavelengths greetings,



Prof Dr Norbert Gutknecht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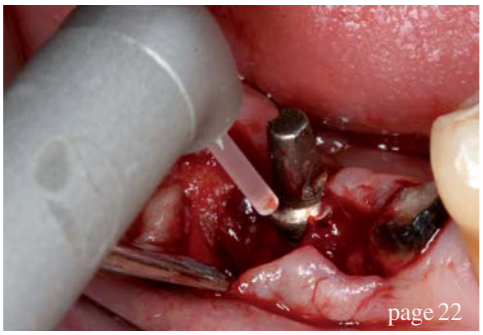
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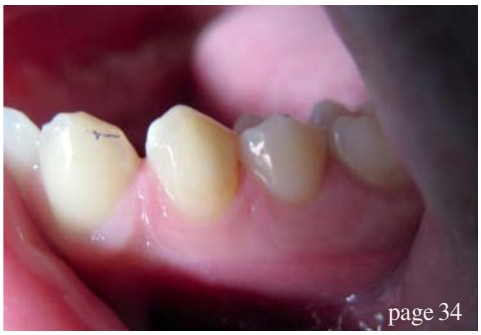
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Effect of diode laser on enamel fissure system

Morphological and microhardness analysis

Authors_Ali M. Saafan, Samah S. Mehani & Nermin M. Yussif, Egypt

_Introduction

Although a declining incidence of dental caries has been observed worldwide, it is still the most prevalent disease in childhood and adolescence.[1] Several methods of prevention have sought to reduce caries prevalence,[2] such as fluoride application, sealants, preventive resin restorations and antibacterial therapy, which can reverse the caries process.[3] Nowadays, sealing materials are gaining acceptance in the scientific community, although they still present some disadvantages: contamination of the operation field and contraction during polymerisation. These issues have led researchers to investigate alternative solutions in order to overcome these limits.[4]

Wear and marginal loss are still the most prominent drawbacks of conventional sealing materials, which lead to exposure of the previously sealed areas.[5] Hence, failure to achieve a satisfactory bond using fissure sealants may be due to the lack of tag formation following poor etching of the prismless structural lines of the fissure system.[6]

Owing to all of these drawbacks of pit and fissure sealants, attention has been directed to laser and its positive effect on the enamel surface. A wide range of lasers (argon, CO_2, Nd:YAG and Er:YAG) have been used to increase the resistance of the tooth structure to caries. It has been demonstrated that laser can alter the permeability and the crystalline structure significantly, promoting the enamel's resistance to demineralisation.[7] The phenomenon responsible for this effect is related to the chemical and physical changes in the enamel induced by laser. The irradiated enamel surface is subjected to water loss between 80–120°C, to decomposition of the small quantity of organic substance at 350°C, to initial loss of carbonate hydroxyapatite between 400–600°C, and to enamel melting at more than 800–1,000°C. The high temperatures reached in the superficial layers of the irradiated areas of the tooth cause melting of the enamel, which then recrystallises, forming hydroxyapatite crystals larger than the initial ones.[8] Tagomori et al. found that the irradiated enamel surfaces show higher surface roughness in comparison with the untreated ones.[9] Marquez et al. observed that the lased surface usually

Fig. 1_An ESEM image of group two 2 shows the rods (R) and interrod regions (I) at X3,000x magnification. Interrod regions (I) are deprived deviate from the normal crystalline arrangement.

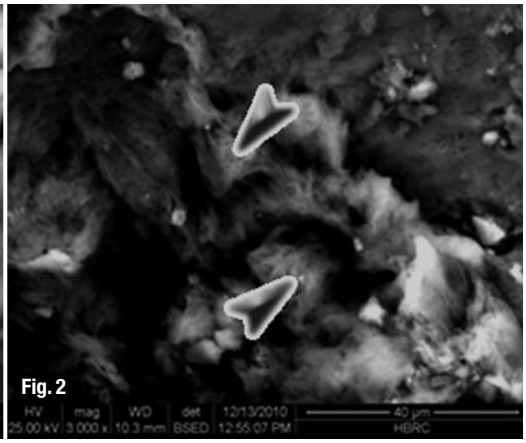

Fig. 2_ An ESEM image of group four 4 shows melting and resolidification of the lateral walls of the fissure and enamel crystals (arrows) at 3,000 x magnification.

Group	1 (control)	2	3	4
Treatment	None	Artificial caries	diode Laser	diode Laser and artificial caries

Table 1_Grouping.

exhibits three layers (from the deepest layer): unaltered enamel crystals,fused crystals and hexagonal hydroxyapatite columns, voids and microcracks on the external surface.[10]

Among the wide range of lasers now used in dentistry, diode lasers offer many advantages that make them quite popular among dentists. Their low cost, small size and ease of use in the oral cavity owing to fibre delivery are important features that favour their use in clinical practice and encourage new studies.[11] Previous studies using diode lasers have demonstrated that the enamel surface of the deciduous teeth underwent melting and resolidification. These changes suggest an increase in the resistance of the enamel to acids, thus possibly playing an important role in the prevention of dental caries.[12]

The aim of this article thus is the evaluation of the microhardness and morphological changes that occur in the fissure system of human dental enamel after diode laser treatment in order to examine its sealing and anti-cariogenic effect.

_Material and method

Sample preparation

Forty disease-free recently extracted permanent molars and premolars were used in the experiment. Extraction had been done for orthodontic treatment. Using a diamond low-speed disc, the teeth were sectioned into two halves buccolingually, which were then used in four different groups (Table 1). Each group contained ten teeth. Group 1 (control group) consisted of teeth with normal enamel. The teeth in group 2 were immersed in ar-

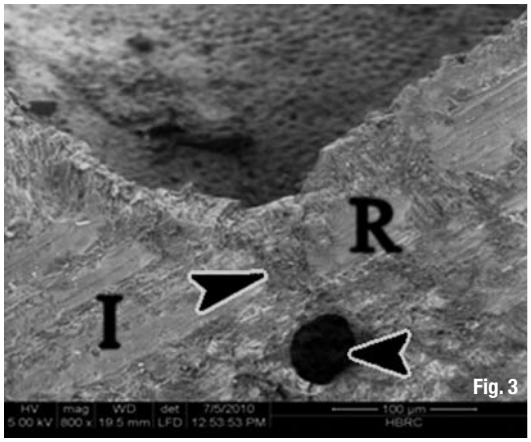

Fig. 3_ An ESEM image of group three 3 shows fusion of the lateral walls of the fissure, leaving retaining the depth of the fissure preserved (black arrow), as well as the rod (R) and interrod regions (I) at 800 x magnification.

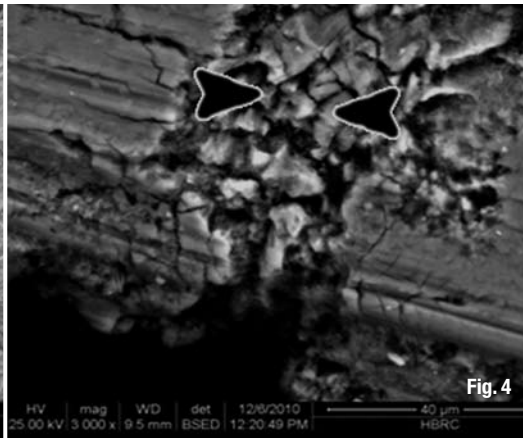

Fig. 4_ An ESEM image of group three 3 shows an accumulation of large crystals with differentof various shapes and sizes (arrows) at 3,000 x magnification.

tificial caries media. Group 3 was subjected to diode laser irradiation. Lastly, group 4 was exposed to diode laser irradiation and artificial caries media. The specimens were kept in distilled water prior to and after examination.[13]

Enamel-surface treatment

In groups 3 and 4, enamel occlusal depressions were irradiated using diode laser irradiation of 980 nm, 2 W for 15 seconds, in contact mode (Quanta System) and an optic fibre transmission system. The fibre tip was positioned perpendicular to the pit and fissure areas. The irradiation was performed by hand, scanning the enamel surface with a uniform motion.[14]

Measurement of thermal changes

Surface and intra-pulpal temperature changes were measured using a thermocouple tester (Fluke 52) in order to evaluate the changes during irradiation.

Artificial caries

The specimens of groups 2 and 4 were individually immersed in an artificial caries media (a media of 50 mmol lactic acid in 6% hydroxyethyl cellulose) with a pH of 4.5 for seven days.[15] The specimens were then washed and kept in distilled water.

Environmental Scanning Electron Microscope analysis

The specimens were examined occlusally and proximally using an ESEM (Inspect S ESEM, FEI). In group 3, ESEM was very useful in examining the specimens before and after in order to confirm the results.

Microhardness measurement

Surface hardness was measured using Vickers microhardness tester (HMV-2 Shimadzu). Measurement was done proximally at the depth of the fissures and at their lateral sides to determine the effect. Indentations were made with the long axis of the Knoop diamond perpendicular to the inner enamel surface laterally and at the depth of the fissures. Each group underwent a load of 19.61 N, applied for 20 seconds, in order to evaluate the variations in surface hardness eventually caused by laser treatment in comparison with unlased enamel. The hardness values were computed automatically.

Statistical analysis

The data was collected and analysed using the ANOVA test. The statistical results were processed by SPSS software (version 17.0, SPSS).

_Results

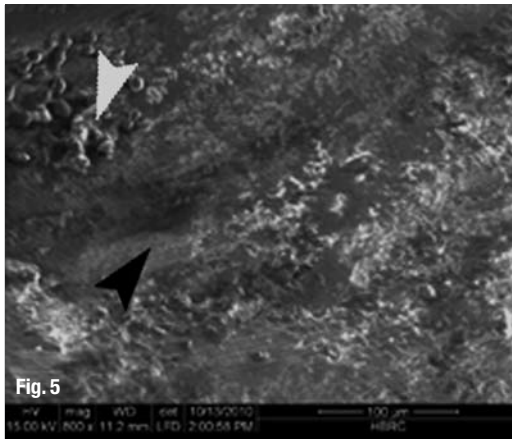

Fig. 5_ An ESEM image of group three 3 shows an occlusal view of the sealed enamel fissure (black arrow) and with molten globules were detected near the irradiated areas (white arrow) at 800 x magnification.

Environmental Scanning Electron Microscope analysis

Total destruction and loss of surface topography, such as the disappearance of the normal elevations and depressions, were clinically observed in the specimens of group 2. Structurally, the surface showed a feather-like or scaly appearance. Few enamel crystalline aggregations reprecipitated on the decayed surface, indicating the demineralisation of enamel. Rod and inter-rod regions due to loss of the surface rodless enamel were detected at the wall of the fissures. The inter-rod regions appeared as voids that deviated from the normal crystalline arrangement as seen in Figure 1. Contrary to

those of group 2, the specimens of group 4 showed a preserved surface structure and morphology of the lased areas. The grooves appeared pitted and intact, while the nearby enamel showed a typical keyhole appearance (rod ends) owing to the loss of the rodless enamel. The lateral walls of the pits exhibited an irregular surface owing to the presence of areas of melted enamel intermingled with carious enamel (Fig. 2). The boundaries between lased and unlased areas were distinct, as the intact lased area could easily be distinguished from the surrounding damaged unlased area.

Morphologically, laser irradiation induced localised enamel fusion of the lateral walls of the fissures in group 3, resulting in a sealing-like effect (Fig. 3). Surface pitting was detected occlusally, indicating the disappearance of the continuous fissures. The lateral walls of these pits revealed a melted homogeneous enamel surface that was masked by multiple enamel granules. Elimination of the defects was accomplished by the accumulation of crystals, which varied in shape and size, forming amorphous and heterogeneous tissue and interrupting the prismatic regions (Fig. 4). Figure 5 shows molten droplets found near the irradiated areas. Occasionally, minimal surface destruction was detected.

Measurement of thermal changes

The measurements recorded only a 1°C elevation in the intra-pulpal temperature and a 67°C elevation in the surface temperature during lasing. A rapid decay of the gained degrees occurred once lasing had been stopped and the temperature returned to normal in less than one minute.

Statistical results

Statistical analysis of the data was done using the ANOVA test. The results were presented as mean ± standard deviation, and a p-value of less than 0.05 was considered statistically significant. The analysis determined that both laser and artificial caries treatments had had statistically significant effects on the enamel microhardness. The degree of demineralisation and the ability of the specimens in each group to resist caries were translated into changes in the microhardness measurements. Table 2 shows the mean Vickers hardness values for the four groups. When comparing all groups to the control group, a highly significant difference was detected ($p = 0.0001$). A post hoc test was done to evaluate the differences among groups regarding the measured normal enamel scores. Group 3 (laser) showed a highly significant difference ($p = 0.0001$). In most of the cases, surface hardness significantly decreased after artificial caries immersion. The contrary was found for group 4 ($p > 0.05$), which means that the positive effect was due to laser only (Table 2).

Group	Mean ± standard deviation S.D.
1	566.3 ± 197.265*
2	79.250 ± 33.9894*
3	1577.40 ± 272.517*
4	191.890 ± 22.7996

Table 2_Vickers microhardness tests results.

**Indicatesing a statistical significant valuece.*

_Discussion and conclusion

Caries is a dynamic process consisting of numerous episodes of the loss and gain of minerals (demineralisation and remineralisation) that occur on the enamel surface.[16] Wavelengths in the red and near infra-red regions are poorly absorbed by dental minerals, but are optimally transmitted and scattered through sound enamel.[17, 18] However, in vivo and in vitro studies have described the beneficial effects of lasers in the former spectrum, such as the Nd:YAG laser (1,064 nm) in caries prevention, but they have not been able to describe the cause or the mechanism.[19] Owing to their low absorption coefficient in hard tissue, neodymium lasers are commonly used with a photosensitiser, which increases the absorption of the laser beam at the enamel surface.[20] Diode lasers were used according to the same protocol, but with different parameters (810 nm, 100 mW/cm^2, 30 mW, 90 seconds, continuous wave).[21]

This study was carried out to investigate the sealing ability of the diode laser (980 nm) by measuring changes in the surface microhardness and detecting the morphological changes using ESEM analysis. ESEM has been established as a useful means of non-destructive microscopic examination of the surface areas of naturally moist oral hard tissue, without the need for a complex preparation and drying process. Another advantage is the avoidance of preparation artefacts. The ESEM results revealed a significant difference between lased and unlased tissue.

Among the four groups, the sealing-like effect of the diode laser in the pit and fissure system and an increased surface hardness were found to be the highest in group 3. Laser treatment produced obvious changes in the orientation and shape of the enamel prisms. The resulting homogenous and heterogeneous apatite crystals, different in shape and larger in size when compared with the untreated enamel, might have been due to enamel melting

and resolidification, as well as a loss of prismatic structure, which corroborates the results of Mercer et al.[22] The granules observed in group 3, according to Zuerlein et al.[23] and Fried et al.,[24] can be explained by the release of the inter-rod and the intercrystalline substance (mainly water and carbonate) near the areas directly exposed to the laser action.

Contrary to the results of Bedini, who used Nd:YAG laser, minimal microcracks and surface roughness were detected with comparable parameters but with a different application mode for the laser, from pulsed to continuous wave.[25] According to Bedini, the use of the Nd:YAG laser with low parameters for caries prevention and high parameters for conservative dentistry is recommended.[25] Simulating the clinical condition and using the free-hand technique (continuous wave mode) assisted the reduction of heat accumulation.[26]

Romanos found that the optical penetration depth of a diode laser at a wavelength of 980 nm was smaller than the penetration depth at 1,064 nm and greater than that of the CO_2 laser.[27] For a better understanding of the penetration depth, an absorption spectrum was taken of water. The absorption in water was markedly higher with a diode laser at 980 nm (0.68 cm^{-1}) than at 810 nm (0.12 cm^{-1}), or even using an Nd:YAG laser at 1,064 nm (0.26 cm^{-1}). The smaller penetration depth results in an increased energy deposition in the upper tissue layers.[28]

The low absorption coefficient of the diode laser wavelength in enamel was of great benefit, as it caused rapid elevation of the surface energy during exposure and rapid decay in temperature once lasing had been stopped. There was no adverse effect on the dental pulp. According to Sulieman et al., the increase in the pulp chamber temperature with a diode laser used at 1 to 2 W is below the critical temperature increase of 5.5°C, which is regarded as the threshold value. In order to prevent irreversible pulp damage, this value should not be exceeded.[29]

In the present study, the maximum temperature elevation on the enamel surface was 67°C, with an intra-pulpal elevation of only 1°C. Previous reports have demonstrated the bactericidal effects of 980 nm wavelength diode lasers. The surface temperature detected thus provides sterilisation of the fissures, destroying *Streptococcus bacteria*, the causative agent of dental caries, which die at 60°C.[30] Regardless of the parameters that were used, Souza et al.[12] found smooth surface melting and resolidification at 1 W power for six seconds. These parameters are roughly half the size of the parameters used in this study. So far, no data has been published that describes the effect of the 980 nm high-power diode laser on enamel microhardness.[31]

Massive destruction of the enamel surface and the lowest surface hardness were found in group 2. Contrary to group 2, the lased samples in group 4 appeared to retain the normal enamel architecture in spite of the pH of the artificial caries media being below 4.5. The appearance of the keyholes in group 4 indicated a loss of prismatic structure, corroborating the results of Mercer and Anderson.[22] Group 4 also exhibited irregular lateral walls of the pits, possibly owing to the presence of areas of melted enamel intermingled with carious enamel. In agreement with our results, Fox et al.[32] found an increase in the acid resistance of irradiated enamel, proving the potential of laser in preventing caries. We conclude that a diode laser can simulate the sealing effect of conventional methods to a limited extend by inducing enamel fusion with no harmful effects on the dental pulp._

Editorial note: A list of references is available from the publisher.

