Diode lasers: the soft tissue handpiece

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Fig. 1_Soft tissue covering gingival margin of fractured tooth. (Photo courtesy Dr. Phil Hudson)
Fig. 2_Laser outline of gingivectomy. (Photo courtesy Dr. Phil Hudson)
Fig. 3_Laser gingivectomy completed. (Photo courtesy Dr. Phil Hudson)
Fig. 4_Hard tissues etched for immediate restoration. (Photo courtesy Dr. Phil Hudson)
Fig. 5_One week post-op. (Photo courtesy Dr. Phil Hudson)
Fig. 6_Laser positioning for gingival troughing. (Photo courtesy Dr. Robert Lowe)

_Dental lasers have been commercially available for several decades. They have been thoroughly documented in the dental literature. Lasers are an exciting technology, widely used in medicine, kind to tissues, and excellent for healing. So why have they not been more widely embraced by the practicing dentist? There is a wide perception that the dental laser is not useful, too complicated, and too expensive. This has changed with the arrival of the diode laser onto the dental scene. There is now a convergence of documented scientific evidence, ease of use and greater affordability that makes the diode laser a "must have" for the dental practice.



Fig. 1

_The science behind the laser

"Laser" is an acronym for Light Amplification by Stimulated Emission of Radiation. Lasers are named for the substance which is stimulated. In the diode laser this substance is a semiconductor (a class of materials which are the foundation of modern electronics including computers, telephones and radios). This innovative technology has produced a laser that is compact and lower in cost. Most 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 in haemoglobin and melanin. This gives the diode laser the ability to precisely cut, coagulate, ablate or vaporize the target tissue.[1]

Treatment with the 810 nm diode laser (Fig. 1, Picasso diode laser, AMD LASERS) has been shown to have a significant long-term bactericidal effect in periodontal pockets. *A. actinomycetemcomitans*, an invasive pathogen associ-

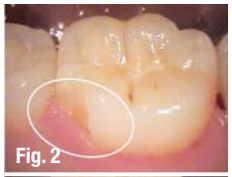

Fig. 2


Fig. 3


Fig. 4


Fig. 5



Fig. 6


Fig. 7


Fig. 8

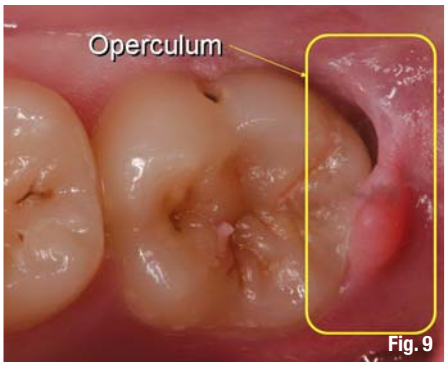
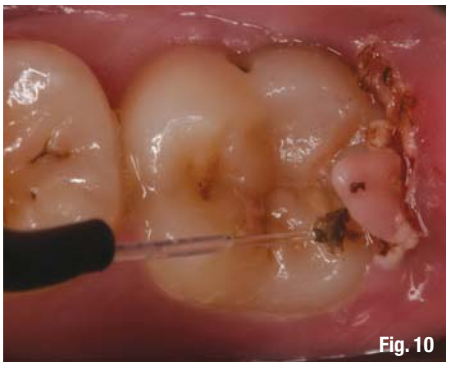


Fig. 9


Fig. 10

ated with the development of periodontal disease and generally difficult to eliminate, responds well to laser treatment.[2,3] Scaling and root planing outcomes are enhanced with the addition of diode laser therapy. The patient is typically more comfortable, and gingival healing is faster and more stable.[4,5]

_Ease of Use

Early adopter dentists thrive on new technology. They enjoy the challenges that come with being the first to use a product. Most dentists are not early adopters. Lasers have intimidated mainstream dentists with their large footprint, lack of portability, their high maintenance profile of operating tips and complex procedural settings. When do I use which tip? What setting works for which procedure? Why do I need a laser when I have been managing well without one?

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. It has one simple fiberoptic cable which is easily transformed to an operating tip. The units come with several presets, although after a very short time, the operator becomes so comfortable that they are not even needed. The power and pulse settings are simply adjusted to suit the particular patient and procedure.

On a personal note, I am a dentist who does not thrive on the challenge of brand new high-tech, high-stress technology. I have tried many lasers in the past that promised to be user-friendly; they were anything but. With the 810 nm diode laser, after a short in-office demonstration, I was able to pick up the handpiece and to feel comfortable enough to perform some simple procedures. I have since taken online training, as well as lecture courses, which have enhanced both my comfort level and my competency.

