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laser

the international c.e. magazine of laser dentistry

1 2013

_C.E. article
The diode laser as an electrosurgery replacement

_trends
Unique maxillary frenectomy with a diode laser

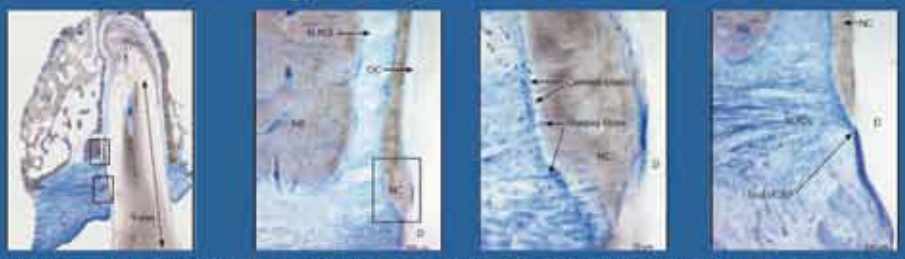
_interview
A less invasive, predictable method for treating periodontitis

"More" Human Histology supports LANAP PROTOCOL

Cementum-mediated periodontal ligament new attachment to the root surface in the absence of long-junctional epithelium.[1]

Human histologic peer-reviewed published manuscript #2

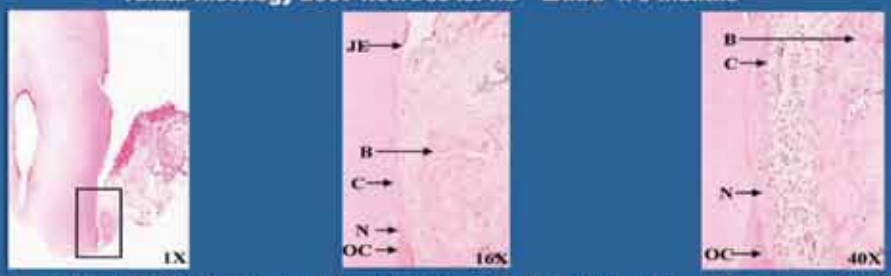
Nevins Histology 2012 Sept/Oct IJPRD - LANAP x 9 months



Key:NC = new cementum; NB = new bone; OC = old cementum; d = dentin; JEP = junctional epithelium; N-PDL = new periodontal ligament

Human histologic peer-reviewed published manuscript #1

Yukna Histology 2007 Nov/Dec IJPRD - LANAP x 3 months



Key:N = notch in calculus; B = new bone; C = new cementum; OC = old cementum; JE = junctional epithelium

The periodontal literature rarely has **two Human Histological studies** to review on the same procedure; but whether you look at the histology, the long-term results, or read the FDA clearance - **the clinical results are the same.**

Human Histology Results Support Periodontal Regeneration with the LANAP protocol. [2,3]

All 12 "hopeless" teeth returned to clinical, radiological, and histologic health.

Cementum-mediated attachment/regeneration achieved with the LANAP protocol is highly competitive with any other studies done on regeneration.[4]

Results you can believe – The **LANAP®** protocol is no longer a breakthrough periodontitis treatment, it is a paradigm-shifting, well established protocol and standard treatment option with long-term results.[5]

1 FDA 510k clearance K030290 using the PerioLase® MVP-7™

2 Yukna, Carr, Evans, Histologic Evaluation of an Nd:YAG Laser-Assisted New Attachment Procedure in Humans. Int J Periodontics Restorative Dent 2007;27:577-587

3 Nevins, Marc, Camelo, Schupbach, et. al., Human Clinical and Histologic Evaluation of Laser-Assisted New Attachment Procedure. Int J Periodontics Restorative Dent 2012;32:497-507

4 Nyman, Lindhe, et al, New attachment following surgical treatment of human periodontal disease. J Clin Perio 1982;9:290-2965

5 Tilt LV, Effectiveness of LANAP as measured by tooth loss. J Gen Dent 2012;60:143-146

See for yourself – Learn why over 15% of practicing AAP clinicians offer the LANAP protocol

- Review the two human histology studies[2,3]
- Review peer-reviewed long-term tooth survival results[5]
- Review scientific and clinical studies or training session dates at www.lanap.com. (NIH registered study at www.clinicaltrials.gov search "LANAP")

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Keep up to date with *laser*

Torsten Oemus, Publisher

_Thanks to laser technology, dental professionals are now able to treat patients in new and innovative ways. But staying on the cutting edge can be a challenge. That's what makes the publication you are holding right now so valuable.