_contact laser

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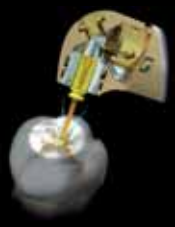

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Laser treatment of dentine hypersensitivity

An overview III

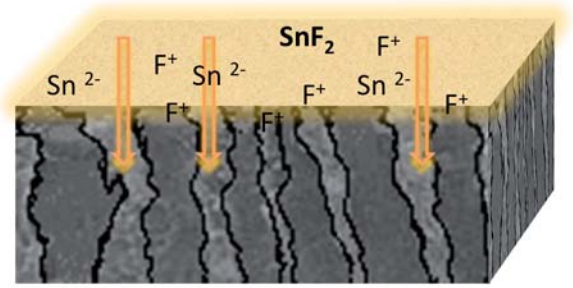
Authors_Dr Ute Botzenhart, Dr Andreas Braun & Prof Matthias Frentzen, Germany

_Introduction

More than two decades ago, laser applications in the treatment of dentine hypersensitivity were introduced to dentistry. Many clinical studies using different laser types have been published since. This overview summarises the basic and clinical aspects, including treatment protocols.

In the first issue of laser, conventional approaches towards the treatment of dentine hypersensitivity were discussed with regard to a set of criteria for a successful treatment as proposed by L. I. Grossman (1935). The authors came to the conclusion that, so far, no conventional therapy has been able to meet all the criteria. The authors then moved on to studies on laser treatment. Studies on GaAlAs laser and He-Ne lasers were introduced and analysed. Part I of this article was finished by a comparison between He-Ne lasers and Nd:YAG lasers. Part II in this year's second issue of laser continued with studies on Nd:YAG-laser treatment, Er:YAG lasers. The third and last part of this extensive study gives insight into the workings of CO_2 lasers and sums up important aspects of laser treatment of dentine hypersensitivity in a final conclusion on laser treatment of dentine hypersensitivity.

Fig. 1_Hypersensitive dentine with SnF_2 gel layer.



SnF_2 diffusion into dentine

Fig. 1

_Middle-output power lasers: CO_2 laser

The CO_2 laser with a wavelength of 10.6 µm also belongs to the group of the middle-output power lasers. It is easily absorbed by tissues with a high water content, presenting superficial penetration (Romano et al. 2011), none penetrating beyond 0.1 mm (Silberman et al. 1994). Its effect is based upon the closure or narrowing of the dentinal tubules and a reduction in dentine permeability (Gholami et al. 2011; Romano et al. 2011; Moritz et al. 2006; Kimura et al. 2000b; Zhang et al. 1998; Pashley et al. 1992; Bonin et al. 1991). Most effects are explained by laser dehydration, protein destruction and carbonate evaporation (Lin et al. 2000a).

Moritz et al. (1995, 1996, 1998, 2006) described two ways to apply the CO_2 laser to the therapy of dentine hypersensitivity: the direct method, that is CO_2 laser application alone (Moritz et al. 2006); and the indirect method, that is the combination of laser application and fluoridation (Moritz et al. 1995, 1996, 1998). The output power for both methods is approximately 0.5 to 1 W (cw). Irradiation time is approximately 0.5 to five seconds, with a repetition rate of five to ten pulses (Moritz et al. 2006).

The direct method

With the direct method, the use of the CO_2 laser at moderate energy density, the sealing of the dentinal tubules in terms of a narrowing or reduction in their permeability can be achieved (Lan et al. 1999). Silberman et al. (1994) hypothesised that CO_2 lasers enhance the retention of the smear layer, which is partly

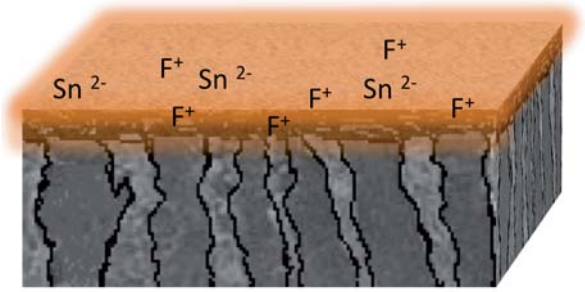


Fig. 2

Fig. 2_CO_2-Laser application throught the SnF_2 gel layer.

responsible for the successful desensitisation of hypersensitive roots. Like other wavelengths, the CO_2 laser light can also cause a desiccation of dentine and a temporary clinical alleviation of symptoms (Bonin et al. 1991). With an application of 0.3 W for 0.1 seconds, the sealing depth is about 2 to 8 µm (Fayad et al. 1996). As for the in vivo application of CO_2 laser light in dogs and monkeys, no thermal damage to pulpal tissue could be detected at an output power of 3 W and in cw mode for two seconds (Kimura et al. 1998), but morphologically, parameters above 1 W (cw, non-contact mode, without cooling) led to carbonisation and cracks in human dentine, making it unfeasible for clinical procedures (Romano et al. 2011). González et al. (1999) too observed that CO_2 laser application to human dentine at 2 W and 10 J for 0.2 seconds and 25 pulses led to varying effects in SEM examinations, for instance charring, cratering, poring, fissuring, fracturing, cracking and localised melting processes or complete disorganisation of the dentinal structure without sealed dentinal tubules. In several studies, melted areas, probably composed of melted hydroxyapatite were detected inside or around the crater formation after CO_2 laser application. This is due to the high temperature gradient that occurs at the surface (Romano et al. 2011; Lin et al. 2000a). PIXE resulted in a decrease in calcium and an increase in the phosphorous content of the dentinal surface treated, compared with controls, indicating changes in the hydroxyapatite crystal structure (González et al. 1999).

Side-effects

In a study by Zhang et al. (1998), the efficiency of CO_2 lasers in the therapy of dentine hypersensitivity *in vivo* and potentially damaging thermal effects at the dental surface were evaluated over a period of three months. Dentine hypersensitivity was determined by thermal stimuli with cold air and VAS score. Immediately after laser application and after one week, two weeks, one month and three months, hypersensitivity was re-evaluated. Laser light was applied to the affected area with an output power of 1 W in cw mode for five to ten seconds and non-contact mode at a right angle with water-cooling. Each application of 0.5 seconds was followed by a break of five seconds. The procedure was repeated as long as the patient was free of pain. The application time for each tooth was five to ten seconds overall. Patients who had not been free of pain after one week were retreated under the same parameters (Zhang et al. 1998). After three months, 50 % of the treated tooth necks were no longer hypersensitive. An interesting phenomenon is that all teeth were free of pain directly after the laser application, but hypersensitivity returned already after one week in nearly 50 % of the cases (Zhang et al. 1998). The pain relief directly after laser application can be explained by the anaesthetic effect of laser or the obturation of tubules by denatured proteins from the dentinal fluid, but there are no reports of nerve analgesia as a result of CO_2 laser application (Zhang et al. 1998).

One possible explanation for the recurrence of symptoms is that the CO_2 laser application did not close the dentinal tubules completely and/or durably (Zhang et al. 1998) or that the melted dentinal surface was abraded, for example by tooth brushing (Pashley et al. 1992). In the study, as described above, the parameters chosen did not damage the pulp. All of the teeth were sensitive to electrical stimuli. The study demonstrates that the CO_2 laser, if used with adequate water-cooling, can be helpful for the therapy of dentine hypersensitivity without thermal damage to the pulp. Coleton (1998) reported a success rate of more than 60 % using the CO_2 laser for the reduction of post-operative sensitivity of root surfaces after periodontal surgery. He did not observe any side-effects.

The indirect method

The indirect method is based upon the idea of combining the advantages of laser and fluoride therapy, thereby achieving as durable a result as possible. First, fluoride is applied onto the cleaned tooth-neck area. Then laser light is applied through this gel layer. By combining these two methods, the integration of fluoride into the dentine surface should be enhanced (Figs. 1–3).

Moritz et al. (1996) analysed the efficiency of this combined therapy compared with fluoride applica-

Fig. 3_Sealed surface after CO_2–Laser irradiation (indirect methode).

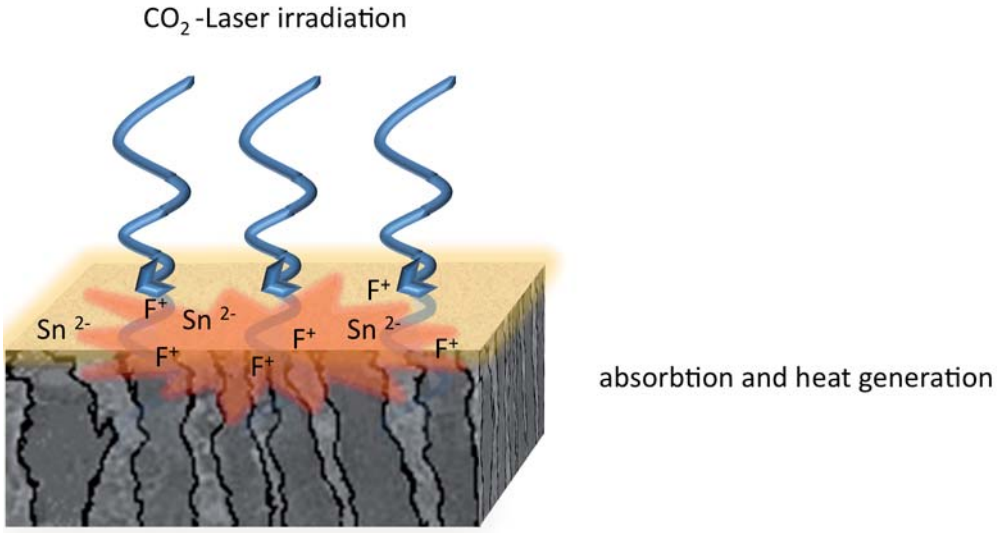


Fig. 3

tion alone, over a period of twelve weeks. Before laser application, a layer of SnF_2 of 10 µm thickness was applied, and then the dentine was irrigated at an output power of 0.5 W in cw mode for five seconds followed by a break of 20 seconds and subsequently a repeated laser application for five seconds (Moritz et al. 1996). This procedure was repeated until each patient had undergone laser application for 30 seconds. Patients who were not free of pain after the first recall were re-treated under the same parameters. The control group was treated with SnF_2 exclusively.

After one week, two weeks, four weeks, six weeks and three months, dentine hypersensitivity was measured again. In combination with VAS, the subjective patient response concerning pain response to specific stimuli was used as an indicator, for example to contact, cold, heat, sweetness and acid. One week after the laser application, all of the patients in the laser group reported an improvement in symptoms and nearly 60 % were free of pain. After two weeks, 87.5 % of the laser group were free of pain, after four, six and twelve weeks, 94.5 % were free of pain. The results of the control group differed from those of the laser group. After one week, a mild improvement was detected, and there was no further improvement in the follow-up periods. Nearly all patients reported a reappearance of the symptoms after fluoridation was stopped. The results concerning fluoride application corroborate the findings of Saxer et al. (1974).

Side-effects

Here, SnF_2 was only able to achieve limited and short-term success. In order to check possible thermal effects of laser light immediately before and after laser application and after one week, laser Doppler measurements of the pulpal blood flow of irrigated teeth were elevated. No laser-induced effect to the pulpal blood flow was detected (Moritz et al. 1996). Six weeks after the combined application of laser light and fluoridation, SnF_2 was still detectable in the surface. Therefore, it can be assumed that the combined application of the CO_2 laser and fluoridation leads to permanent integration of fluoride into the dentine surface. With a few exceptions, patients had no pain during the therapy. Laser application was accepted without any problems (Moritz et al. 1996).

Although the combined therapy mentioned above is noted to be more effective and durable compared with the GaAlAs diode (Gerschman et al. 1994), He-Ne or Nd:YAG laser (Gelsky et al. 1993), there was no evidence of statistical clinical superiority of the CO_2 laser in the comparisons by Ipci at al. (2009). They examined how the CO_2 (1 W, cw, ten seconds) and Er:YAG (30 Hz, 60 mJ, ten seconds) lasers were used with and without fluoride. A clinical improvement in dentine hypersensitivity was achieved in all of the cases (Ipci et al. 2009).

Combination with bioactive glass

Another promising therapy method for dentine hypersensitivity is the combined use of laser light and bioactive glass (bioglass) paste. The application of hydroxyapatite, the principal inorganic constituent of the tooth, also promises rapid relief from clinical pain by complete obliteration of dentinal tubules in hypersensitive teeth (Shetty et al. 2010). Bioglass and glass-ceramics resemble human dentinal hard tissue to a large extent and are characterised by high biocompatibility (Bakry et al. 2011a; Tirapelli et al. 2010; Kuo et al. 2007). Melting the bioglass paste and its resolidification promise a homogeneous blockage of dentinal tubules and deep precipitates in the dentinal tubules, offering a prolonged therapeutic duration (Lee et al. 2005a).

From various in vitro investigations (SEM and FTIR analysis), it was found that DP-bioglass paste could produce a new carbonate-apatite formation at the dentinal surface as a thin protective layer and that it was also able to induce a hydroxyl-carbonate apatite deposition in open tubules (Mitchell et al. 2011; Tirapelli et al. 2010) with a sealing depth of up to 60 µm (Kuo et al. 2007). In a study by Mitchell et al. (2011), a bioglass paste with a particle size range of less than 1 µm to approximately 20 µm mixed with glycerol as a carrier was more effective in the immediate reduction in fluid conductance with resistance to acidic solutions and tooth brushing, compared with non-bioactive particles (Mitchell et al. 2011).

The combined use of the CO_2 laser and bioglass actually melted DP-bioglass paste and reached a sealing depth of 10 µm (Lee et al. 2005a). A mixture of bioglass paste with 50 % phosphoric acid and CO_2 laser irradiation (0.5 W, 0.12 ms, 100 Hz, non-contact mode, one minute, energy density 136 J/cm^2) can modify the surficial layer, creating a more compact layer, rich in calcium phosphate, with a thickness of 5 µm, higher mechanical properties and a penetration depth of 3 µm in the dentinal tubules (Bakry et al. 2011b).

No clinical investigations thus far

Compared with bioglass application alone, it is assumed that CO_2 laser irradiation could improve the mechanical organisation of the surficial precipitates (Bakry et al. 2011b).

Clinical investigations into the therapeutic effect of such a combined treatment are not available. One of the principal problems still is the very high temperature rise that accompanies the production of glazes with this procedure, and makes clinical application currently impossible. The temperature must be over 900 °C to form a melting glass and an even higher rise in temperature is needed to melt apatite to fuse these two components together (Lin et al. 2000b). If the glaze point could be reduced, this procedure would be conceivable as a possible treatment (Lee et al. 2005b). Maybe in the future, it will be possible to fuse a bioglass with a low melting point to enamel and/or dentine (Lin et al. 2000a).

Recently, Romano et al. (2011) analysed the morphological and temperature changes after CO2 laser irradiation with different energy parameters (0.5 W, 1 W, 1.5 W, cw, six times for five seconds with intervals of ten seconds between for cooling, non-contact mode, sweeping movement) with and without calcium-hydroxide paste applied prior to laser treatment. Statistically significant differences were detected between laser irradiation and combined treatment, with more satisfactory closure of tubules and mineral deposition on the dentinal surface after combined treatment. It is known that calcium-hydroxide paste can promote the tissue-repair process (Olsson et al. 2006) and it promises an interaction between calcium-hydroxide paste and dentine associated with the morphological changes resulting from the thermal effect of the CO_2 laser on dentine, possibly also resulting in the reduction of clinical symptoms of pain (Romano et al. 2011). With the protocols used in this study, a change of temperature in the dental pulp of 1 to 5 °C was noted, but parameters above 1 W led to carbonisation and cracks, a characteristic result of high temperature, making it unfeasible for clinical procedures (Romano et al. 2011). However, in this study, with parameters of 0.5 W in cw mode for five seconds, the temperature rise was less than 5 °C, which is assumed to be safe for clinical use (Romano et al. 2011). Nevertheless, further studies should be undertaken before clinical application. Table 1* gives an overview of the clinical studies conducted on the application of laser for the therapy of dentine hypersensitivity thus far.

