

Diode lasers - the soft tissue handpiece

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While dental lasers have been commercially available for decades and their popularity among patients is unparalleled, the dental profession has taken to this treatment modality rather slowly. Having said that, lasers have been thoroughly documented in the dental literature and 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 practising dentist? There is a wide perception in the profession that somehow the dental laser is not useful, too complicated and/or too expensive. These parameters changed forever with the arrival onto the dental scene of the diode laser. 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.

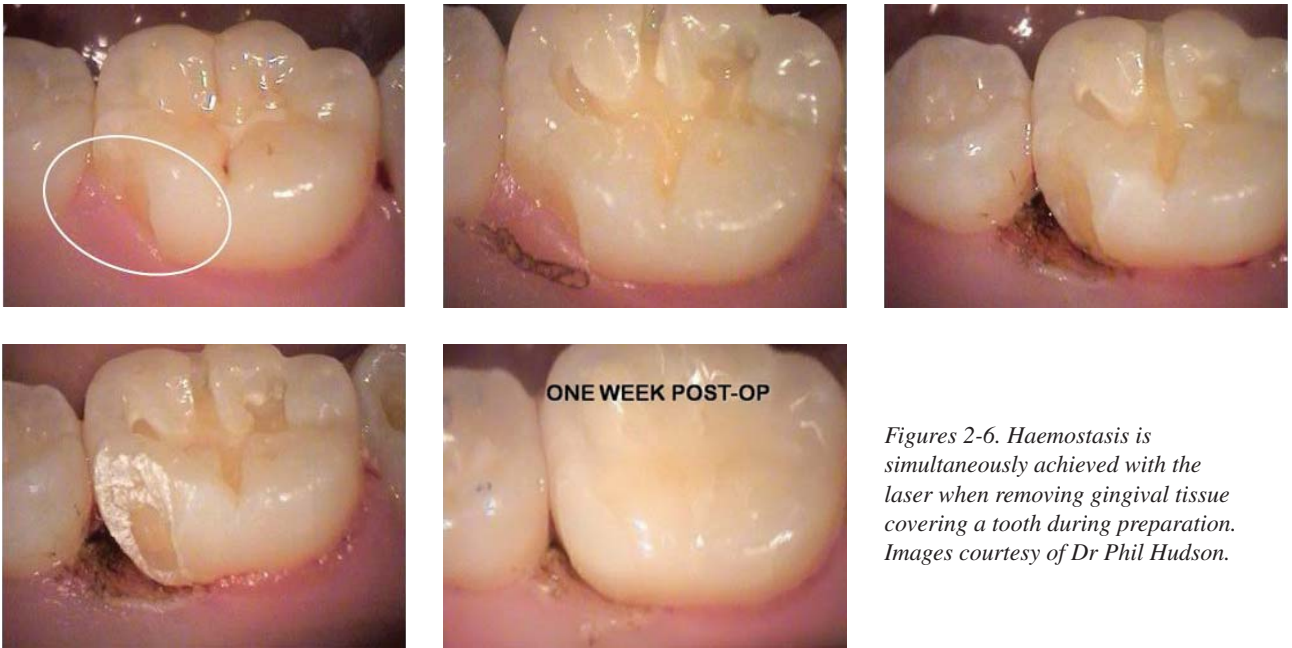
The science in brief

L A S E R is an acronym for Light Amplification by Stimulated Emission of Radiation and are commonly classified based on the substance which is stimulated to produce the coherent light beam. In diode lasers, this substance is a semiconductor (a class of materials which are the foundation of modern electronics including computers, tele-



Figure 1.
The Picasso diode laser.

phones 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 highly absorbed by melanin and haemoglobin. Other diode lasers with wavelengths of 940 and 980 nm absorb strongly in haemoglobin and water. Absorption of energy gives diode lasers their ability to precisely cut, coagulate, ablate or vaporize the target soft tissue.¹



Figures 2-6. Haemostasis is simultaneously achieved with the laser when removing gingival tissue covering a tooth during preparation. Images courtesy of Dr Phil Hudson.



Figures 7-8. Excess gingival tissue can be readily managed with the laser for improved restorative access to Class V preparations.