For this issue of *laser*, we've assembled a collection of articles from some of the most respected names in laser dentistry. These expert clinicians are sharing their knowledge and expertise with you.

Within this issue you can read a case report on a unique maxillary frenectomy using a diode laser by Dr. David L. Hoexter. In addition, Managing Editor Fred Michmershuizen has interviewed Dr. Lloyd V. Tilt about his pioneering research on the LANAP protocol.

But there's even more.

Every issue of *laser* magazine also contains a C.E. component. By reading the article on the diode laser as an electrosurgery replacement by Dr. Glenn van As, then taking a short online quiz about this article at *www.DTStudyClub.com*, you will gain one ADA-CERP certified C.E. credit. Keep in mind that since *laser* is a quarterly magazine, you can actually chisel four C.E. credits per year out of your already busy life without the lost revenue and time away from your practice.

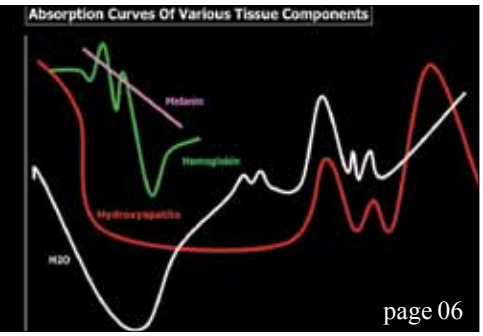
To learn more about how you can take advantage of this C.E. opportunity, visit *www.DTStudyClub.com*. Annual subscribers to the magazine ($50) need only register at the Dental Tribune Study Club website to access these C.E. materials free of charge. Non-subscribers may take the C.E. quiz after registering on the DT Study Club website and paying a nominal fee.

I know that taking time away from your practice to pursue C.E. credits is costly in terms of lost revenue and time, and that is another reason laser is such a valuable publication.

I hope you enjoy this issue and that you get the most out of it.

Sincerely,

Torsten Oemus
Publisher



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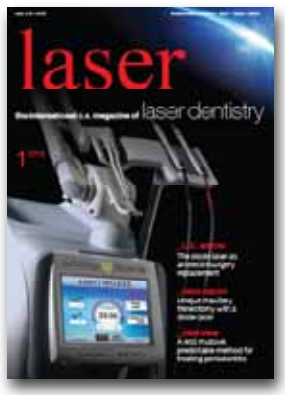

on the cover

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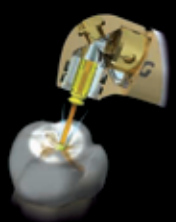

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DENTISTRY TODAY 2011 TOP 50 Technology Products

The diode laser as an electrosurgery replacement

Author_Glenn A. van As, BSc, DMD

_c.e. credit

This article qualifies for C.E. credit. To take the C.E. quiz, log on to *www.dtstudyclub.com*. Subscribers to the magazine can take this quiz for free and will be emailed an access code after the magazine's release. If you do not receive the code, please write to *support@dtstudyclub.com*. Non-subscribers may take the quiz for $20. You can access the quiz by using the QR code below. The quiz will be available on Jan. 21.

_In 2008, Dr. Gordon Christensen wrote an article in JADA comparing the soft tissue cutting abilities of diode lasers to those of electrosurgery (radiosurgery) units.[1] In comparing these two technologies against each other, he found that both dental lasers and the less expensive electrosurgery units have advantages and disadvantages, and he summarized with several key points:

1. Although there was considerable overlap in their uses and both technologies were effective, Christensen found that diode lasers were able to be used around metal (amalgam and gold) as well as with dental implants.

2. He stated that lasers did not harm dental hard tissues (bone) or soft tissues (pulp), and that the clinician could use the laser with less anesthetic, and finally he mentioned that lasers were antimicrobial (antibacterial).

3. The acceptance and use of lasers, especially the diode laser, was increasing in dentistry, and that lasers attract patients because of their recognized and accepted role within the field of medicine (LASIK eye surgery).

4. Electrosurgery units were "far less expensive than the least expensive diode lasers" and he questioned whether "the advantages of the diode laser were significant enough to compensate for the additional cost."