_Conclusion

There are many studies on the application of laser for the clinical therapy of hypersensitive tooth necks. Current evidence is based upon a slight superiority of laser application compared with conventional topical applications (He et al. 2011). *In vitro* experiments have not yet been able to clarify the mechanisms of the different application modes sufficiently. Besides analgesic effects, the modification of the dentinal surface in terms of a reduction in dentine permeability is in the foreground (Fig. 1). The latter mechanism could be enhanced by the combination of other techniques, for example the additional application of fluoride. In order to achieve optimal monitoring of the patients, the user should be familiar with the different mechanisms that the specific laser and the chosen parameters produce._

*Editorial note: *Table 1 and the list of references are available from the publisher.*

_contact laser

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Diode lasers: The soft-tissue handpiece

Authors_Dr Fay Goldstep & Dr George Freedman, Canada

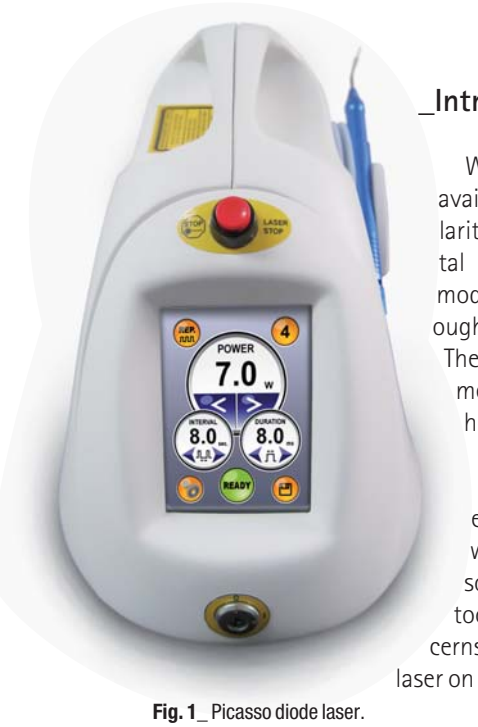


Fig. 1_ Picasso diode laser.

_Introduction

While dental lasers have been commercially available for several decades, and their popularity among patients is unparalleled, the dental profession has taken to this treatment modality rather slowly. Lasers have been thoroughly documented in the dental literature. They are an exciting technology, widely used in medicine, kind to tissue, and excellent for healing.

So why have they not been more widely embraced by the practising dentist? There was a perception in the profession that somehow the dental laser was not useful, too complicated, or too expensive. These concerns have changed with the arrival of the diode laser on the dental scene.

There is now a convergence of documented scientific evidence, ease of use and greater affordability that makes the diode laser a necessity for every dental practice.

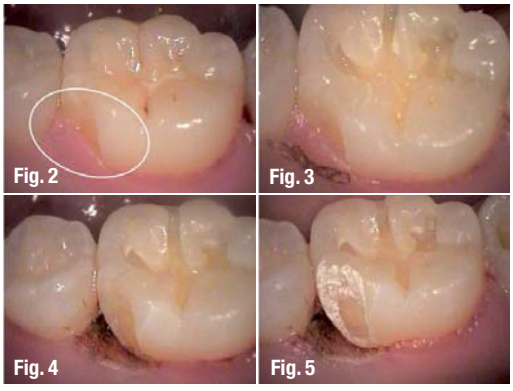
_The science in brief

LASER is an acronym for "light amplification by stimulated emission of radiation". Lasers are commonly named for the substance that is stimulated to produce the coherent light beam. In the diode laser, this substance is a semiconductor (a class of materials that is the foundation of modern electronics, including computers, telephones and radios).

This innovative technology has produced a laser that is compact and far lower in cost than earlier versions. Much of the research has focused on the 810 nm diode laser. This wavelength is ideally suited for soft-tissue procedures since it is highly absorbed by haemoglobin and melanin. This gives the diode laser the ability to cut precisely, coagulate, ablate or vaporise the target soft tissue.[1]

Treatment with the 810 nm diode laser (Picasso, AMD Lasers; Fig. 1) has been shown to have a significant long-term bactericidal effect in periodontal pockets. *Aggregatibacter actinomycetemcomitans*, an invasive pathogen associated with the development of periodontal disease and generally quite difficult to eliminate, responds well to laser treatment.[2,3]

Scaling and root planing outcomes are enhanced when diode laser therapy is added to the dental armamentarium. The patient is typically more comfortable during and after treatment, and gingival healing is faster and more stable.[4,5]



Figs. 2–6_Removal of gingival tissue covering the tooth. (Photographs courtesy of Dr Phil Hudson)

_Ease of use

Early adopter dentists thrive on new technologies. They enjoy the challenges that come with being the first to use a product. Most dentists, however, are not early adopters.

Over the past two decades, lasers have intimidated mainstream dentists with their large footprint, lack of portability, high maintenance profile, confusion of operating tips and complex procedural settings.

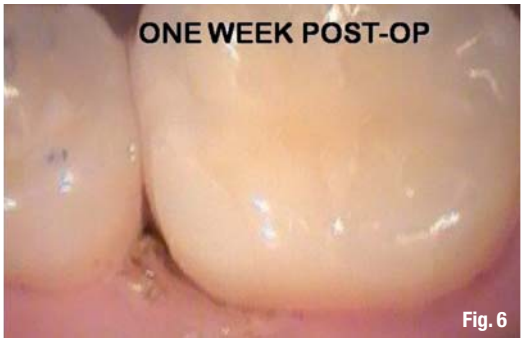


Fig. 6

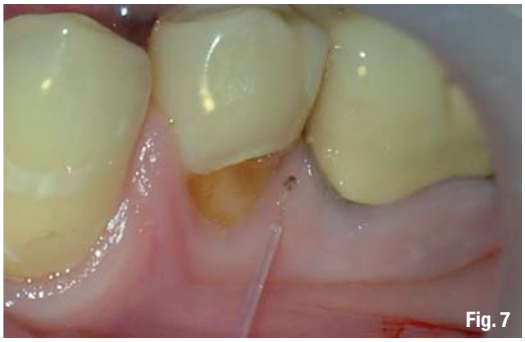


Fig. 7

Figs. 7 & 8_Management of excess gingival tissue (ezlase).

Enter the diode laser. It is compact. It can easily be moved from one treatment room to another. It is self-contained, and does not have to be hooked up to water or air lines. It has one simple fibre optic cable that can be utilised as a reusable operating tip.

The units come with several presets, although after a short time the operator becomes so comfortable that they are rarely needed. The power and pulse settings are quickly adjusted to suit the particular patient and procedure.

One of the authors is a dentist who does not thrive on the challenge of brand new high-tech, "high-stress" technology. In fact, having tried many lasers in the past that promised to be user-friendly, they were found to be anything but. The 810 nm diode laser was a different experience: after a brief in-office demonstration, the laser handpiece felt comfortable enough to perform some simple clinical procedures. Further online training and lecture courses enhanced both clinical comfort level and competency.

_Affordability

Laser technology has always come with a high price tag. Manufacturing costs are high and cutting-edge technology commands steep prices, but diode lasers are less expensive to produce. Pricing for this technology has now reached under US$5,000. At this level, the diode laser becomes eminently affordable for the average practising dentist.

_Soft-tissue laser

The 810 nm diode laser is a soft-tissue laser. This wavelength is suited for soft-tissue procedures, since haemoglobin and melanin, both prevalent in dental soft tissue, are excellent absorbers. This provides the diode laser with broad clinical utility: it cuts precisely, coagulates, ablates or vaporises the target tissue with less trauma, improved post-operative healing, and faster recovery times.[6–8] Given its incredible ease of use and versatility in treating soft tissue, the diode laser has become the soft-tissue handpiece in the dentist's armamentarium. The dentist can use the diode laser soft-tissue handpiece to remove, refine and adjust soft tissue in the same way in which the traditional dental handpiece is used on enamel and dentine. This extends the scope of practice of the general dentist to many soft-tissue procedures.

The following procedures are easy entry points for the new laser user:

1.Gingivectomy, haemostasis and gingival troughing for impressions

The diode laser makes restorative dentistry a breeze (Picasso). Any gingival tissue that covers a tooth during preparation can easily be removed, as haemostasis is simultaneously achieved (Figs. 2–6). The restoration is no longer compromised due to poor gingival conditions and there is no more battling with unruly soft tissue and blood. Excess gingival tissue can readily be managed (Figs. 7 & 8) for improved restorative access for Class V preparation

Figs. 9–11_Removal of hyperplastic tissue (Ivoclar Vivadent).

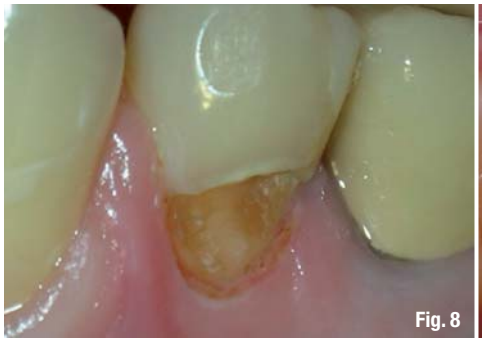


Fig. 8

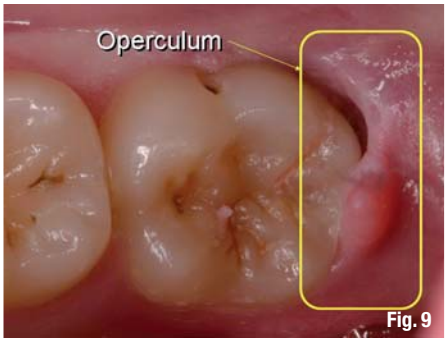


Fig. 9

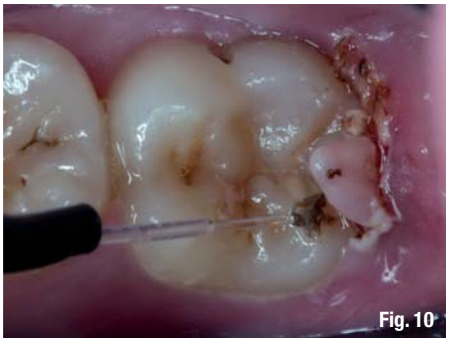


Fig. 10

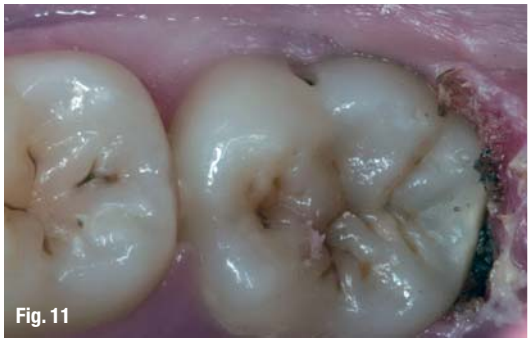


Fig. 11

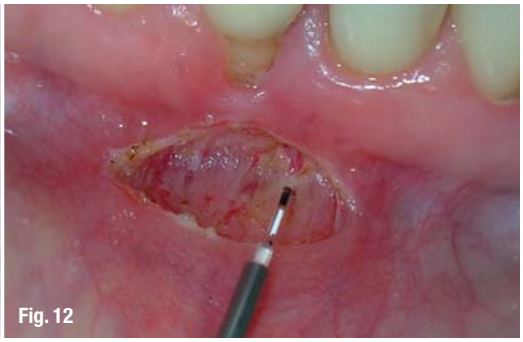


Fig. 12

Fig. 12_Frenectomy (ezlase).

(ezlase, BIOLASE Technology). Gingival troughing prior to impression taking (Picasso; Figs. 6 & 7) ensures an accurate impression, particularly at the margins, and an improved restorative outcome. Packing cord is no longer necessary.

2. Operculectomy, excision and/or recontouring of gingival hyperplasia, and frenectomy

These procedures are not commonly offered or performed by the general dentist. They are examples of the expanded range of services readily added to the general practice. The dentist becomes more proactive in dealing with hyperplastic tissue that can increase the risk of caries and periodontal disease (Figs. 9–11). In addition, a frenectomy has now become a simple and straightforward procedure (ezlase; Fig. 12).

3.Laser-assisted periodontal treatment

The use of the diode laser in conjunction with routine scaling and root planing is more effective than scaling and root planing alone. It enhances the speed and extent of the patient's gingival healing and post-operative comfort.[4,5] This is accomplished through laser bacterial reduction (Picasso), debridement and biostimulation (Figs. 13 & 14).

A. actinomycetemcomitans, which has been implicated in aggressive periodontitis, may also be implicated in systemic disease. It has been found in atherosclerotic plaque[9] and there has been recent data suggesting that it may be related to coronary heart disease.[10] The diode laser is effective at decreasing *A. actinomycetemcomitans*,[2,4] thereby indirectly improving the patient's cardiovascular health.

_Conclusion

The soft-tissue diode laser has become an essential mainstream technology for every general practice. Its science, ease of use and affordability make it simple to incorporate. The laser is now the essential soft-tissue handpiece for the practice. In fact, there is a case for having a diode laser in each restorative and each hygiene treatment room. Restorative dentistry becomes easier, more predictable and less stressful. Laser therapy expands the clinical scope of practice to include new soft-tissue procedures that keep patients in the office. The patient's gingival health is improved in a minimally invasive, gentle manner._

_contact laser

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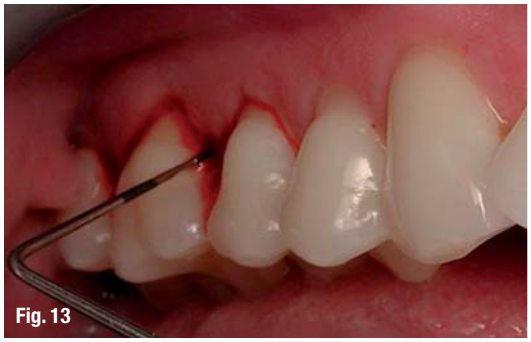
Fig. 13


Fig. 14

Figs. 13 & 14_Laser bacterial reduction, debridement and biostimulation. (Photographs courtesy of Dr William Chen)

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Hygiene requirements for dental laser fibers

Author_Hans-Joachim Koort, Germany

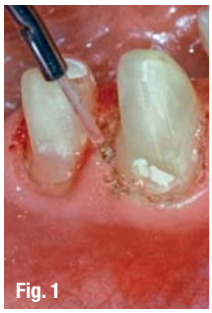
Fig. 1

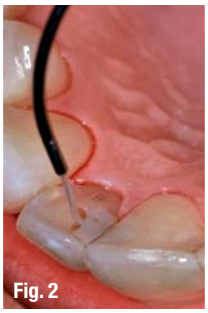
Fig. 2

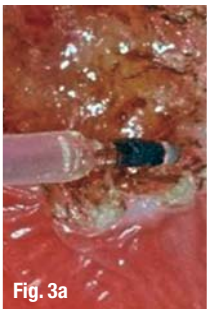
Fig. 3a


Fig. 3b

Fig. 1_Laser application in periodontology: The fiber is inserted into the gingiva pocket, parallelly to the long axis of the tooth to kill pathogen germs with the laser radiation by means of heat.
Fig. 2_Laser use in endodontics: The laser fiber is inserted into the root canal for disinfection.
Fig. 3a & b_Different situations with laser treatments.

_Introduction

Methods including laser application have been successfully established in the clinical work, especially in soft tissue surgery, periodontics and endodontics as well as in therapeutic applications (e.g. in photodynamic therapy) and in bleaching. Lasers can be used successfully for the decontamination of periodontal pockets (Fig. 1) and for the disinfection of root canals (Fig. 2). Although laser devices have been widely adapted to the dental needs in terms of performance parameters, design, size and mobility, only a few enhancements have been made with respect to the fibre-based systems. A situation frequently encountered is that laser fibres, although designed as single-use products, are not verified and validated to be reprocessed and reused. This situation must be regarded as very risky and, therefore, critical. A solution to this problem is the use of special single-use fibre tips. Still, a considerable amount of fibre lasers on the market neither corresponds with the requirements of the relevant standards nor do they agree with recommendations such as EN ISO 60601-2-22, EN ISO 13485 and national government guidelines. They are often neither subjected to biocompatibility (e.g. NAMSA) tests nor do they possess a proof of sterilization according to EN ISO 17664. Sometimes there is not even a certification. In cases such as these, these products must be scrutinized very carefully for their usability according to the Medical Devices Act, and their capability of being prepared for reuse. The reuse of unauthorised and undocumented products after refurbishing and reprocessing can be deemed at least negligent and at most very risky. Primarily for cost reasons, fibre systems are often used again and again after cleaning and disinfection. However, only rarely are they used with proper sterilization, independently from their suitability for recycling and reuse. To quote an expert: "What's happening during the preparation process is a large-scale experiment on people" and to quote a judge, "It is usually medical malpractice when choosing the riskier method among several alternatives. Neither economics, nor negative bid lists or budgeting can put this normative system out of power..."