Treatment with an 810nm diode laser (Figure 1) (Picasso Diode Laser) has been shown to have a significant long-term bactericidal 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}

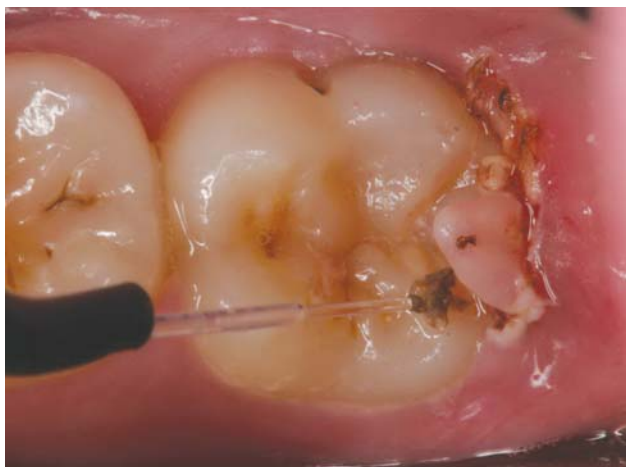
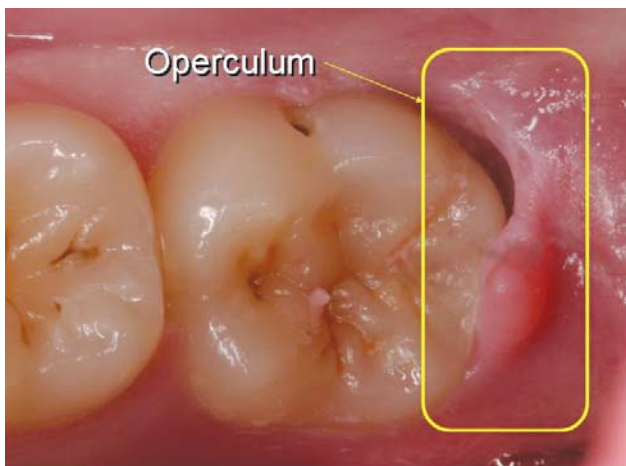
Ease of use

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, many lasers have become available for clinical practice.

Common questions are: When do I use which fiber or tip? What setting works for which procedure? Why do I need a laser when I have been managing until now without one?

Diode lasers are compact and can easily be moved from one treatment room to another. They do not have connections to water or air lines. Most systems come pre-programmed with several presets. The power/energy and pulse settings are easily 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, however the diode laser was found to be easy to use and easily introduced into everyday practice. The laser handpiece felt comfortable enough to perform simple clinical procedures. Further online training and lecture courses enhanced both clinical comfort level and competency.



Figures 9-11. Hyperplastic tissues that can increase risk of caries and periodontal disease are easily removed with the laser.

Affordability

Diode laser systems are less expensive to produce than gas or solid state lasers, so these systems are affordable for the average dentist.

Why do I need this technology?

Diode laser are used primarily for soft tissue procedures involving cutting, coagulating, ablating or vaporizing soft tissues and they achieve this with less trauma, improved post-operative healing and faster recovery times than conventional methods.^{6,7,8} Given their ease of use and versatility, a diode laser becomes the “soft tissue handpiece” in the dentist’s armamentarium. The dentist can use this to remove, refine and adjust soft tissues in the same way that we think of using rotary instruments to adjust or remove enamel and dentine. A diode laser extends the scope of practice of the general dentist to include more soft tissue procedures.

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

1. Gingivectomy, haemostasis and gingival troughing for impressions

Gingival tissue that covers a tooth during preparation can be removed and haemostasis simultaneously achieved (Figures 2-6). The restoration is no longer compromised due to poor gingival topography. There is no more battling with unruly soft tissue and blood. Excess gingival tissue can be readily managed (Figures 7-8) for improved restorative access to Class V preparations (ezlase, Biolase Technology Inc.).

Gingival troughing prior to taking an impression ensures an accurate impression (particularly at the all-important margins) and an improved restorative outcome. Packing cord is no longer necessary.

Diode lasers make restorative dentistry less stressful, more predictable and more enjoyable for the dental team and the patient.

2. 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 9-11).

A frenectomy is now a simple and straightforward procedure (ezlase) (Figure 12).



Figure 12. Lasers make frenectomies simple and straightforward.



Figures 13-14. When used in conjunction with routine scaling and root planning, a laser enhances the speed and extent of the patient's gingival healing and post-operative comfort through improved bacterial reduction, debridement and biostimulation. Images courtesy of Dr William Chen.

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 improved bacterial reduction, debridement and biostimulation (Figures 13-14).

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 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, gentler manner. Every time the dentist picks up the diode laser the question is: where have you been all my life?

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About the authors

Dr Fay Goldstep has served on the teaching faculties of the post-graduate programs in aesthetic dentistry at SUNY Buffalo, the Universities of Florida (Gainesville), Minnesota (Minneapolis) and has been an ADA Seminar Series speaker. She has lectured nationally and internationally on Healing Dentistry, Innovations in Hygiene, Dentist Health Issues and Office Design and has published several articles on these topics. Dr Goldstep is a consultant to a number of dental companies and maintains a private practice in Markham, Canada.

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