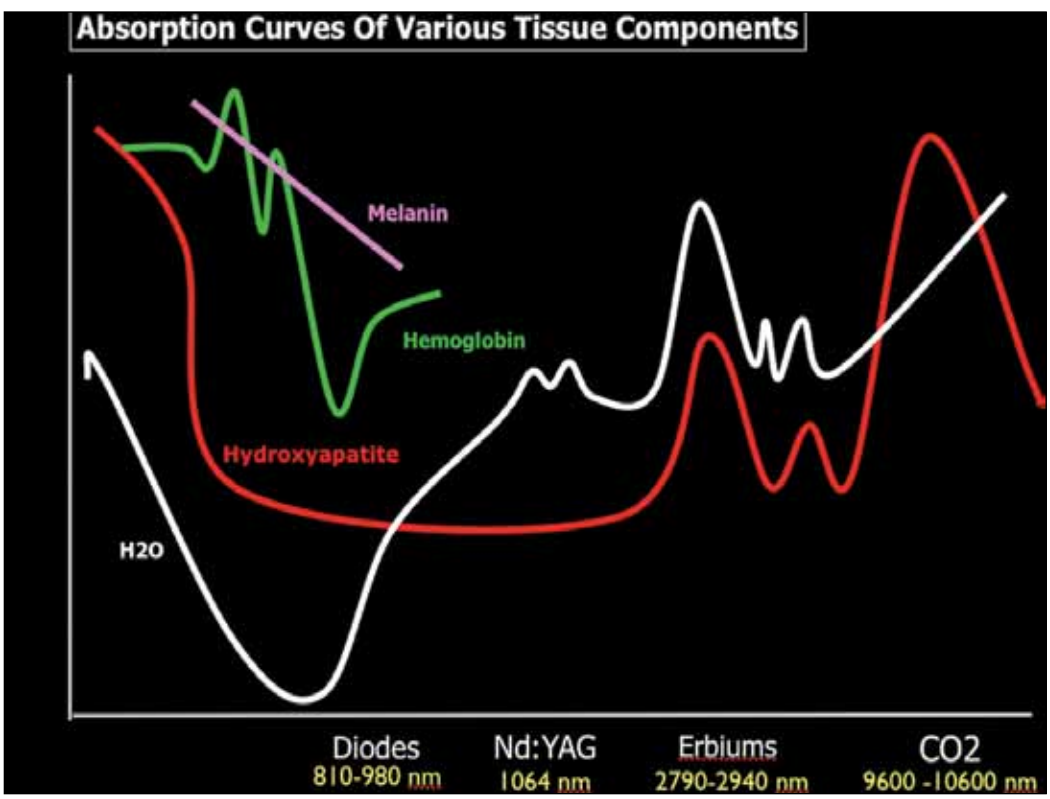


Fig. 1_Absorption curve of various tissue components shows diode lasers to be well absorbed in melanin (pigment), hemoglobin and to some degree water. (Images/Provided by Glenn A. van As, BSc, DMD)

Diode Laser vs Electrosurgery

Feature	Electrosurgery	Diode Lasers
Work around Metals	No - causes sparks, pulp death etc.	Yes and safe.
Pacemakers	No cannot be used	Yes can be used
Anesthetic	Local Anesthetic needed	Sometimes topical only
Antibacterial	No antibacterial qualities	Yes kills bacteria.
Lateral Thermal damage	Can cause recession when used.	Less Likely to cause recession.
Uses	Good for large tissue removal.	Multiple uses as seen today.

Table 1

Table 1_Comparison of diode laser versus monopolar electrosurgery units.

Fig. 2

Fig. 2_Gingival hyperplasia around orthodontic appliances.

Fig. 3

Fig. 3_Immediate post-op after diode laser gingivectomy completed.

Fig. 4

Fig. 4_Eight-day healing of soft tissue around brackets.

Fig. 5

Fig. 5_Diode laser for second-stage implant uncovery in edentulous maxilla.

There are two basic types of electrosurgical units that can be purchased in dentistry:

- *Monopolar*, in which a single electrode exists and the current travels from the unit down a single wire to the surgical site. The patient must be grounded with a pad placed behind the patient's back (a part of the procedure that many patients may question). Heat is produced when the electrode contacts the tissue, and due to pain that is produced, anesthetic must be used.
- *Bipolar*, in which two electrodes are placed in very close proximity to each other. Bipolar units are more expensive than diode lasers and the electrical current flows from one electrode to the other, thus eliminating the need for a grounding pad. Bipolar units, because of the two wires, create less of a precise cut than the monopolar or diode laser.