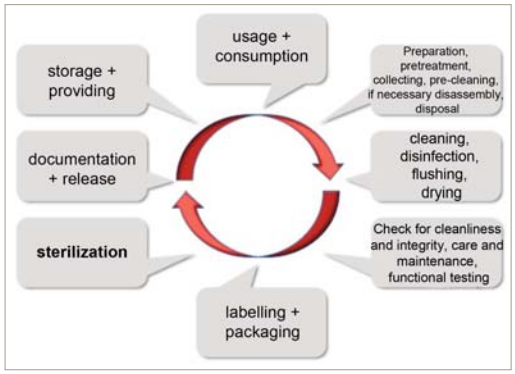

Fig. 4_Preparation does not equal sterilization alone.

_The legal situation

The Medical Devices Directive (MDD) does not explicitly distinguish between disposable products and those that can be used multiple times. However, when it comes to reprocessing, at least the statutory requirements for a validated method must be fulfilled. This is almost impossible to accomplish for most dentists in their private practice. All preparations of medical devices are based on the requirements of the MDD and other national directives, in particular the "hygiene requirements when processing medical devices". For the reprocessing of medical devices (e.g. laser fibres), therefore, only persons with specialized knowledge, appropriate training and practical work should be appointed. The marketability of reusable medical devices according to EN ISO 17664 also includes that the original manufacturer provides data on the validated preparation. A conformity declaration by the manufacturer of the respective disposable instruments consequently concerns sin-

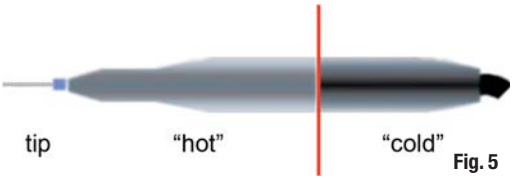

Fig. 5

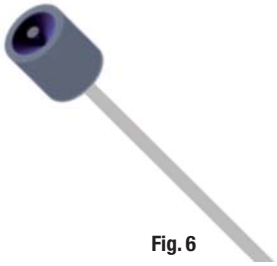
Fig. 6

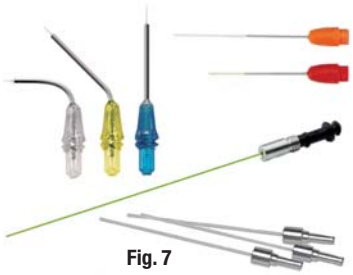
Fig. 7

gle-use only. Risk assessment and classification of the medical device must be made before the treatment, stating whether, how often and by what measures the device, e.g. a laser fibre, can be reprocessed. Procedures which were validated accordingly to the manufacturer's information must therefore be applied for the reprocessing of semi-sterile or sterile medical devices. This validation should be appropriate with regard to the medical device, its risk assessment and classification. It should furthermore be established in agreement with generally accepted engineering standards, as well as the current state of science and technology. This means that processes applied in the preparation of laser fibres must be documented. They also have to be repeatable in order to ensure that the objectives to be achieved by each preparation process can be reached before re-application. Manual cleaning and disinfection procedures must be performed with proven efficacy and documented according to standard operating procedures. The disinfection procedures must demonstrate bactericidal, fungicidal and virucidal effects.

_Problem and solution

The used laser fibre can be assumed to become microbiologically contaminated in the oral cavity. Direct contact with the tissue can result in soiled fibres, changing the optical properties of the fibre tip by cracks and erosion, thus diminishing their quality. Typical problems which may occur in laser fibres are shown in figure 3a: The tip of a laser fibre is covered by combustion products, with the fibre acting upon further use like a hot soldering iron. As a result, the surrounding tissue will be affected by the heat much stronger than planned by the dentist. Figure 3b shows coagulum and tissue residuals at the laser fibre, which, if not immediately removed and without cleansing of the fibre tip, may quickly burn down to the glass fibre. Proper use and care in terms of a strict hygiene therefore must play an important role when using laser fibres. The patient's safety and benefit must always and above any economic considerations be regarded as imperatives. More stringent hygiene directives with the respective laws and regulations, increased control practices, high costs and the commitment to run a quality management system in the dental practice are requirements which must be met. Moreover, they make single-use items, such as disposable fiber tips for laser applications in dentistry, worth considering. Each preparation of fibres, including those fibres which are explicitly declared for reuse, must be critically assessed in terms of patient safety. Due to the high requirements for validation and verification measures, necessary qualifications of the dentist and his or her assistant as well as the time of preparation, the alleged costs of disposable products are relativized (Fig. 4). International regulations often allow the preparation of single-use products, but this permission is usually tied to high standards, which are usually hard to meet by any dentist owning a private practice. In addition, special tools are required for the preparation of laser fibres. In this regard, the fact that preparation tools such as fibre stripping devices or ceramic/diamond knifes cannot be sterilized in most cases should be considered. Thus, the preparation can take place only in a non-sterile area.

A solution to these problems can be found in the use of single-use fibre tips. Combinations of hygienic compliant hand pieces with matching disposable fiber tips are required, as shown in figures 5 and 6. A hand piece such as this consists of two parts: The "cold" part is permanently fixed to the laser device and can be disinfected. The "hot" part should be cleaned by machine and can ideally be autoclaved. Finally, to transmit the laser radiation to the tissue, short fiber tips are added. These tips should be designed as single-use products, sterile and individually packaged and documented by the manufacturer. Some producers have recognized these problems and have already developed hand pieces and fiber tips (Fig. 7). A final solution – in terms of patient safety, hygiene, as well as a reasonable price-performance ratio – will probably be achieved within the next few years. In the future, the acceptance of laser applications in dentistry can be assumed to increase greatly._

_contact laser

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Fig. 5 _Hygienic compliant hand piece.
Fig. 6_Schematic drawing of a fiber tip as a single-use product.
Fig. 7_The tips available on the market are not quite perfect yet, however, they lead the right way. Tips made by Biolase (USA), elexxion, Hager & Werken, Sirona (Germany).

The use of the LiteTouch Er:YAG laser in peri-implantitis treatment

Authors_Prof Tzi Kang Peng, Taiwan & Prof Georgi Tomov, Bulgaria

_Introduction

With oral implantology experience its Renaissance, the growing incidence of peri-implantitis worldwide today is point of interest for both scientists and clinicians. Peri-implantitis is a disease of inflammatory nature which leads to the loss of the implant when left untreated.[11,24] The aetiological factors of peri-implantitis are very similar to periodontitis.[2,24] Different treatment modalities for the inflammatory soft tissue and bone lesions in peri-implants have been proposed—antibiotics, antiseptics, mechanical debridement, and surgical procedures have been suggested, depending on the grade of the clinical and radiographic manifestations.[6,7,10,16,17]

Treatment modalities such as scaling and root planing, used to treat roots with periodontitis, cannot be used in the same way on the threaded and retentive implant surfaces. The rough implant surface provides bacteria with shelter, unapproachable to conventional mechanical removal.[23] Conventional treatment procedures like closed peri-implant pocket debridement have shown limited success[7,10] whereas the treatment of peri-implantitis using open-flap procedures has shown more promising results.[17] Although the improved access to the implant surface with open procedures can be seen as a fact, clinicians meet the same problems as encountered with open periodontal therapy. The decontamination of the retentive implant surface is much more complicated than the decontamination of a plane root surface.[23] The instruments used in periodontal treatment are too large to clean an implant surface from bacteria and any metal to metal contact during mechanical debridement has the potential to damage the implant surface.[12,13] The common antiseptic therapy seems to be effective against bacterial biofilm in in vitro conditions.[5] In addition, the local antibiotics used as an adjunct therapy to mechanical debridement has been advocated and shown to reduce bleeding on probing and probing pocket depth in patients with peri-implantitis,[16] but there are no data supporting the effect of antibiotics on the decontamination of implant surfaces and more specifically the endotoxin elimination.[10,16,18]

Currently, there are no clinical studies or case series documenting successful regenerative procedures in periimplant bony lesions after conventional treatment. Some case series demonstrated limited bone fill after GBR procedures.[6] Another treatment modality that may offer an advantage over traditional mechanical treatment is the use of lasers.[25,26] Studies have demonstrated that the treatment with an Er:YAG laser has a

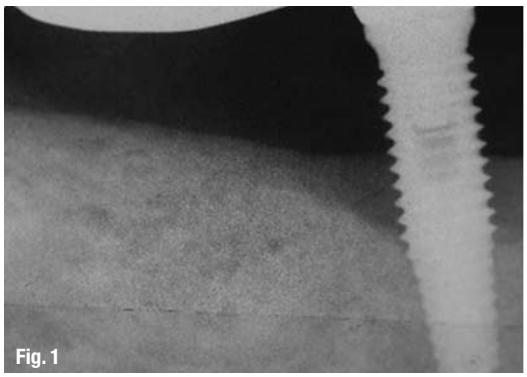
Fig. 1

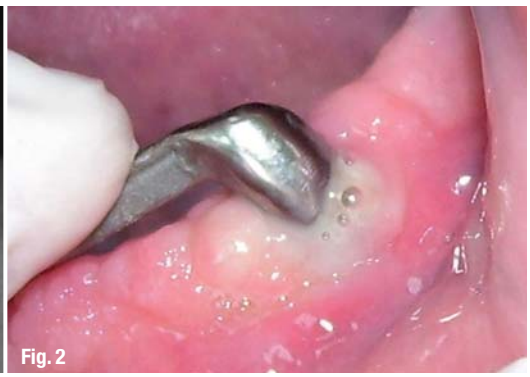
Fig. 2

Fig. 1_Periapical radiograph of a dental implant with bone loss of > 3 mm.
Fig. 2_Implant site prior to measurement (implant superstructure still in place). Pus discharge is evident.

bactericidal effect.[8] Er:YAG laser treatment can debride the implant surface effectively and safely without damaging.[31,35] Much better clinical results have been reported for Er:YAG laser treatment compared with non-surgical mechanical debridement.[15,27,31,35]

_Aim

The aim of the (present study) intercontinental research led by Syneron was to assess the clinical outcomes of an open-flap procedure performed with conventional mechanical therapy (CMT) or laser-assisted surgical treatment (LAS) with the novel LiteTouch Er:YAG laser (Syneron Dental Lasers) in patients with implants and a diagnosis of peri-implantitis.

_Materials and methods

The design was a single-masked, randomized six-month clinical intervention trial with two groups of patients diagnosed with peri-implantitis. The ethics committees of Cheng Hsin General Hospital, Taipei, Taiwan, and the Faculty of Dental Medicine, Plovdiv Medical University, Bulgaria, approved the study. Written consent was obtained from all enlisted patients. Patients were enrolled if they presented with at least one dental implant with bone loss of > 3 mm around the implant identified on intra-oral radiographs (Fig. 1), and with a PPD of > 5 mm with bleeding and/or pus discharge (Fig. 2) on probing. The study was conducted between September 2010 and August 2011 at the Cheng Hsin General Hospital and Plovdiv Medical University's Faculty of Dental Medicine. The following general criteria were used to exclude subjects from the study:

_subjects having taken medications likely to cause gingival hyperplasia within one month prior to baseline examination;
_subjects receiving regular periodontal maintenance treatment or having undergone any sub-gingival cleaning less than twelve months prior to baseline examination;
_subjects received peri-implantitis surgery of any type prior to baseline examination;
_subjects with clinically significant chronic illness (diabetes mellitus, compromised heart condition, rheumatism, joint replacement) requiring antibiotic prophylaxis;
_subjects having undergone systemic cancer therapy and/or radiation therapy at any time;
_subjects taking or having taken bisphosphonates;
_subjects having taken antimicrobials, steroids or non-steroidal anti-inflammatory drugs within one month prior to baseline examination;
_pregnant or lactating women;
_subjects engaged in excessive tobacco or alcohol intake or drug abuse.

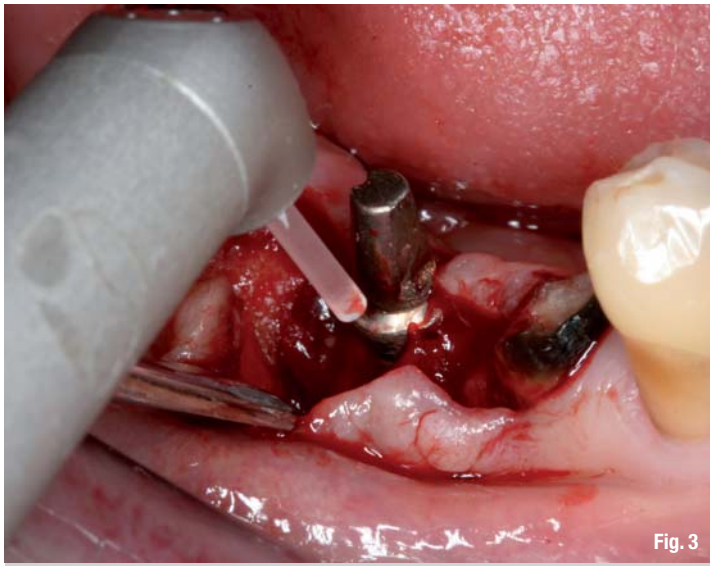

Fig. 3_Removal of plaque biofilm and granulation tissue using the LiteTouch Er:YAG laser with its 1.3 x 1.4 mm sapphire tip.

Sixty-eight patients with a total number of 128 implants were included consecutively over a period of one year.

_Clinical measurements

The measurement scale used in this study was constructed in order to obtain quantitative measurement data:

_PPD at four sites per implant (mm);
_presence/absence of BOP at the implant (four sites/implant), graded as follows:
_no bleeding, (1) point of bleeding, (2) line of blood and (3) drop of blood;
_bone loss (in mm on segment radiographs).

The PPD and BoP measurements were taken using a color-coded plastic periodontal probe (Kerr). All clinical measurements were obtained after removing the suprastructures. Intraoral standardized radiographs of sites of interest were obtained at baseline and at six months. Holders were used for standardization purposes. Radiographs were analyzed by two of the study investigators after previous calibration.

_Hygiene phase (non-surgical phase)

Before treatment, the suprastructures were removed and the baseline measurements were taken. The goal of the initial phase was the reduction of as much tissue inflammation as possible. The patient moved on to the support phase once signs of improvement and reduction of inflammation had been observed. In case of persisting bleeding and pus discharge, a surgical procedure was planned. For this surgical phase, fifty-one of all sixty-eight patients with a total number of 100 implants were randomized with a lottery assignment.

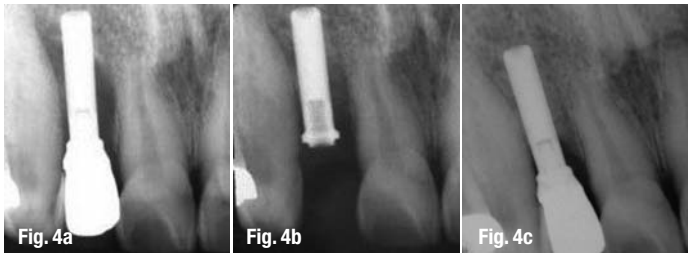

Fig. 4_The periapical radiograph revealed peri-implantitis with bone loss of > 5 mm **(a)**. The abutment was removed and surgical treatment using the LiteTouch laser was performed. Bone grafting with a biomembrane followed the laser treatment **(b)**. The periapical radiograph revealed bone regeneration after six months **(c)**.

_Surgical phase

If there was no significant improvement after the non-surgical phase (in the second week), a surgical intervention was planned (surgical phase). Surgical intervention was indicated in cases in which the conditions around the implant had failed to improve after the initial phase, but plaque control was adequate, and there was a need to retain the contaminated implant. The supraconstruction of the implants was removed in order to gain access and to preserve as much soft tissue as possible to cover the area after surgery. Patients were randomly assigned to one of the two treatment regimens.

_Conventional mechanical therapy (Group I)

Infiltration local anesthesia was used during treatment. The first incision was an internal gingivectomy, directed towards the bony ridge, which separates the peri-implant tissue from the mucosal flap. The flap was then raised to the level of the bony ridge, gaining access to the entire implant surface. The granulation tissue around the implant was carefully removed with sharp curettes and the implant surface was inspected for calculus deposits. The implant surface was then carefully cleaned using an ultrasonic device at low settings (PI tip, Piezon® ultrasonic unit, EMS). The PI tip was placed and used for approximately 60 seconds around the implant, ensuring coverage of the full circumference of the implant. Chemical debridement with a tetracycline solution was performed after ultrasound cleaning. In addition, bone augmentation was performed when required (21 patients; Bio-Oss, Geistlich Pharma; Dembone). During the study, all subjects received individualized oral hygiene instructions.

