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Bringing laser to sunlight

Dr Dimitris Strakas

Dear colleagues,

Laser dentistry has long ago passed its years of baby steps and we are living the era that laser is already part of modern dentistry modus alongside with other technological innovations and digital technologies. The biggest and oldest scientific community that has united and served laser dentists since 1988 is undoubtedly the World Federation for Laser Dentistry (WFLD). In the heart of this family, the European Division (ED) has a significant part throughout the years. The 6th WFLD European Division Congress is here and the beautiful city of Thessaloniki is waiting to host us in the country of sunlight, Greece.

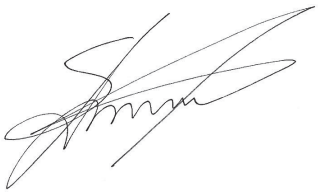
We are more than delighted to discover that all forces of laser dentistry have contributed to this important scientific event, emphasising the fact that dentists from around the world are eager to participate and discover the latest research and clinical projects from the most prominent opinion leaders. I am feeling also honoured that for the first time all "major" companies in dental laser and restorative field have sponsored this event and their presence will give us the opportunity to have a multicolour "palette" of wavelengths and laser devices in the congress exhibition.

23 sponsors, 25 invited speakers, 70 oral presentations, 30 e-posters, a parallel aesthetic and CAD/CAM congress on Saturday and eight free-of-charge workshops are ensuring a successful and informative meeting. Moreover, the social events such as the Welcome Cocktail on the exhibition area and the Gala Dinner will give you the opportunity to meet and reunite with colleagues from all over the world.

The 6th European Division Congress of the WFLD is opening its doors and welcomes you in the Makedonia Palace hotel of Thessaloniki on 22 and 23 September. You are cordially invited to join us and indulge in two days of science and socialising in the laser dental family.

Let's meet in Thessaloniki! Let's bring laser light to sunlight!

Sincerely,



Dr Dimitris Strakas
Chairman of WFLD-ED

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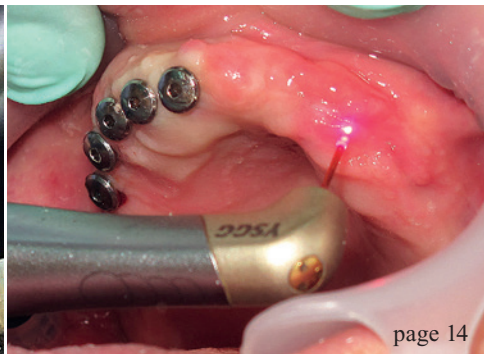
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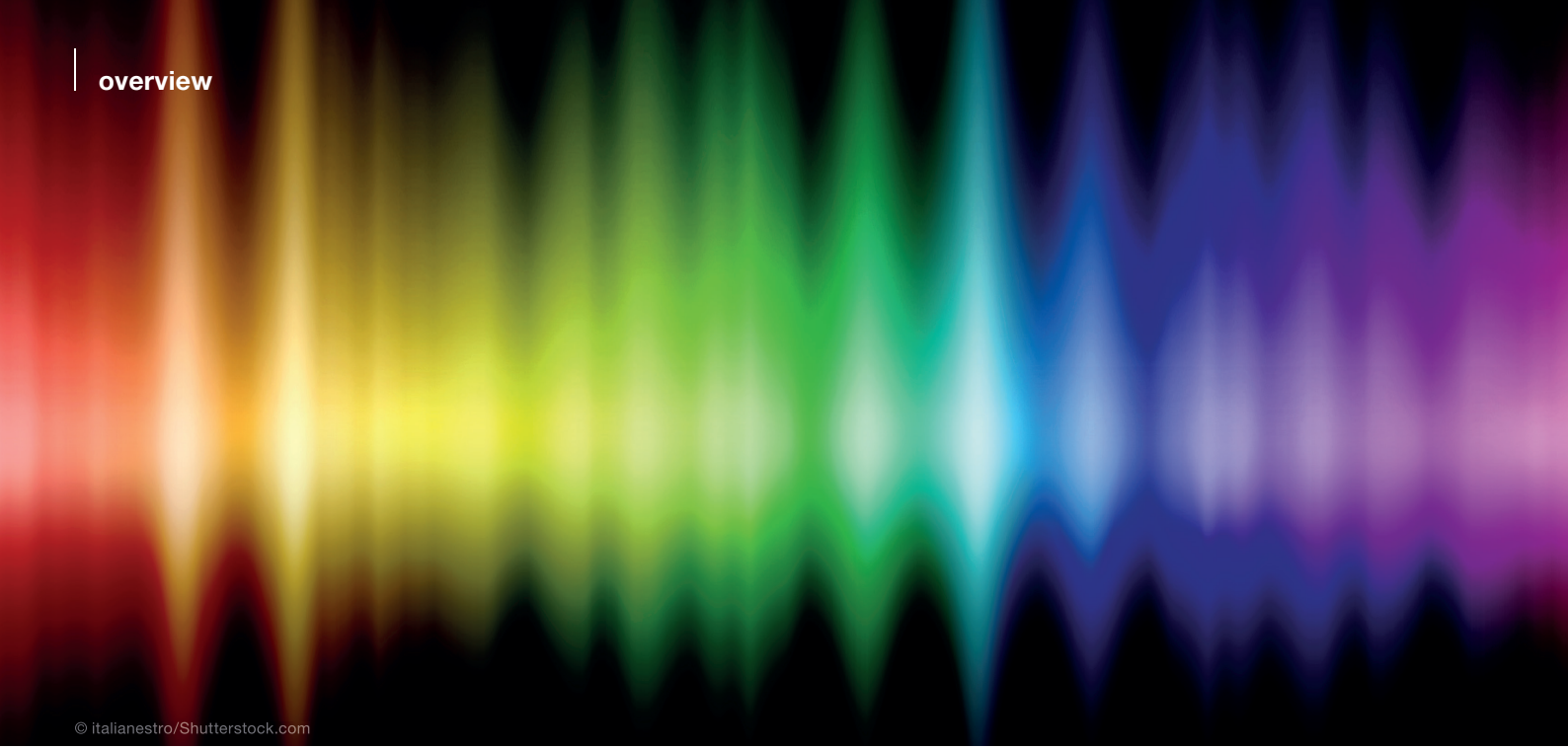