_Affordability

Laser technology has always come with a high price tag. Manufacturing costs are high and cutting edge technology commands steep pricing. Diode lasers are less expensive to produce. Breakthrough pricing for this technology has now reached well under CAN$10,000. At this level the diode laser becomes affordable for the average practicing dentist.

_Why do I need this technology?

The 810 nm diode laser is specifically a soft tissue laser. This wavelength is ideally suited for soft tissue procedures since it is highly absorbed in haemoglobin and melanin, both of which are prevalent in soft tissues. This gives the diode laser the ability to precisely cut, coagulate, ablate or vaporize the target tissue with less trauma, improved post-operative healing, and faster recovery times.[6,7,8] Given the incredible ease of use and its versatility in treating soft tissue, the diode laser becomes 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 tissues in the same way that the traditional dental handpiece is used on enamel and dentin. This extends the scope of practice of the general dentist to include many soft tissue procedures.

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

1. Gingivectomy, haemostasis, gingival troughing for impressions

The diode laser makes restorative dentistry a breeze. Any gingival tissue that is covering a tooth during preparation can be easily removed and haemostasis achieved simultaneously. The restoration is no longer compromised because of poor gingival conditions. There is no more battling with unruly soft tissue and blood (Figs. 1–5).

Fig. 7_Close-up of laser positioning in sulcus. (Photo courtesy Dr. Robert Lowe)
Fig. 8_Infected operculum distal to second molar. (Photo courtesy Ivoclar Vivadent)
Fig. 9_Laser removing operculum. (Photo courtesy Ivoclar Vivadent)
Fig. 10_Operculectomy completed. (Photo courtesy Ivoclar Vivadent)


Fig. 11

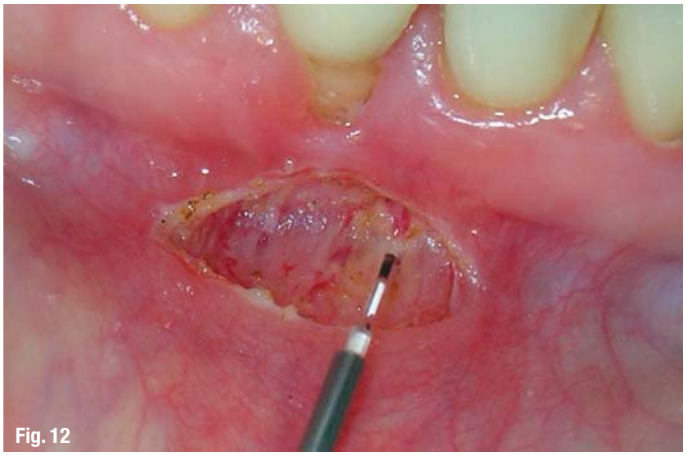

Fig. 12

Fig. 11_Gingival condition prior to Laser Assisted Periodontal Treatment. (Photo courtesy Dr. William Chen)
Fig. 12_Gingival condition after Laser Assisted Periodontal Treatment. (Photo courtesy Dr. William Chen)

Gingival troughing prior to impression taking helps to ensure an accurate impression and an improved restorative outcome. Packing cord is no longer necessary (Figs. 6 & 7).

With these procedures, restorative dentistry becomes less stressful, more predictable and more enjoyable for the dental team and the patient.

2. Operculectomy Gingival Hyperplasia

Excision and/or recontouring of gingival hyperplasia frenectomy.

These procedures are usually not 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 tissues that can increase risk of caries and periodontal disease (Figs. 8–10).

3. Laser Assisted Periodontal Treatment

The use of the diode laser in conjunction with scaling and root planing is more effective than scaling and root planning 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, debridement and biostimulation (Figs. 11 & 12, courtesy of Dr Phil Hudson).

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 in decreasing *A. actinomycetemcomitans*, [2,4] and thereby indirectly improving the patient's heart health.

_Laser Education

Most diode laser manufacturers provide some education to get the new user started. The most comprehensive online, unbiased, unaffiliated diode laser introductory course with certification (which includes the science, safety and clinical procedures) can be found at www.advancedlaser-training.com. This course provides everything necessary to get you started with soft tissue diode lasers. Advanced courses are available for more complex procedures.