_Laser-assisted surgical treatment (Group II)

Under local anesthesia, gingivectomy and the separation of the peri-implant tissue from the mucosa were performed. The flap was raised to the level of the bony ridge, gaining access to the entire implant surface. The granulation tissue around the implant was removed with the LiteTouch Er:YAG laser (Fig. 3). Tip of choice was 1,300 micron, noncontact mode (distance between end of the tip and target tissue = 1.5 mm). If calculus deposits were found, the implant surface was then carefully cleaned with laser. Decontamination with a noncontact, defocused Er:YAG laser was performed by systematically moving the laser tip along the surface. The area was rinsed with a sterile saline solution. Bone augmentation was performed when necessary (19 patients; Bio-Oss and Dembone with or without an absorbable biomembrane). The tips and settings used during treatment are given in Table 1.

_Postoperative Instructions

The patients were prescribed clindamycin 150 mg x 50 tabs to avoid infection. They were also given ibuprofen 800 mg x 15 tabs for pain. Patients were instructed to rinse with chlorhexidine 0.2 %, starting the next day, for two weeks three times a day, and were advised to maintain good oral hygiene.

_Support phase

The goal of the support phase was to maintain long-term treatment results. Regular examination of the soft tissue, plaque control, radiographs and minor local treatments were performed, based upon the recall interval. If there was a recurrence of minor inflammation around an implant, the antibacterial periodontal treatment was repeated.

_Statistical methods

A statistical software package (SPSS) was used for the statistical analysis. Statistical significance was defined by a p-value of < 0.05. A change in PPD was defined as the primary outcome measure. The secondary outcome measure was a change in bone height. The data was also analyzed using independent t-tests for continuous variables with a normal distribution (equal variance not assumed; PPD, changes in bone height) and using the Mann-Whitney U-test for non- parametric data (BoP, suppuration) and a chi-squared test.

_Results

At baseline, a point of bleeding was found at 4.2 % of all implant surfaces, a line of blood at 47.6 % and a drop of blood at 56.9 % of the sites. Statistical analysis failed to demonstrate baseline differences in BoP between different implant surfaces ($p = 0.85$). At six months, no evidence of bleeding was found in 81 % of the implants in the LAS group and in 59 % of the implants in the CMT group. The decrease in BoP was significant in both study groups ($p < 0.001$). Statistical analysis demonstrated differences in changes in BoP between the study groups ($p < 0.001$). The mean PPD reduction in the CMT and LAS groups was 0.8 mm (SD $\pm$ 0.5) and 1.7 mm (SD $\pm$ 1.3), respectively, with mean changes in bone height (loss) of -0.5 mm (SD $\pm$ 0.6) and -0.1 mm (SD $\pm$ 0.2), respectively

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Procedure	Hard tissue/ soft tissue	Contact/ non-contact	Laser energy (mJ)	Pulse frequency (Hz)	Tip diameter x length (mm)	Waterspray level
Releasing incision of the flap	Soft tissue	Contact	200	35	0.4 x 17	5–6
Granulation tissue ablation	Soft tissue	Non-contact	400	17	1.3 x 14	6
Bone remodelling	Hard tissue	Non-contact	300	25	1.3 x 19	8
Implant decontamination	Hard tissue	Non-contact	150	45	1.3 x 17	6
Decortication for GBR technique	Hard tissue	Non-contact	300	25	1.3 x 19	8

Table 1_Tips and settings used during laser treatment.

(S) (Table 2). The proportional changes in bone height between baseline and six months, assessed from radiographs and defined at the implant level, are presented in Table 3. A positive treatment outcome, PPD reduction of > 4 mm and gain or no loss of bone were found in 59 % of the CMT and 81 % of the LAS groups, respectively (S). All subjects completed the study, and no implants were lost.

_Discussion

In modern oral implantology, lasers have a considerable spectrum of clinical application. The literature data revealed that different laser wavelengths are used on peri-implant tissues: treatment of peri-implant mucositis, treatment of infrabony defects, removal of peri-implant hyperplastic overgrowth tissue, preparation of bone defects for GBR.[3,4,22,28,29] Unlike mechanical decontamination methods, which cannot fully adapt to the irregularities on the surface of an implant, lasers can irradiate the whole surface, reaching areas that are too small to receive mechanical instrumentation. Recent in vivo studies have analyzed the outcome of peri-implantitis treatment using Er:YAG lasers[1,21,27,31] and CO_2 laser.[3,28,29] Many of these studies showed promising short-term results (less than six months), but report no long-term follow up. In the present study, differences in the reduction of BoP six months after treatment were found between LAS and CMT groups. While oral hygiene had improved greatly and no plaque was found at the treated implants, a large proportion of the implants in the CMT group continued to exhibit BoP at the six-month post-treatment assessments. In the present study, BoP was graded to distinguish the severity of inflammation and approximately 14 % of the implants in the LAS and 41 % in the CMT groups presented with bleeding, which was consistent with other data.[30] The reasonable explanation for these results is the quality of decontamination of the implant surface provided by the treatment approaches evaluated.

Contaminants such as bacteria and their by-products, calculus, and granulations should be removed without modifying the implant surface and with respect to surrounding soft tissues. Numerous methods for the decontamination of implant surfaces have been suggested, either alone or in various combinations, as part of the surgical treatment of peri-implantitis. The literature data revealed that methods as cleaning with metal curettes and impropriate ultrasonic tips or irradiation

PPD changes	CMT (%)	LAS (%)
Decrease (mm)		
> 4	1.2	37.4
3.1–4.0	7.9	35.0
2.1–3.0	14.0	7.9
1.1–2.0	35.4	12.1
0.1–1.0	1.7	4.2
Unchanged (mm)		
0.0	29.2	1.4
Increase (mm)		
0.1–1.0	7.9	0.0
1.1–2.0	1.2	0.0
2.1–3.0	1.0	0.0
3.1–4.0	0.0	0.0

Table 2_Proportional changes in PPD between baseline and six months, defined at the implant level based on the mean value of changes at four sites/implant.

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Table 3_Proportional changes in bone height between baseline and six months, defined at the implant level based on the mean value of changes in mesial and distal bone height.

Radiographic changes in bone height	LAS (%)	CMT (%)
Decrease (loss in mm)		
1.1–2.0	12.2	35.4
0.1–1.0	37.1	39.5
Unchanged (mm)		
0.0	29.3	4.2
Increase (gain in mm)		
0.1–1.0	17.4	12.5
1.1–2.0	4.9	2.1
2.1–3.0	7.1	6.3

with Nd:YAG laser can damage the implant surface and could compromise the residual implant stability.[9,20] Air-powder abrasive units are often recommended for the surgical treatment of peri-implantitis. A recent study aimed at evaluating the influence of different air-abrasive powders on cell viability at biologically contaminated titanium dental implant surfaces revealed that no surface treatments led to mitochondrial cell activity values comparable to the sterile control group.[33] Citric acid application and sandblasting have also been recommended.[18] However, implant decontamination using sandblasting units have been associated with risks such as soft tissues damage and emphysema.[34]

Er:YAG lasers are seen as the most promising new technical modalities of treating failing dental implants, since their performance of tissue ablation is accompanied by a high bactericidal and detoxification effect.[26,32] When considering the use of Er:YAG lasers in the treatment of peri-implantitis, there are some crucial points with clinical importance. Power settings are variable, and the clinician must also choose a setting that will effectively disinfect the implant while not damaging the surface. A narrow range of power settings (100 mJ/ per pulse) was described in the literature.[21,27,30,31,32] Only one study used a higher power setting of 120 mJ per pulse.[1] The frequency was set at 10 Hz for each of the mentioned studies, however, neither the distance from which the laser was applied, nor the time of application to each implant was stated. In the present study, the settings used for implant surface decontamination are 150 mJ/45 Hz, at non-contact mode and constant movement. Another important point is the interaction between laser light and metal surfaces. This interaction is mainly determined by the degree of absorption and reflection. With a reflectance capacity of about 71 %,[19] titanium implant surfaces do not absorb irradiation. Consequently, there is no increase in temperature which could damage the implant surface. Several investigations have reported on the promising ability of the Er:YAG lasers in implant surface debridement without producing thermal side-effects on implant surface and adjacent tissues.[14,35] Treatment of peri-implantitis using Er:YAG laser therapy has been investigated before and appears to result in a more effective reduction in bleeding around implants than surgical debridement with hand instruments and sub-gingival application of chlorhexidine.[1,27,30,31] Irradiation with this specific wavelength seems to have a bactericidal effect on periodontopathic bacteria and remove bacterial biofilm. However, in order to treat the implants with the laser device in the present study, the suprastructures were removed, allowing the access to the implant surfaces to improve. Thus, the results of the present study are limited to implants where the suprastructures can be removed during treatment.

_Conclusion

Among lasers used in the field of dentistry, the Er:YAG laser seems to possess the characteristics most suitable for peri-implantitis treatment because of its ability to ablate both soft and hard tissue, as well as bacterial biofilm and calculus, without causing thermal damage to the adjacent tissues and implant surfaces. The decontamination effects of Er:YAG laser are also beneficial regarding peri-implantitis pathogenesis. In the present study, the use of the LiteTouch Er:YAG laser has been proposed for the treatment of peri-implantitis and the results indicate that the laser-assisted surgical therapy may lead to significant clinical improvements such as BoP and PPD reduction as well as a gain in clinical attachment. From a clinical point of view, these results advocate the Er:YAG laser as an alternative treatment modality to conventional mechanical therapy._

With the collaboration of Dr Ke, Dr Yu, Dr Lu , Taiwan; Dr Kenny Chiu, Hong Kong; Drs Kanbayashi, Takahashi, Ikeda & Kamiya, Japan.

Editorial note: A list of references is available from the publisher.

_contact laser

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Up-to-date vestibuloplasty at the age of implant dentistry

Author_Dr Darius Moghtader, Germany

_Introduction

Whether nowadays, in the age of implant dentistry, one can still perform vestibuloplasty in good conscience, is a question constantly being raised. In the pre-implant era, vestibuloplasty was applied to deepen the vestibule with the aim of lining the vestibular trough with functional mucosa in order to form a valve-type margin.[1] Vestibuloplasty today continues to be used for this purpose if the patient's financial resources preclude implantation.

_Classical surgical procedures

There are three possible approaches to the classical surgical procedure[1]:

1. Incision of the mucosal, leaving the periosteal wound surface to secondary healing;
2. Covering the periosteal wound area with skin or mucosal graft;
3. Submucosal incision without opening of the mucosal cover, using Obwegeser's technique.

Procedure one is the technique most commonly used in practice, although it has the drawback of being associated with a loss of the gained alveolar ridge height of 50 % as a result of scar contraction. The patient has to endure pain due to the open wound surfaces and is limited in terms of food intake. In addition, patients often have to re-attend the dental practice because they develop pressure sores owing to scar contraction. In the worst-case scenario, the relined denture is not worn by the patient, resulting in conditions similar to the pre-treatment situation. The elexxion diode laser and its patented high-pulse technology enable practitioners to achieve a more sustainable result, causing minimal pain to the patient, without the disadvantages of the conventional surgery.

_Pre-implantation surgery

Apart from the social indications, the implant era bears the following medical indications prior to planned implantation:

Fig. 1_Initial situation.
Fig. 2_Laser cutting. Anterior view.
Fig. 3_Laser cutting. Lateral view.
Fig. 4_Check-up and soft laser one day post-op.

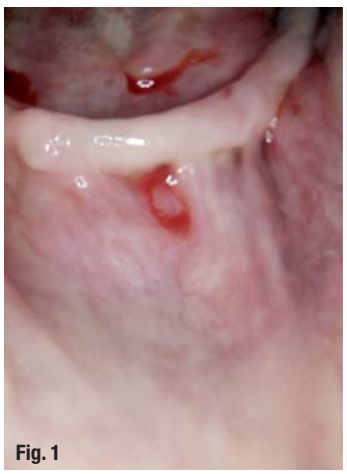


Fig. 1

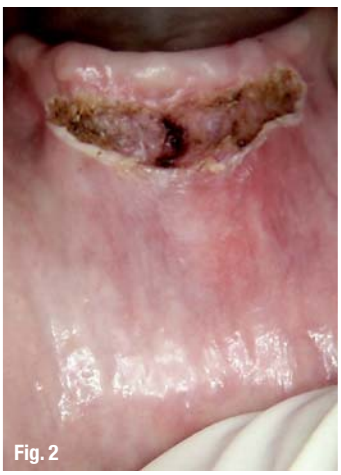


Fig. 2

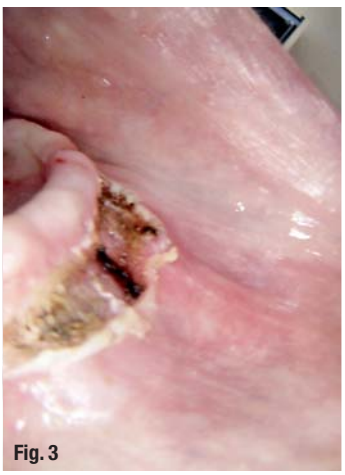


Fig. 3

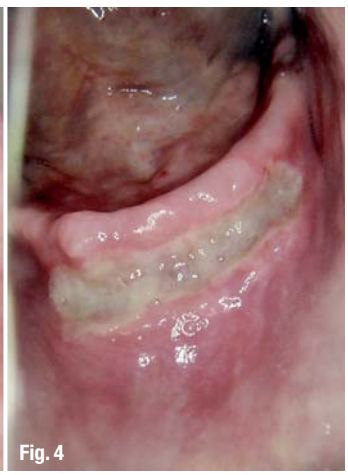


Fig. 4

1. Removal of the mobile mucosa and fraenal attachments extending into the area of the implants;
2. Creating valve-type margins for coverimplant dentures;
3. Reduction of the impaction of food remnants, especially if performing immediate loading of implants.

These pre-implantation surgical measures provide the implants with lasting protection against mobile mucosa. Even in the event of implant loss or if only a few implants are placed, additional retention can be achieved by the valve-type margin. If immediate loading is performed, the implants can heal unaffected by external influences.

_Case presentation

A patient with a long history of pain presented at our dental practice and reported that she can no longer eat even semi-solid foods and that she is using analgesics constantly without being able to wear her lower denture. After general and specific history-taking, treatment with at least six minimally invasive implants and a preceding vestibuloplasty in the mandible were proposed. A new denture in the lower jaw was to be fabricated, with immediate loading of the implants. After detailed advice and a thorough explanation, the patient consented to the proposed treatment. As a complicating factor, the patient's heavy consumption of analgesics resulted in a highly reduced anaesthesia time.

Anaesthesia was performed first (Fig. 1). Superpulsed laser cutting was then performed with the elexxion diode laser 810 nm (Fig. 2). It is important to make sure that the laser is guided parallelly to the bone in order to avoid unwanted side effects (Fig. 3). This procedure is accompanied by the instant haemostasis known to be typical of laser treatment, as well as reduced postoperative pain resulting from the deactivation of the nerve fibre endings. Fast, high-performance cutting with low carbonization is made possible by the patented high-pulse technology.

Immediately afterwards and on the following day, the glass rod of the elexxion diode laser was used for soft laser application in order to reduce pain and accelerate wound healing. A reline impression was taken immediately after surgery and inserted at the evening of the surgery after indirect relining in the laboratory.

Fig. 5_Wound healing after five days. Anterior view.
Fig. 6_Wound healing after five days. Lateral view.
Fig. 7_Wound healing after ten days. Anterior view.

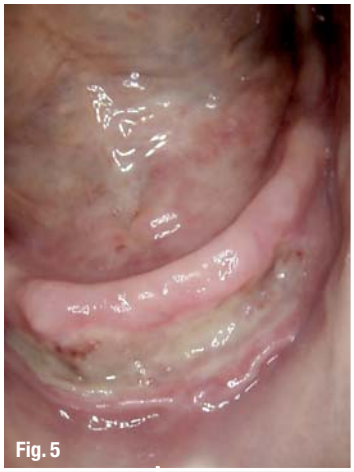
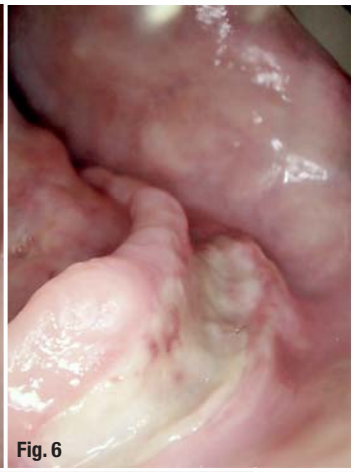


Fig. 5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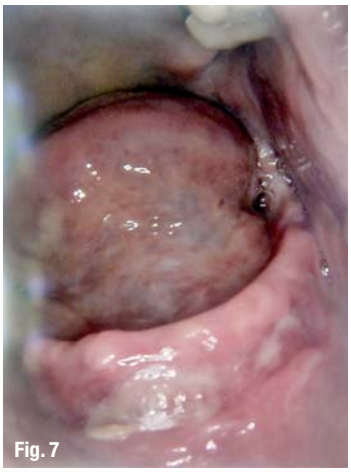
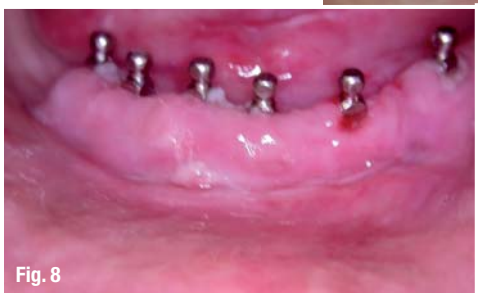


Fig. 7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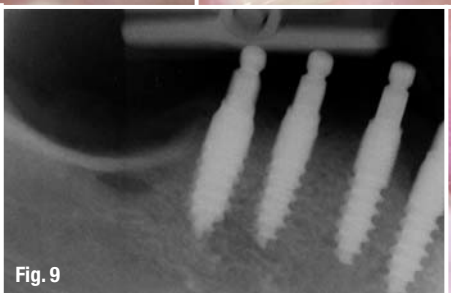
Fig. 9

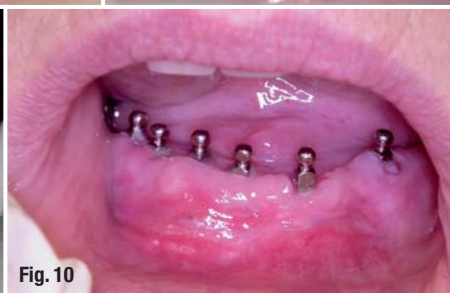
Fig. 10

Fig. 8_Immediately after implantation.
Fig. 9_Exit of the mental nerve close to the alveolar ridge.
Fig. 10_One week after implantation.