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Laser-supported restorative dentistry

Authors: Prof. Dr Kosmas Tolidis & Dr Dimitris Strakas, Greece

Since the advent of laser in dentistry, one of the most benefited disciplines alongside oral surgery is restorative dentistry.

A plethora of existing wavelengths is providing excellent, but most significantly, essential service in a unique way. Starting from the visible light spectrum (445 nm) going to red (660 to 670 nm), near-infrared (810, 940, 980, 1,064 nm) up to the mid-infrared spectrum (2,780 to 2,940 nm), a variety of clinical situations can be dealt successfully, either with the unique use of laser or a combination of conventional approaches with laser. Numerous devices have been developed, either on a single wavelength or more versatile multiple diode laser devices with two or even three different wavelengths adding ease of use to clinical applications.

The purpose of this paper is to present an overview of laser-supported restorative dentistry, going through the available wavelengths and their different applications and capabilities by using exemplary clinical cases.

The "blue laser"

Recently, Dentsply Sirona introduced the SiroLaser Blue, a three wavelength device (445, 660, 970 nm) aiming to respond to a variety of clinical conditions requiring laser approach. As it is well known from the absorption chart (Fig. 1), 445 nm is being highly absorbed by melanin and haemoglobin establishing this device as a very useful tool for surgery and haemostasis.

In the field of restorative/operative dentistry, minor surgeries in the form of gingival contouring and especially haemostasis are necessary, but a significant use, as it appears from early research data, can also be light curing and energy provision to restorative materials. Composite resins and glass ionomers can be light cured by the SiroLaser Blue device in a very efficient way.