Although electrosurgical units are inexpensive, require no safety glasses and can remove large amounts of tissue quickly, diode lasers have become much more common in dental operatories in the four years since Christensen's article was published. The primary reasons for their increased popularity are that diode lasers have a small footprint, are reliable and durable lasers, and are portable. Where a few short years ago, diode lasers could cost in the range of $10,000 to $15,000, they are now cost effective and can be purchased for less than $2,500.

Fig. 6_Four healing cuffs in place in maxilla immediately after uncovery with the diode laser.

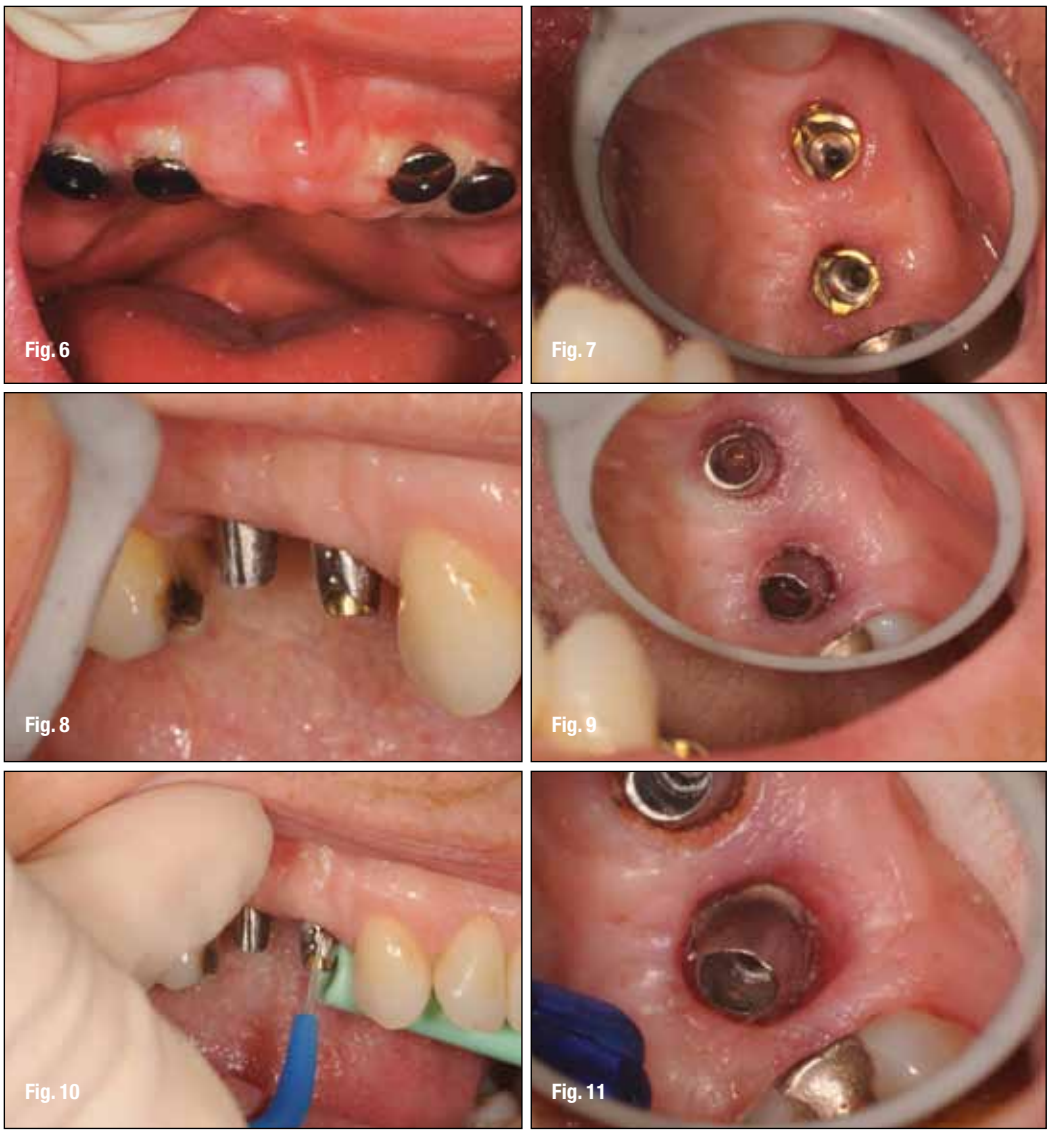
Fig.7_Replace select implant fixtures for upper right premolars.