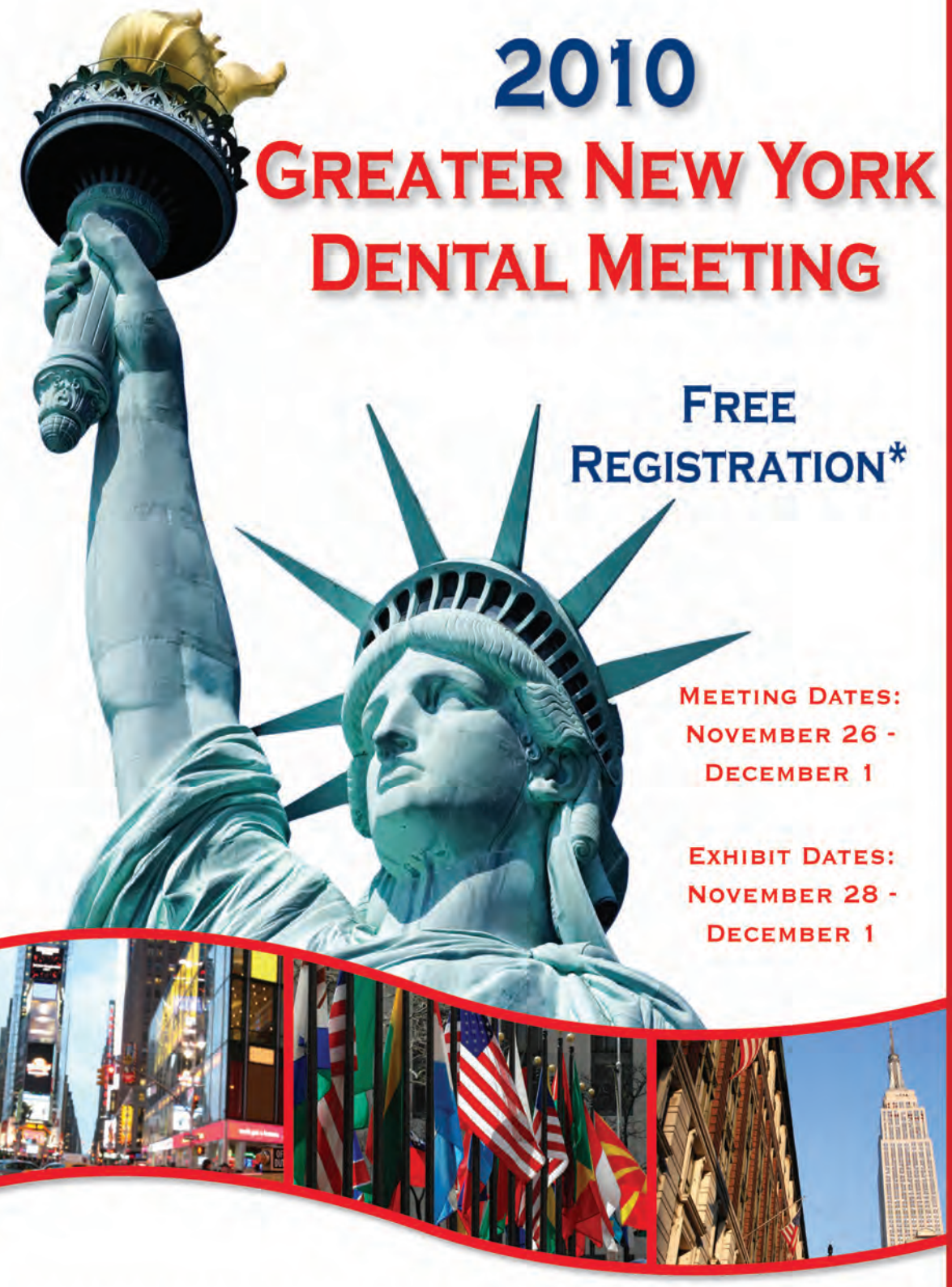
The soft tissue diode laser is rapidly becoming a "must have" mainstream technology for the general practice. The science, ease of use, and affordability make it simple to incorporate. It becomes the essential "soft tissue handpiece" for the practice. The time may soon come when a diode laser will be placed in each restorative and each hygiene treatment room. Restorative dentistry becomes easy, predictable and less stressful. The scope of practice is expanded to include new soft tissue procedures that keep patients in the office. The patient's gingival health is improved in a minimally invasive, gentler manner. Every time the dentist picks up the diode laser the question is: where have you been all my life?_

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

_contact laser

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