More in particular, conventional glass ionomer can benefit from the energy provided by the laser and increase significantly their surface microhardness and

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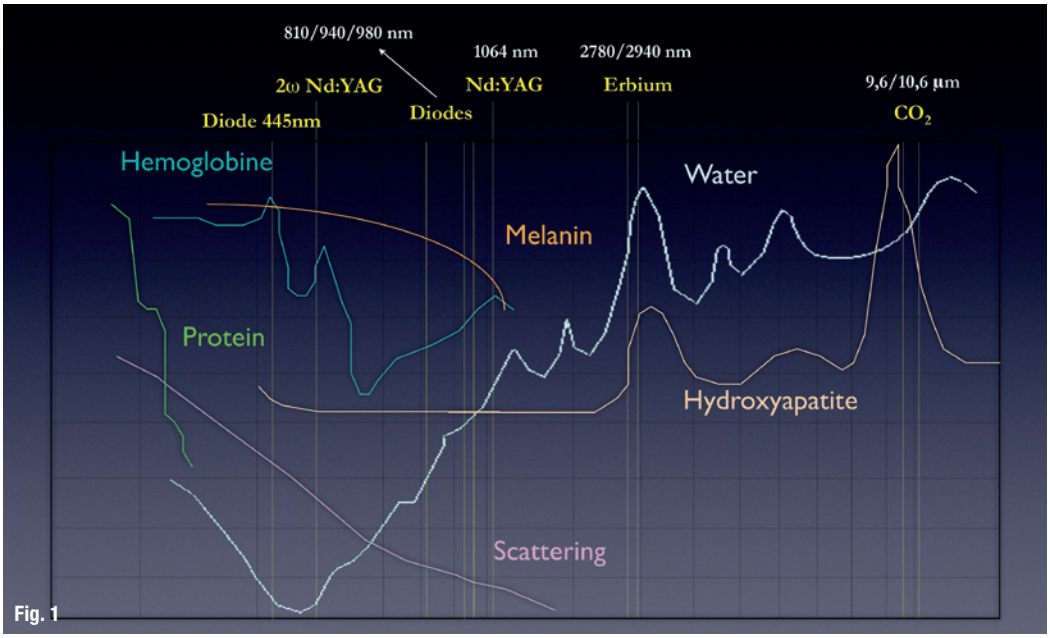

Fig. 1: Absorption of the different laser types.

resistance to dissolution. Therefore, alongside surgery, 445 nm has been proven a potent and efficient wavelength when dealing with restorative materials.

The "soft" red

Dentine hypersensitivity

Dentine is a difficult and demanding dental tissue, presenting certain difficulties in its management due to its composite structure character. Alongside this fact, certain clinical entities related to dentine morphology, structure and interrelation with other oral tissues such as the gingiva are the root of difficult to solve clinical problems.

One of the major challenges in contemporary restorative dentistry is managing dentine hypersensitivity. Dentine hypersensitivity is a multifactorial clinical situation that affects a significant number of patients in almost all age groups. A variety of different treatment modalities have been suggested, starting from toothpastes and varnishes, going up to restorative procedures.

Low Level Laser Therapy (LLLT) seems to be a key way to manage these problems, especially in cases where there is no space available for the placement of "permanent" coverings. Patients are coming in, exhibiting different pain levels when thermal stimuli are applied, in particular cold ones.

The application of a "soft" laser (0.2 to 0.5 W, cw) for one to two minutes at the cervical area of each tooth provides an effective treatment in most cases. Certainly, because of the multifactorial character of the problem, there are cases that perhaps would respond positively on a different approach. But laser is a strong, valid way for dentine hypersensitivity's management.

Dentine disinfection

Following caries excavation, a dental practitioner is faced with dentinal walls still contaminated with remaining bacteria either in a "soft" layer of carious dentine or existing infiltrated inside dentinal tubuli. Light-activated disinfection (LAD) or photo-activated disinfection (PAD) are different names for the same procedure. The foundations of this approach refer to the use of a red laser in conjunction with a blue dye (e.g. toluidine blue or methylene blue).

In principle, the red light activates the dye in order to produce free oxygen radicals, a very potent disinfectant that would disinfect dentinal walls without affecting pulp's vitality or interfering with adhesive procedures and bond strength of contemporary bonding systems and materials. The same method is also being suggested for periodontal pockets and root canal disinfections following similar procedures (Fig. 2).

Subsequently, the red light "soft" laser can be useful in a variety of restorative cases providing either immediate pain relief in some difficult cases, or a safe environment for our restorative materials to function, providing extended longevity of restorations.

The "diode laser"

Diode laser devices at 810, 940 and 980 nm can be also referred to as the "standard" diode devices found in almost every laser equipped dental clinic. These wavelengths are the most common wavelengths

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