On the following day, the patient presented for check-ups with the expected fibrin deposit (Fig. 4). She was delighted to report that this was the first time she managed to do without pain killers after any dental surgery. At the subsequent check-ups after five (Fig. 5 and 6) and ten (Fig. 7) days, wound healing appeared to proceed successfully and pain-free.

_Complete preservation of the alveolar ridge

After complete healing, minimally invasive implantation was performed with six Champions tulip-head implants (Fig. 8), followed by immediate loading with the overdenture (Fig. 10). Masticatory function was immediately restored, and complete osseointegration of the implants was successfully achieved after six and twelve weeks. The exit point of the mental nerve can clearly be identified on the control X-ray (Fig. 9). This also explains the severe pains which were resistant to analgesics when the patient wore the previous full denture. In cases such as this, it is important to ensure a sufficient number of at least six implants or, if there are only four implants, a bar restoration should be planned in order to relieve the mental nerve from pressure. Only four weeks after implantation, almost complete contouring of the vestibule was achieved (Fig. 11).

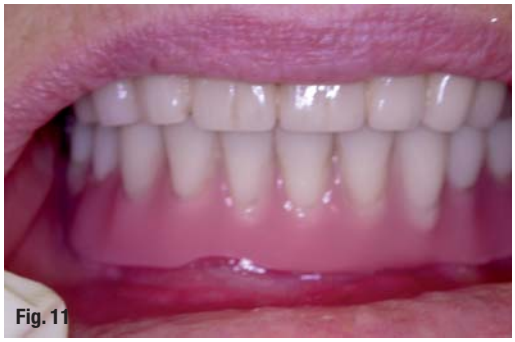
Fig. 11

Fig. 11_Four weeks after implantation.

_Is vestibuloplasty still up-to-date?

With laser it definitely is. This is because a very good outcome can be achieved with minimal discomfort for the patient and the surrounding area can be prepared for implantation to ensure problem-free, undisrupted healing even with immediate loading, provided there are sufficient implants._

_information laser

[1] Band 2 Spezielle Chirurgie, Norbert Schwenzer und Gerhard Grimm, Thieme Verlag 1990, p.439 ff.

_contact laser

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Quantum Square Pulse Er:YAG lasers in clinical practice

Authors_Evgeniy Mironov, Zhasmina Mironova, Bulgaria

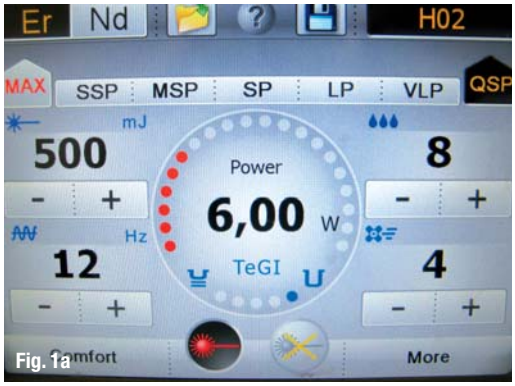

Fig. 1a

Fig. 1_ a) LightWalker AT settings for QSP mode; **b)** H02-C handpiece; **c)** H14-C handpiece.

_Introduction

Er:YAG lasers are becoming increasingly popular in every day dental practice due to a higher level of patient acceptance and greater precision and procedure quality. There are many advantages over conventional mechanical preparations, such as lower increases in pulp temperature, less pain for the patient, less risk of secondary caries,[1,2,3] and improved strength of adhesion of the composite resin to dentin prepared by low-energy SSP Er:YAG laser pulses.[4]

The ability tosetdifferent laser pulse durations represents a significant development that expands the versatility of Er:YAG dental lasers.[5,6] One of the recent advances in Er:YAG laser technology is the introduction of Quantum Square Pulse (QSP) technology. In QSP mode, low-energy, short pulses follow each other at an optimally fast rate, resulting in both higher efficiency and precision at the same time. Cavities made with QSP mode are sharp and well defined, with high surface quality as required for high bond strength.[7,8]

Fig. 1b & c

_Materials and methods

A LightWalker AT laser (Fotona, Slovenia) was used with a H02 non-contact handpiece (beam spot size in focus: 0.6 mm) for enamel and composite preparation, and with a H14 contact handpiece with a cylindrical fiber tip of 0.8 mm diameter for surface modification and dentine (Fig. 1b, 1c). For all clinical cases QSP mode was used: pulse energy varied from 120 mJ to 500 mJ, with repetition rates ranging from 10 to 15 Hz (Fig. 1a).

The composites used for fillings and bonding were supplied by Voco (Cuxhaven, Germany).

Prior to the beginning of the treatment, the effects of the Er:YAG laser treatment, benefits and possible risks and complications were explained in understandable terms to every patient. Laser safety rules were strictly observed by the LSO (laser safety officer, Dr. Evgeniy Mironov) during the treatments.

_Patient cases

All patient cases with chronic and acute conditions (described below) were taken from everyday practice. Patients signed informed

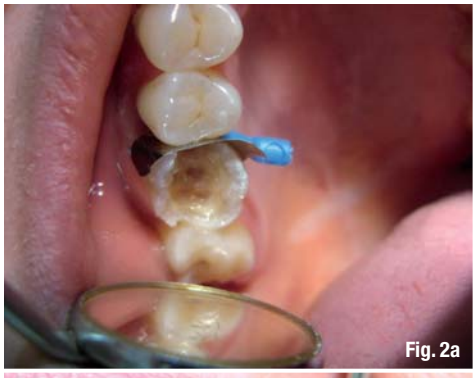
Fig. 2a

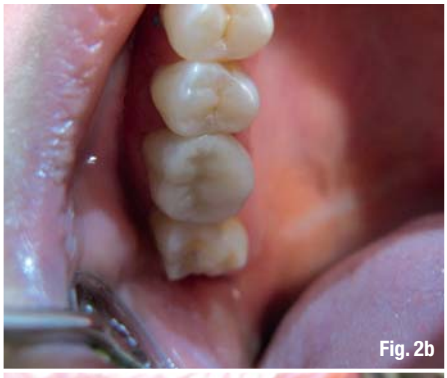
Fig. 2b

Fig. 2_ a) Tooth 16 after preparation with QSP;
b) Tooth 16 after complete restoration (Case I).
Fig. 3_a) Tooth 26 before treatment;
b) Tooth 26 after preparation with QSP;
c) Tooth 26 after complete restoration (Case I).
Fig. 4_a) Removal of old composite veneer with QSP mode; **b)** After complete surface preparation;
c) Clinical situation after complete direct restoration (Case II).

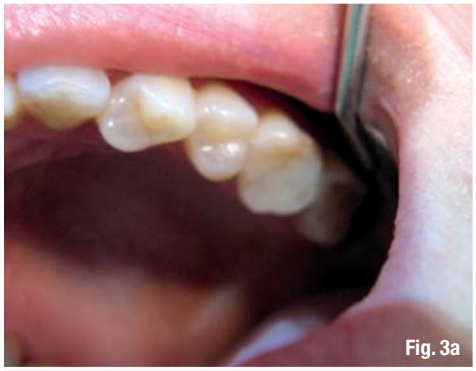
Fig. 3a

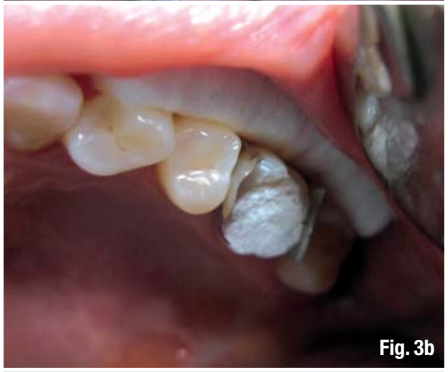
Fig. 3b

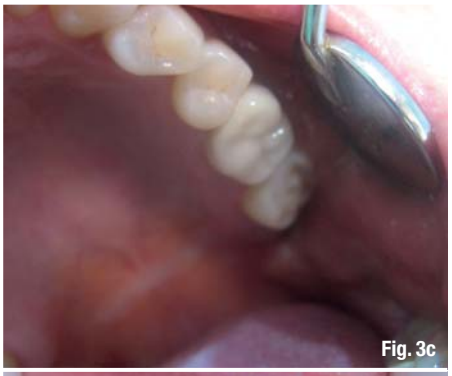
Fig. 3c

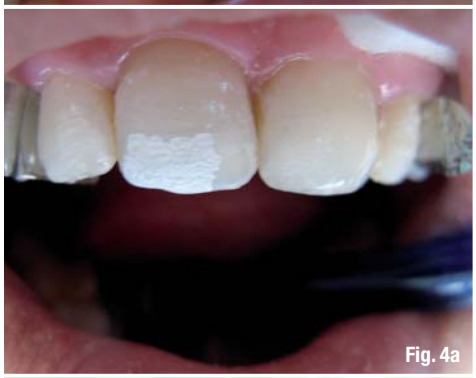
Fig. 4a

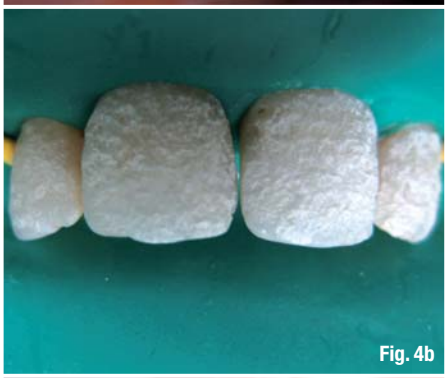
Fig. 4b


Fig. 4c

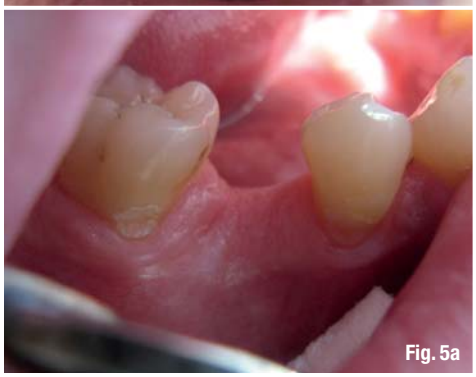
Fig. 5a

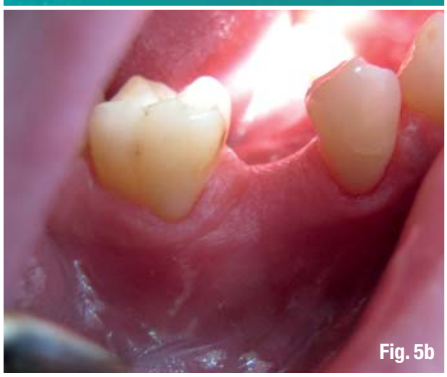
Fig. 5b

Fig. 5_a) Clinical situation on both premolars before the treatment; **b)** Clinical situation after surface modification with QSP mode and filling with flow composite (Case III).
Fig. 6_a) Clinical situation before the treatment;
b) The situation just after treatment with QSP mode showing completely untouched gingiva, even though high energy was used for the treatment;
c) Clinical situation after treatment.

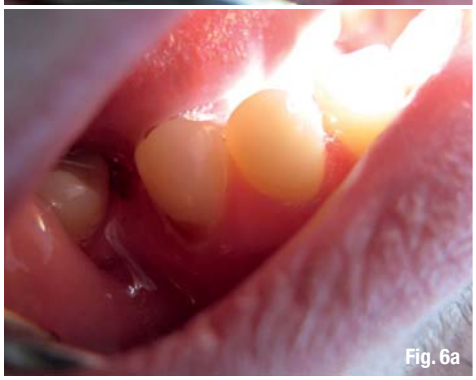
Fig. 6a

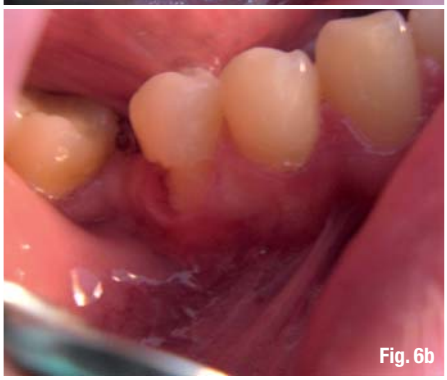
Fig. 6b

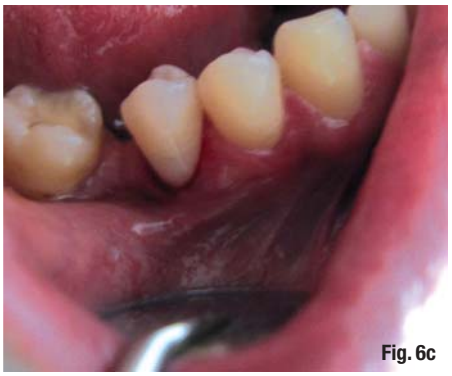
Fig. 6c

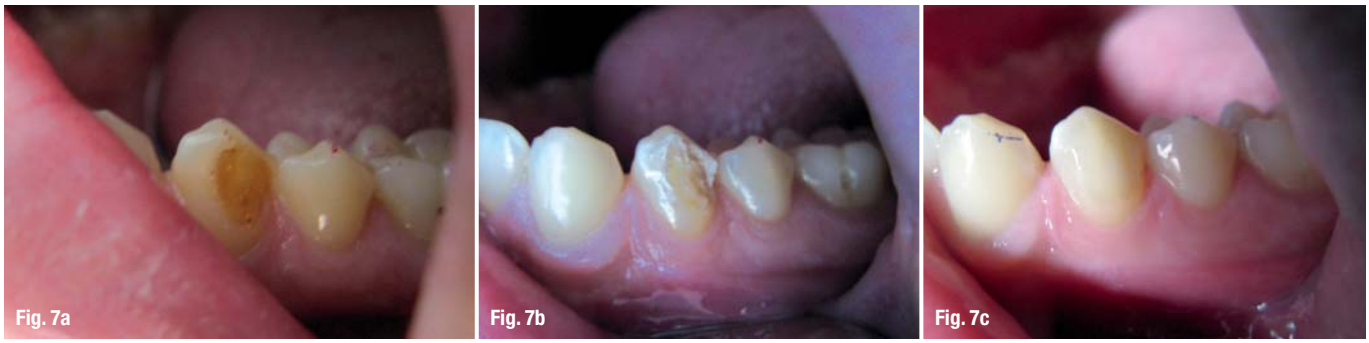

Fig. 7_ a) Clinical situation before the treatment; **b)** The situation just after treatment with QSP mode showing an ideal surface for bonding; **c)** Clinical situation after the final filling (Case V).

consent forms after reading the explanation of the procedures to be performed with the LightWalker AT laser, and they permitted photos to be taken.

Case I

The filling on tooth 16 of a 26-year old female patient was to be changed due to discoloration and reported transitive hypersensitivity. For removal of the existing composite filling, the parameters were set to QSP, 500 mJ, 12 Hz, and for the dentine preparation, to QSP, 160 mJ, 15 Hz. The preparation with QSP mode was fast and precise: QSP mode is very suitable for the removal of secondary and chronic caries, which are not as rich in internal substrate water as acute caries. It is also beneficial to use QSP mode in deeper zones to reduce the risk of thermal damage due to insufficient water inflow. No anesthesia was used during the treatment, and the patient did not show any signs of discomfort or pain (Fig. 2).

A deeper abrasion on the filling of tooth 26 was made in the same patient. A fresh and sterile surface for changing its occlusal part was performed with QSP mode, with pulse energy of 300 mJ, 15 Hz, water and air spray (Fig. 3). The patient reported the disappearance of hypersensitivity at the fifth day post-op check-up, and after six months the stability and functionality of the restorations were confirmed.