Fig.8_Abutments in place for both teeth.

Fig. 9_Soft tissue on margins preventing full seating of crowns.

Fig. 10_Picasso Lite diode laser removing tissue on abutment margins.

Fig. 11_Note tissue off the margins of abutments after diode use.



_Advantages of the diode laser over electrosurgery

Ability to work around metals intraorally

Diode lasers in the range of 810–1,064 nm are well absorbed in hemoglobin, melanin (pigment) and to some degree water (Fig. 1). These mid infrared dental wavelengths in the absorption spectrum offer the dental clinician the ability to ablate soft tissues precisely while controlling hemostasis, providing the clinician with an excellent view of the surgical site with a reduced reliance on sutures. Diode lasers have features that make them attractive as mentioned earlier, but they also have several advantages in function over electrosurgical units[2] (Table 1).

Perhaps the greatest benefit of these lasers is that they allow the clinician to work safely around metals. The literature has shown that monopolar electrosurge units can accidentally create catastrophic results when touching metal intraorally. Published reports have shown that contact for very short periods of time with the electrode of a monopolar electrosurgical unit can cause both pulpal and periodontal problems,[3] bone loss,[4] severe intraoral burns,[5] arcing, and that within three seconds of exposure to a dental implant electrosurgical units can cause failure of osseointegration and loss of an implant.[6,7]

In clinical practice, with today's emphasis on the more esthetically pleasing composite resins and newer porcelains, there are still many metallic materials used intraorally, including cast partial denture frameworks, gold, amalgam, orthodontic brackets and semi-precious alloys.

Diode lasers, unlike their electrosurgical counterparts, show little interaction with metallic objects used intraorally. It is important to remember that due to the laser's ability to reflect off mirrored surfaces and potentially cause eye damage, that all members of the dental team as well as the patient must wear laser safety glasses for eye protection if they are within the nomi-


Fig. 12


Fig. 13


Fig. 14


Fig. 15


Fig. 16


Fig. 17

Fig. 12_Final crowns cemented onto abutments without soft-tissue impingement.

Fig. 13_Partially exposed canine requires orthodontic bracket.

Fig. 14_Topical gel placed on soft tissue prior to gingivectomy to uncover soft tissue.

Fig. 15_Pulsed mode at 1.4 w shows removal of attached tissue to expose canine.

Fig. 16_Brackets in place on both canines — immediate post-op view.

Fig. 17_Pre-op prior to maxillary incisor veneers.

nal ocular hazard zone (NOHZ) during laser operation. This zone is most often between 3 and 7 feet, but some diodes can have extended NOHZ ranges of 40 feet.

Orthodontic patients will often exhibit gingival hyperplasia when in brackets that can make it difficult to work on them. This overgrowth of tissue can be due to poor oral hygiene, space-closing mechanics, excess cement or a combination of factors. The diode laser can be used for gingivectomies to safely remove and recontour the excess tissue and healing can be remarkable in a very short period of time (Figs. 2–4).

Ability to work around dental implants safely

Various laser wavelengths that are available today can offer the clinician who needs to expose an implant during second stage surgery an alternative to traditional methodologies. The ability of the diode laser to ablate tissue, at times without the need for local anesthetic, while controlling hemostasis, provides the clinician a great view of the surgical site.

In addition, the diode wavelength, like all laser wavelengths, provides for decontamination of the implant site through its antibacterial actions. Bacterial reduction with the diode laser can lead to an almost sterile operative field (98 percent reduction of pathogenic bacteria). Finally, there is a growing body of evidence that suggests that lasers used at lower energy settings can have a biostimulatory effect on tissue, which in turn can reduce postoperative discomfort, improve healing and shorten healing times while even improving early osseointegration.[8–12]

As an aside, there have been clinicians who routinely use monopolar electrosurgery units to expose implants. It is imperative to realize that although more expensive bipolar (two electrodes) electrosurgery units can be used safely around implants, that the more commonly purchased single electrode (monopolar) units may damage the implant surface and can cause complete loss of osseointegration with resulting implant failure with contact times as short as three seconds.[13,14] Lasers, in contrast, can be used safely with tremendous coagulation and a reduction in pain postoperatively for the patient[15] (Figs. 5,6)