Diode lasers: the soft-tissue handpiece

By Fay Goldstep, DDS, FAACD, FADFE

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 tissues and excellent for healing. So why have they not been more widely embraced by the practicing dentist? There is a general perception in the profession that somehow the dental laser is not useful, is too complicated and too expensive. These parameters have changed forever 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 every dental practice.

The science behind the laser
“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 are 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 because it is highly absorbed by hemoglobin and melanin. This gives the diode laser the ability to precisely cut, coagulate, ablate or vaporize the target soft tissue.1 Treatment with the 810 nm diode laser (Fig. 1a, Picasso diode laser, AMD LASERS) has been shown to have a significant long-term bacterial effect in periodontal pockets. A. 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

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, their high maintenance profile, confusion about operating tips and complex procedural settings.

Common questions include: 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 lines. It has one simple fiber-optic cable that can be utilized as a reusable handpiece.

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operating tip.

The units come with several presets, although after a very 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.

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.

After a short in-office demonstration of the 810 nm diode laser, I was able to pick up the handpiece and felt 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 traditionally 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 arrived at under $5,000. At this level, the diode laser becomes eminently 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 because hemoglobin and melanin, both prevalent in dental soft tissues, are excellent absorbers.

This provides the diode laser with broad clinical utility: it cuts precisely, coagulates, ablates or vaporizes the target tissue with less trauma, improved postoperative healing and faster recovery times.6–8

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 easy entry points for the new laser user:

- Gingivectomy, haemostasis, gingival troughing for impressions
- The diode laser makes restorative dentistry a breeze (Picasso, AMD Lasers). Any gingival tissue that covers a tooth during preparation can be easily removed because hemostasis is simultaneously achieved.
- The restoration is no longer compromised due to poor gingival conditions. There is no more battling with unruly soft tissue and blood (Figs. 1–5). Excess gingival tissue can be readily managed (Figs. 5a, b) for improved restorative access to Class V preparation (ezlase, Biolase Technology).
- Gingival troughing prior to taking impression (Picasso, AMD LASERS) ensures an accurate impression (particularly at the all-important margins) and an improved restorative outcome. Packing cord is no longer necessary (Figs. 6, 7).
- Diode lasers make restorative dentistry less stressful, more predictable and more enjoyable for the dental team and the patient.
- Operculectomy, excision and/or recontouring of gingival hyperplasia, 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 tissues that can increase risk of caries and periodontal disease (Figs. 8–10, courtesy of Iovcav Vivadent).

A frenectomy is now a simple and straightforward procedure (Fig. 10a).

- Laser-assisted periodontal treatment

The use of the diode laser in conjunction with routine scaling and root planing is now more effective than scaling and root planing alone. It enhances the speed and extent of the patient's gingival healing and postoperative comfort.4,5

This is accomplished through laser bacterial reduction (Picasso, AMD LASERS), debridement and biostimulation (Figs. 11, 12, courtesy of Dr. Phil Hudson).

Actinomycetemcomitans, which has been implicated in 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. actinomycetemcomitans11 and thereby indirectly improving the patients' heart health.

Laser education

Most diode laser manufacturers provide some education to get the new user started quickly and effectively.

The most comprehensive online diode laser introductory course with certification — which includes the science, safety and clinical procedures — can be found at the International Center for Laser Education, www.dentallaseredu.com (telephone, (877) 522-6885).

This course provides everything necessary to get started with soft-tissue diode laser therapy. Advanced courses are available for more complex procedures.

In conclusion

The soft-tissue diode laser has become a “must have” mainstream technology for every general practice. The 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 hygiene treatment room. As a result, restorative dentistry becomes easier, more predictable and less stressful.

Laser therapy expands the clinical scope of a practice 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? 

A complete list of references is available from the author.

About the author

Dr. Fay Goldstep sits on the Oral Health Editorial Board (healing/preventive dentistry), has served on the teaching faculties of the post-graduate programs in esthetic dentistry at SUNY Buffalo, the University of Florida (Gainesville) and the University of Minnesota (Minneapolis), and is a former ADA Seminar Series featured speaker. Goldstep is a consultant to a number of dental companies, and she maintains a private practice in Markham, Ontario, Canada. She can be reached at goldstep@epdot.com.