Case II

A female patient required an aesthetic treatment on her front teeth. One week after undergoing a successful TouchWhite™ Er:YAG teeth whitening procedure, the replacement of her existing direct-made composite veneers was necessary to adjust the color to the new color of the bleached teeth. Because of the high precision of QSP mode, it was possible to keep the enamel untouched and to work in the previous composite layer only. The ablation was started with QSP mode, 150 mJ, 12 Hz (Fig. 4a). According to the material's response, the energy was raised to 180 mJ, and in areas with a thicker layer of the existing composite, the frequency was increased to 15 Hz. The preparation took 1.5 to 2 minutes for each central incisor and one minute each for the laterals (Fig. 4b).

After placing the rubber dam, direct adhesive restorations were made with a layer of Grandioso Heavy flow (VOCO, Germany) to establish a strong and uniform connection between the two kinds of composites. The patient was satisfied with her new look and felt relaxed after the painless procedure (Fig. 4c).

Case III

A 30-year-old patient reported hypersensitivity to mechanical irritation and cold liquids in the region of the lower premolars. The gums were healthy and no isolation cord was necessary. Using the laser's especially precise QSP mode assured keeping the gingival tissues untouched. The surface modification parameters were QSP, 120 mJ, 10 Hz. Easy accessibility with the non-contact handpiece and a clearly visible pilot laser beam allowed the preparation to be finished in less than 20 seconds for both teeth (Fig. 5). The restorations were made by flow composite. Some light gingival bleeding around tooth 44, which is seen in Fig. 5, was caused by polishing. This case demonstrates how fast and accurate treatments can be made using QSP mode.

Case IV

A deep cervical carious lesion on tooth 45 was treated in a 23-year-old male patient. Since the carious lesion was deep and the patient was very afraid of dental procedures, anesthesia was used and the fastest possible treatment parameters were set: QSP mode, 500 mJ, 12 Hz. The first step of the preparation was performed in 5 seconds, and then the energy was changed to 300 mJ because deep carious dentine was reached. To operate still faster, the frequency was increased to 15 Hz and the second step was also completed in 5 seconds. After placing the haemostatic cord, Calcimol LC (VOCO) was used as a liner, covered with Grandioso Heavy Flow and finally filled with Grandioso.

Case V

This is a case of localised single-tooth Amelogenesis Imperfecta due to excessive fluoride intake. The patient is an 18 year-old male and his only complaint is due to aesthetic reasons. After explanation of the laser treatment procedure, a decision was taken to make a filling, following Er:YAG ablation without anesthesia. The patient was afraid of dentists and denied injections in previous visits for dental treatment. The parameters on the Fotona Lightwalker AT were set in QSP mode, which is exceptionally fast and quiet. In cases such as this, enamel is much stronger and richer in mineral content, so a high energy setting of 500 mJ was used with a 12 Hz repetition rate. After preparation, the energy was lowered to 120 mJ at 10 Hz, still in QSP mode, for a marginal laser-etching procedure. The preparation was done in less than 30 seconds and the patient remained still and calm. The filling was done with GrandioSo and Futurabond M (VOCO).

_Conclusion

In the above-described clinical cases, QSP mode was used because fast, precise, and minimally invasive treatments were required. This is of great importance in pediatric dentistry and with highly anxious patients. The treatment provided good aesthetic results, and patients did not report any subsequent sensitivity.

All patients appreciated the lower noise generated by QSP pulses in comparison to other pulse modes as well as the speed of the treatments. A very important clinical benefit of the QSP mode are the resulting clear and sharp margins of preparations for fillings or for surface modification. This is of primary importance when working close to the pulp or near the gingiva. The quality of surfaces prepared by QSP mode seems to be excellent for the composites that were used._

_contact

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Manufacturer News

Miyachi

Miyachi Europe displays laser precision

Miyachi Europe, supplier of laser and resistance welding systems and laser marking products, will be showcasing its laser system solutions at LASYS 2012, the international trade fair for laser material processing system solutions, which will take place in Stuttgart, Germany, from June 12–14, 2012, at the Stuttgart Trade Fair and Convention Centre, Booth #4E10.

On display will be the highly flexible NOVA-6 CNC Class-1 laser welding workstation, designed for a wide range of applications ranging from production of spot and seamwelded medical implants to automotive sensors, pacemaker leads and research & development environments. The NOVA-6 can be upgraded to a glovebox system for welding in a controlled atmosphere. Also featured is the ML-8150C

green (SHG) laser welder, ideal for welding high reflectance materials like copper, gold and their alloys. The new ML-7350C Yb:fibre laser marker is designed for high speed laser marking, laser engraving and laser ablation. The high power level of 50 W results in high contrast marks on both plastics and metals at high speed.

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elexxion

delos 3.0 combines diode and Er:YAG

The delos 3.0 laser from elexxion AG enables gentle yet effective treatment of both hard and soft tissue. By combining the 810 and 2,940 nm wavelengths, the device represents a perfect symbiosis of one of the fastest Er:YAG lasers and a powerful diode laser, and thus covers nearly all dental indications for laser treatment.

delos 3.0 is therefore not only one of the most universal devices on the market but it is also one of the most operator-friendly high power lasers thanks to the new floating arm technology and the 10.5 inch touchscreen.

With up to 50 W and a variable impulse frequency of up to 20,000 Hz, the diode laser in the delos 3.0 conservatively treats soft tissue at low penetration depths – whether in surgery, prosthetics, implantology or periodontics. Atraumatic to the distal end: the Er:YAG laser wins over the practitioner with a power bonus of 50 per cent. Thus instead of conventional glass fibre cables, the system is equipped with high quality mirror optics, which are integrated in the floating arm and which guide the laser beam without scattering losses into the handpiece – for effective hard tissue ablation with a maximum output of 12 W.

Depending on the clinical requirement, the power can be individually adjusted, which also has presettings for more than 20 indications. Other features: Cooling system, pedal switch and an integrated fee calculator.

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Schützenstraße 84
78315 Radolfzell, Germany

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Fotona

Fotona expands clinical & academic ties

A team from the dental laser manufacturer Fotona recently visited the newly-opened Faculty of Dentistry at Bezmialem Vakif University in Istanbul, Turkey, which is offering postgraduate courses in dentistry in cooperation with AALZ Aachen University in Germany.

The new Faculty's lecture room and clinical rooms are equipped with the latest technologies of modern dentistry and state-of-the-art research equipment, including dental laser systems and SEM and AFM microscopes.

The Faculty will conduct education, research and clinical work using Fotona's LightWalker® AT dental laser system, which has received several highly distinguished international design and technology awards for its combination of innovation, technological excellence and superior design. The Faculty's research team has already begun performing intensive clinical studies using new dental-laser technologies developed by Fotona, such as the company's patented QSP (Quantum Square Pulse) mode and TwinLight® dual-wavelength treatment method.

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1000 Ljubljana, Slovenia

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Henry Schein/Planmeca

Henry Schein becomes new US distributor for Planmeca

Finnish dental company Planmeca has named Henry Schein the US distributor of its full range of dental equipment, software and other products, including digital imaging products. Henry Schein is already familiar with Planmeca products, as it has served as its exclusive distributor in Australia and New Zealand for nearly two decades.

HENRY SCHEIN® DENTAL

PLANMECA

Henry Schein, headquartered in Melville, New Jersey, is a provider of health-care products and services to office-based dental, medical and animal-health practitioners. "Planmeca and Henry Schein have a shared commitment to quality and customer service, and we are pleased to be embarking on a new relationship with this industry leader in the important US market," said Bob Pienkowski, President of Planmeca USA. "Henry Schein's customers rely on the company for a comprehensive offering of dental equipment and for the latest in advanced-technology solutions. We look forward to helping Henry Schein continue to meet its customers' needs and to our future mutual success."

"Planmeca has a very good reputation among dental practitioners worldwide, and we are delighted to be selling the company's leading dental equipment in the US," said Tim Sullivan, President of Henry Schein Dental.

Source: DTI

Biolase

Biolase to distribute 3Shape Trios intraoral scanner

Last week, dental laser enterprise Biolase announced that it had signed an agreement with dental scanner and software developer 3Shape. Biolase will be distributing the Danish company's Trios intraoral scanning technologies for digital impression-taking solutions to dental professionals in the US and Canada.

Biolase entered a five-year agreement with 3Shape, making the dental laser manufacturer a non-exclusive distributor of the Trios system, which includes a handheld scanner, operator's control cart and software. Under the agreement, Biolase will distribute the Trios system to dentists, dental specialists and dental schools in North America.

"The Trios digital system is quickly becoming an important and integral part of the modern high-tech dental suite and our agreement with Biolase provides us with significant new access to the important North American market," said Henrik Vestermark, vice president of operations at 3Shape America. Federico Pignatelli, Biolase chairperson and CEO, said that the agreement not only allows the company to better serve the periodontists, orthodontists, endodontists and oral surgeons doing complex dentistry, but also opens a new market for Biolase to partner with dental labs.

"By putting the Trios digital solution together with our advanced laser products and our full line of digital imaging products under our Biolase umbrella, we can offer dental professionals a 'one-stop shop' for a totally integrated group of devices and dental engineering services while driving new revenue growth in all aspects of the dental market," he added.

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www.biolase.de

Omnia

Customized procedure kits

OMNIA S.p.A. introduces the new brochure about its customized procedure kits for oral surgery and implantology.

The brochure clearly explains what a customized procedure kit is, its benefits and how to set up a kit in order to better fulfill the needs and requirements of the surgical staff.

Simple, functional and efficient, Omnia procedure kits assist each dental surgeon from basic to advanced surgery. Realized on the specific needs and requirements of the surgical staff, the customized procedure kits help to improve the quality and simplify the management of the surgical theatre, optimizing the long set up phase and streamlining working times and costs, for a general reduction of hidden costs.

The customization of the procedure kits also foreseen that the name of the surgical staff is printed on the label of each kit. The label used by Omnia for sterile kits contains all the information you need to identify the device (code, lot, expiration date); there are two more cut-outs for the end user that allow easy data storage and traceability also by end customer. Traceability is a procedure that allows us to reconstruct with ease and precision all the phases of the production process (from the entrance of raw materials/components, to sterilization) through registration on paper and/or computer for proper data storage and preservation.

Omnia procedure kits create an optimal working environment in dental offices and in the best clinics all over the world.

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100th Annual FDI congress celebrated in Hong Kong

Author_Dental Tribune International

_The Grand Hall of the Hong Kong Convention and Exhibition Centre saw its latest highlight on 29th August, when the FDI World Dental Federation officially opened its centennial congress with an eye-catching traditional performance featuring a 100-foot long dragon dancing among a sea of lions and flags.

The ceremony was attended by high-ranking officials from the Hong Kong Dental Association, the University of Hong Kong, among other institutions, as well as the Chinese and Hong Kong SAR governments, including China's Minister of Health Zhu Chen, who also received the FDI World Oral Health Recognition Award, which was handed over by FDI President Dr Orlando Monteiro da Silva.

Chen, who has served in this position since 2007, is the first person ever to have received this award. According to the FDI, he was selected for his contributions to the development of dentistry in China, as well as his leadership in the education of new dentists and the establishment of new dental schools.

In his welcome speech, da Silva congratulated Chen, saying that the challenges the minister has had to overcome in the People's Republic of China are a good example of the challenges his own organisation is confronted with in its goal to improve oral health globally. With its "Vision 2020" document (see also page 6 of this edition), introduced at a special forum during the World Dental Parliament on Tuesday, da Silva said that the FDI is able to provide not only a roadmap for the future of dental medicine, but also inspiration to the profession, preparing it for new and exciting partnerships in leading the world to optimal oral health.

"Vision 2020 demonstrates the FDI's agility and determination to address issues such as the huge disparities in access to oral care between countries and within countries between urban and rural areas," he commented.

Available for download from the FDI's website, the document focuses on significantly improving access to oral health care worldwide by 2020 by expanding the role of oral health professionals and developing a responsive model for future dental education, among other things. In addition, the federation has launched two new websites in Hong Kong, both for its Global Caries Initiative, developed jointly with Dental Tribune International, and for its noncommunicable diseases campaign with the World Health Professions Alliance. The latter aims to help professionals, including dentists, to respond to the epidemic of noncommunicable diseases, such as cancer and respiratory disease.

This year marks the 100th time that the FDI has invited dental professionals to its Annual World Dental Congress and it is the second time that it is being held in Hong Kong. Thousands of dental professionals from the region and around the globe are expected to attend the event from Wednesday to Saturday, which has been organised in collaboration with the Hong Kong Dental Association.

Besides a comprehensive scientific programme, including a presentation on oral health in China by Dr Lingzhi Kong, Deputy Director-General of the PRC's Center for Disease Control and Prevention, in a special session, the latest dental materials and equipment were on display at the World Dental Exhibition in the Hong Kong Convention and Exhibition Centre._

[PICTURE: ©LEUNGCHOPAN]

Study club honored for elevating educational standards in the New York City area

Author_Dental Tribune America

_The Office of Queens Council Member Daniel J. Halloran submitted awards to Dr Alexander Ross Kerr of New York University and Dr Robert Trager, to acknowledge their work in raising educational standards and awareness on Oral Cancer at a recent meeting of the Fialkoff Dental Study Club.

Dr Bernard Fialkoff, a Queens periodontist and dental implant specialist, founded the club in the mid '90s and invited two of the most prominent dentists in New York to present the New York state-mandated oral cancer screening course. More than 160 dentists from Long Island, the boroughs, New Jersey and even Connecticut participated in the course.

The Oral Cancer Foundation and LED Dental's Velscope and Zila's ViziLite Plus, both oral cancer screening devices, sponsored the seminar, providing additional information on ways to detect oral cancer in dental offices.

Fialkoff said, "Many dental publications today are publishing articles on the preventative methods we can take on oral cancer. It is my job to ensure our study club members are kept abreast of the latest dental technology. We invited Dr Kerr and Dr Trager, as they fit the bill to impart this vital information to our attending dentists, who can in turn, bring this information to their offices and further help their patients. The driving purpose of our study club is to raise dental standards throughout the Greater New York area through our monthly educational presentations and meetings."

Council Member Halloran's City Council Citation award reads, "Such service, which is truly the lifeblood of the community and the city, so often goes unrecognized and unrewarded."

Kerr is a clinical associate professor of the Department of Oral & Maxillofacial Pathology, Radiology & Medicine at New York University College of Dentistry, a member of the steering committee for the World Workshop on Oral Medicine a and member of the Scientific Advisory Board of the Oral Cancer Foundation. Trager has dental practices at LaGuardia and JFK airports and is the chairman of the Oral Cancer Committee for the Nassau County Dental Society, past president of the Queens County Dental Society, and is known throughout New York for volunteering at Belmont Raceway Track, Saratoga's horse races and numerous other occasions providing free oral cancer screenings.

Attending dentists learned methods on preventing oral cancer, effective communication methods to help their patients avoid the dangers of the disease and practiced using the oral cancer screening device at the meeting. Kerr's NYU Oral Cancer Clinic also gave out informational materials on the research and work it is doing.

The study club has an audience of 60 to 100 dentists each month. It focuses on raising dental excellence, standards and camaraderie in the New York boroughs. The club will continue its monthly meetings into 2012 with a presentation in September by Dr Mark Montgomery, in October by Dr Bernard Fialkoff and with a special appearance by Dr Harold Edelman in December, instructing on the mandatory infection control course.

Fialkoff has had a periodontal, dental implant and cosmetic laser surgery office for more than 31 years on 56-03 214th St. in Bayside, N.Y. The office web site and blog, which shows study club photos and bulletins, and other community activities of the office, is www.baysidedentist.com. Study Club newsletters and past photos are also available for viewing at www.facebook.com/DrBernardFialkoffDDS.

(Source: Fialkoff Dental Study Club)

Barcelona meets laser specialists from more than 45 countries

Author_Javier de Pison

[PICTURE: © IAKOV FILIMONOV]

_From 26 to 28 of May, the 13th World Federation for Laser Dentistry (WFLD) World Congress and the 12th annual meeting of the Sociedad Española de Láser Odontoestomatológico (SELO) were held in Barcelona. This meeting gathered more than 500 specialists from all around the world.

The high scientific standard of the invited lecturers, as well as the high quality of both oral presentations (150) and posters (140), tagged the event as highly prestigious. The congress was developed in four simultaneous rooms: two for the lecturers and the other two for the oral presentations. There was also a big space reserved for the poster presentations. In one of the conferences rooms, in which general aspects of laser application in dentistry were treated, simultaneous translations from English to Spanish took place during all the congress. In the other main room, more specific and advanced aspects of laser in dentistry were discussed. The scientific programme of the congress was meticulously organized, avoiding that a lecture of a certain field overlapped with another lecture on a similar subject.

There was also a big space for the trade fair, in which recent technologies and devices in the field of dentistry were presented. The congress held the main manufacturers of lasers in dentistry from around the world at its disposal.

The different social events that took place during the congress days also played a major role in its success. On the first day, the opening ceremony was celebrated, with the presence of the delegate of the rector of the University of Barcelona, honorable Dr Miquel Viñas, the dean of the dentistry faculty of the International University of Catalonia. honorable Dr Lluis Giner, the President of the Dentists Association in Catalonia, honorable Dr Josep Lluis Navarro, the president of the World Federation for Laser Dentistry, Dr Jean-Paul Rocca, the president of the Sociedad Española de Láser Odontoestomatológico, Dr Josep

[PICTURE: ©NITO]

[PICTURE: ©R.NAGY]

Arnabat, and the president of the congress, Dr Antoni España. At the inaugural ceremony of the congress and after the speeches, a representation of the Spanish folklore took place. In addition, snacks and Catalan cava were served.

The scientific committee rewarded the best oral presentations of "young researchers". The ten best oral presentations were selected and repeated in one of the main rooms, with a jury awarding the best ones.

During the closing ceremony, president Dr Jean-Paul Rocca thanked the organizing committee for all the effort carried out during the congress preparation and emphasized that "the Barcelona congress has been the best among all the WFLD Congresses held so far, and exceeding this would be difficult".

On the last day of the congress, a closing dinner was prepared in a restaurant located in the Montjuic mountain, with wonderful views of all the city of Barcelona. During the dinner, there was a prize draw for a diode laser, offered by Syneron Dental, the Congress' Gold Sponsor. The President of the SELO, Dr Josep Arnabat, presented Dr Isao Ishikawa with a commemorative plaque of acknowledgement for his career and support, and Dr Antoni España with another gratitude plaque for his work as previous President of SELO.

In the meeting, the new President of the WFLD, Dr Aldo Brugnera Jr., was introduced and dedicated a few words to all the people at the dinner._

_contact laser

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German distributor files against dental laser manufacturer

Interview by Georg Isbaner, Germany

"Lasers in dentistry are on a good way with a great market potential. Even such an incident by an individual manufacturer will not change this."

NMT Senior Consultant Joachim Koop comments on the current legal dispute between NMT and Syneron Dental Laser. Interview by Georg Isbaner. Leipzig, 17 August 2012.

Joachim Koop, Senior Consultant NMT Munich GmbH

_laser: *Dear Mr Koop, in the year 2009 your company started to market dental laser systems made by Syneron. These are meant to be systems with trailblazing technology, which you distributed with tremendous success from scratch.*

Trailblazing laser technology is complemented in this case with the consulting, sales and training competence in your company. It also meant a great opportunity to enter into a new promising partnership with new impulses that had long been awaited by many in the dental laser market.

Since the end of last year the situation has turned when a legal dispute between the manufacturer, you as the distributor of Litetouch products and the dentists harmed ensued. What happened?

If an accredited certification body, that furthermore has its seat in Germany, issues a CE certificate for a medical device, all market players should have the right to trust the certificate that the product really meets the certification requirements.

The ordering of a suspension of a certificate issued in 2007 raises many questions that the responsible manufacturer Syneron has not yet adequately responded to.

I would never have thought this is possible for such a big and up to now very renowned laser manufacturer like Syneron that operates worldwide and is listed on the Stock Exchange.

_How did you find out about the increased EMC radiation that led to the suspension of the CE certificate?

The corresponding indications came from a former sales partner of Syneron in Italy. The company, Creation, represented by Prof Resch, during an attempt to get a CE admission for an OEM product on the basis of Litetouch, did not get permission due to increased EMC values which are practically identical with the currently measured values of the original product.

This happened—as we know only today—in the year 2009. Prof Resch correspondingly also informed the German officials and, among others, the trade supervisory board in Munich. Despite all placatory letters by Syneron, the company went on to deny facts even in December 2011, which led to an official order end of January 2012 to suspend the CE license.

This was definitely not a voluntary attempt on behalf of Syneron. An incredible case—unique in its way.

_Are the examination and certification procedures insufficient?

In Germany and the EU there are no general pointers to underline this hypothesis. In my view, there is no such case.

_May the dentists continue treating their patients with their Litetouch?

With the current product on the market, we expressly recommend not to do that—however, very much so with the new product which is now, after almost seven months, used in exchange for the device with our customers—one after the other and in a sequence that is not comprehensible.

_What does it mean for your company?

Thank God only very few users have tried to file any claims against us because it is clear to everybody who is solely responsible for this situation. Our customers supported us in our endeavour to find out and make progress with the manufacturer for the benefit of the customer. What is more, we filed suit with the public prosecutor against Syneron and the responsible representatives, because it is important that all wronged parties find out about the true circumstances. The result of the public prosecutor investigations is of great importance also for NMT. This is why the six doctors affected filed their own demands for prosecution.

_May the laser devices still be sold?

The former device may no longer be sold within the European Economic Area of the EU—due to the official decree confirming their non-applicability without a CE certification.

_What does the manufacturer do?

The conduct of Syneron Dental after the loss of the CE certificate seems almost worse than the loss itself. Many months went by without any attempt to limit the damage, without any appropriate compensation offer for the long non-operation of the laser therapy during daily therapy—a completely insufficient information policy.

To me, this conduct is incomprehensible with regard to a formerly highly respected manufacturer of high-calibre laser technology.

_Does this new technology still have a market?

The basic idea of this new technology was and has been irresistible. The device put on the market by Syneron obviously was not ready for the market; this is shown by the new heavy hand pieces of the products to be exchanged. In my view, the development will be driven forward and lead to success in the future.

_Which solutions do you offer to the customers concerned?

We recommend to all to accept the exchange of the instruments by Syneron, without waiving any claims for damages at this very time. Damages may also be claimed at a later time, depending on the outcome of the public prosecutor investigations.

A future better alternative is already available with the laser systems of Biolase, the world market leader of dental laser systems. Only with the help of this experienced manufacturer was it possible for NMT to overcome the dispute and finally emerge stronger from this ongoing legal dispute with Syneron.

Lasers in dentistry are on a good way with great application and market potential. Even such an unbelievable and irresponsible incident by an individual manufacturer will not change this.

Mr Koop, thank you for this interview!

_contact laser

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NEWS

Ultraviolet radiation offers

New hope for cancer patients

Scientists from Japan have announced that they will soon have a new method of treating cancer that uses ultraviolet C (UV-C) light to destroy abnormal cells while leaving normal cells unharmed. Their findings, to be presented at the International Congress of Histochemistry and Cytochemistry in Kyoto next week, indicate that short bursts of UV-C radiation have the potential to harm neoplastic cells, the biological units that form tumours.

By irradiating these cells with high-intensity UV-C pulsed flash rays through a modified UV sterilisation system in the lab, researchers at the Tokai University School of Medicine were able to effect changes in the cells that led to their dysfunction and death within seconds. Non-neoplastic cells, however, were affected much less and survived the treatment, the scientists report. They now intend to develop their discovery into a cancer treatment method using a range of light irradiation equipment, including endoscopy and laser microscopy.

"This method offers a simple means of reducing the burden on patients undergoing cancer therapy," they commented.

Sensitivity of neoplastic cells to UV-C radiation has been also observed by other researchers. In a study, published in the Biochemical and Biophysical Research Communications journal in 2009, for example, scientists from the Gifu University Graduate School of Medicine in Japan reported the potential of low-dose UV-C combined with standard medication to inhibit the growth of pancreatic cancer cells. Similar effects were reported by the same research team regarding colon cancer cells.

Short-wavelength UV-C light does not occur naturally owing to the fact that it is completely reflected by the earth's ozone layer, but its germicidal effects have been proven and applied in medicine for sterilising equipment. In dentistry, among other things, UV-C is used in the sterilisation of toothbrushes and purification of air in dental offices. In contrast to the latest method investigated in Japan, however, these applications use low-intensity UV-C light emitted over a longer period.

Russian healthcare system

Improving but in need of investments

According to a new Espicom market research report, Understanding Russia's Regional Health Markets, the progress in improvement in Russia's health system is slow. Urban areas, particularly Moscow are of a high quality, but provision in rural areas remains poor.

Russia is the largest country in the world, with a land area of over 17 million square kilometres, encompassing eleven time zones. It has an estimated population of 142.9 million. Delivering universal high quality health services is a challenge.

Funding is at the heart of Russia's health improvement plans, and at the beginning of 2011 obligatory medical insurance contributions increased from 3.1 % to 5.1 %, deducible from salaries. This will raise an additional R460 billion (US$15.1 billion) over two years and will help cover the costs of overhauling, and equipping hospitals and polyclinics. The extra funds will also help to provide a wider range of free-of-charge medical services. With measures to increase income, however, has come the challenge of distribution and the recognition that, in common with countries such as India and China, there is a yawning gap between well provided for cities and the more remote regions.

In 2010, the government introduced the idea of a regional healthcare services modernisation scheme that aims to improve quality and availability of medical services and raise the profile of the medical profession. The decision to implement the required changes was difficult, particularly during a period of economic pressure. Healthcare modernisation is well overdue. To put this into context, over 30 % of hospitals lack a hot water supply, 8 % do not have a drinking water pipeline and 9 % lack drainage.

For further information on the report please visit www.espicom.com/rrmpr.

Tomorrow's dentures

Resemble Shark teeth

Researchers at the German University of Duisburg-Essen and the Max Planck Institute for Iron Research in Düsseldorf examined the teeth of two different sharks, the shortfin mako and the tiger shark, in terms of their structure, composition and mechanical properties. The teeth of both sharks were found to have a similar crystalline composition. According to the researchers, the interior of shark teeth contains dentine, a softer material also found in human teeth, while the enamel exterior is highly mineralised. Shark teeth contain fluorapatite, a very hard mineral, which could lead to the conclusion that they are harder than human teeth, which contain hydroxylapatite, a softer mineral, according to Dr Matthias Epple, Professor of Inorganic Chemistry at the university.

However, comparative analyses revealed that the hardness of shark teeth and human teeth was comparable, both for dentine and enamel. "This is mainly due

to the micro- and nano-structures of our teeth, in which crystals are highly ordered in a special topological orientation," said Epple. The scientists are now continuing their research on other shark species. They are hoping to recreate their dental structures for the production of dentures in the future. The study was published in the June issue of the Journal of Structural Biology.

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NEWS

Student wins US$2,000

For toothbrush sterilizer


[PICTURE: ©EVGENIY KARANDAEV]

A South African high school student has won first prize in the world's largest international pre-college science competition for a new toothbrush-sterilizing device.

Through a one-year project, she found four disease-causing pathogens on household toothbrushes, especially on those from houses in rural areas, and developed a promising method that destroys these bacteria and prevents cross-contamination.

Once when Chené Mostert from Ladysmith, KwaZulu-Natal, South Africa, was brushing her teeth she realized that bathroom layouts are hygiene disasters, as toilets are often situated in close proximity to the basin, where toothbrushes are generally stored. In collaboration with microbiologists at a commercial laboratory in Pretoria, South Africa, the 17-year-old tested 104 toothbrushes from urban and rural areas in South Africa and neighboring countries and established the presence of pathogens such as *Staphylococcus*, *Streptococcus, Candida* and *E. coli* on a number of brushes.

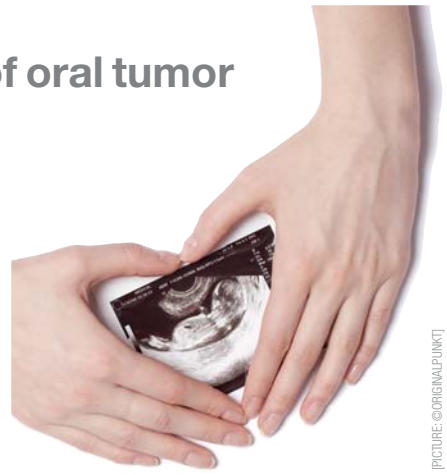
The student's aim was to develop a device to store toothbrushes that is simple in design and suitable for people in rural areas who do not necessarily have electricity. According to Mostert, the device consists of a box with four separate, perforated plastic tubes, into which the brushes can be placed to prevent cross-contamination.

By turning a handle, the user activates a rotating mechanism that rinses the bristles with hydrogen peroxide, which destroys any microorganisms present on the toothbrushes. "It's basic but effective," she said.

As the device is still in the process of being patented, Mostert was not allowed to provide any images of her sterilizing unit.

Surgeons perform

First in utero removal of oral tumor


[PICTURE: ©ORIGINALPUNKT]

For the first time in the history of fetal medicine, doctors have successfully removed a large oral tumor from the mouth of a four-month-old fetus in a pioneering in utero surgery. Last week, media representatives were invited to meet the child, who is now 20 months old, at a press conference.

As reported at the Jackson Memorial Hospital's press conference on June 21, a 37-year-old woman was diagnosed as having a fetus with a mass protruding from the fetal mouth, during a routine ultrasound in the twentieth week of her second pregnancy. According to the doctors, the findings were suggestive of an oral teratoma, a rare tumor that arises from all three embryonic germ layers.


[PICTURE: ©ERMOLAEV ALEXANDER]

After serious consideration, the procedure was carried out in May 2010 by Ruben Quintero, professor of obstetrics and gynecology, and Eftichia Konopoulus, assistant professor of obstetrics and gynecology, at the Jackson Memorial Hospital in Miami, Fla. Using an endoscope, guided by ultrasound, and a laser, the tumor was resected in utero without any maternal or fetal complications in a 68-minute operation under local anesthetic.

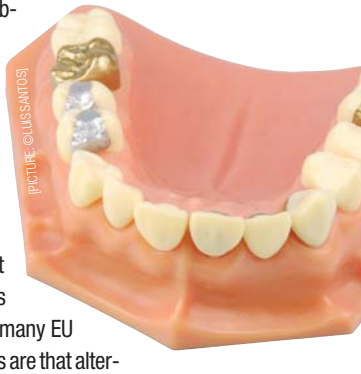
Five months after surgery, the patient went into spontaneous labor and delivered a healthy female infant without complication. The only sign of the surgery was a tiny scar on the baby's mouth, the doctors said.

According to the surgeons, nasopharyngeal teratomas are associated with an exceptionally high risk of neonatal mortality, particularly from airway obstruction. If done early enough, as in the present case, fetoscopic removal of the teratoma can avoid growth of the tumor mass, distortion of the facial structure, excess amniotic fluid, edema and the risk of a stillbirth, they said.

European Commission study

Ban of dental amalgam

A new study, conducted on behalf of the European Commission, recommends phasing out dental amalgam use over the next few years owing to mercury's negative impact on the environment.


[PICTURE: ©LUISSANTOS]

According to the recently published study results, the ban should be combined with improved enforcement of the EU waste legislation regarding dental amalgam.

The report explains that mercury-free alternatives are still not used widely in many EU member states. The reasons are that alternative fillings are often believed to be more expensive than amalgam fillings, that many dentists are simply not trained to apply new methods and that many dentists think that composite materials have a lower durability than amalgam fillings.

Some dentists are also "reluctant to change their current practice and invest in new equipment to handle mercury-free fillings," according to the report. Additionally, many patients are not even aware that amalgam fillings contain mercury.

International events

2012

AAID 61st Annual Meeting
Washington, DC, USA
3–6 October 2012
www.aaid-implant.org

42nd International Congress of DGZI
Hamburg, Germany
5–6 October 2012
www.dgzi-jahreskongress.de

ADF 2012 Conference and Trade Exhibition
Paris, France
27 November-1 December 2012
www.adf.asso.fr

7th CAD/CAM & Computerized Dentistry International Conference
Singapore, Singapore
6–7 Oktober 2012
www.capp-asia.com

BDTA Dental Showcase 2012
London, United Kingdom
4–6 October 2012
www.dentalshowcase.com

3rd Congress of the European Society of Microscope Dentistry
Berlin, Germany
4-6 October
www.esmd.info

World Dental Show 2012
Mumbai, India
5–7 October 2012
www.wds.org.in

Dental World 2012
Budapest, Hungary
11–13 October 2012
www.dentalworld.hu

Expodental Milan 2012
Milan, Italy
18–20 October 2012
www.expodental.it

NorDental – Dental Exhibition and Congress
Lillestrom, Norway
11–13 October 2012
www.npg.no

Dental-Expo St. Petersburg 2012 International Dental Forum
St Petersburg, Russia
30 October–1 November 2012
www.dental-expo.com

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international magazine of laser dentistry

WFLD World Federation for Laser Dentistry
Formerly ISLD, founded 1988

oemus

Published by
OEMUS MEDIA AG
Holbeinstraße 29
04229 Leipzig, Germany
Tel.: +49 341 48474-0
Fax: +49 341 48474-290
kontakt@oemus-media.de
www.oemus.com

Printed by
Messedruck Leipzig GmbH
An der Hebemärchte 6
04316 Leipzig, Germany

laser
international magazine of laser dentistry
is published in cooperation with the World Federation for Laser Dentistry (WFLD).

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