

Up to date literature at
your disposal to discover
the benefits of laser
dentistry

doctor smile[®]
dental laser

For further information contact info@doctor-smile.com +39-0444-349165

Earn
4 CE credits
This course was
written for dentists,
dental hygienists,
and assistants.



Soft-Tissue Lasers and Procedures

A Peer-Reviewed Publication
Written by Raymond J. Voller, DMD, MAGD

ADA CERP® | Continuing Education
Recognition Program

PennWell is an ADA CERP recognized provider
ADA CERP is a service of the American Dental Association to assist dental professionals in identifying
quality providers of continuing dental education. ADA CERP does not approve or endorse individual
courses or instructors, nor does it imply acceptance of credit hours by boards of dentistry.
Concerns of complaints about a CE provider may be directed to the provider or to ADA CERP at
www.ada.org/goto/cerp.



Go Green, Go Online to take your course

This course has been made possible through an unrestricted educational grant. The cost of this CE course is \$59.00 for 4 CE credits.
Cancellation/Refund Policy: Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.

Educational Objectives

The overall goal of this article is to provide dental professionals with information on soft-tissue laser procedures. Upon completion of this course, the participant will be able to do the following:

1. List the wavelengths of the different types of dental lasers that are available
2. List the soft-tissue procedures that can be performed using a soft-tissue laser
3. List and discuss the relative advantages and disadvantages of lasers, scalpels and electrosurgery units
4. List and discuss the considerations involved in deciding whether to purchase a laser and specific attributes of lasers.

Abstract

Dental lasers are used for multiple dental procedures, including soft-tissue procedures. Soft-tissue lasers are available at varying wavelengths and powers and can be used for procedures that would otherwise be performed using a scalpel, or possibly an electrosurgical unit. Soft-tissue lasers enable safe and effective removal of soft tissue when used properly, and contribute to the efficiency and marketability of the dental office.

Introduction

Lasers for use in dentistry have been generally available for approximately two decades, with the first investigation of a dental laser having occurred more than forty years ago.^{1,2} The first laser using helium was created in 1960, and the first diode laser, which had a wavelength of 850 nm, was developed in 1962.³ Laser technology is currently routinely used in dentistry for many types of procedures, including hard-tissue procedures, soft-tissue procedures and the identification of carious lesions, as well as in relation to orthodontic therapy, periodontal and endodontic procedures.^{1,4-8} Recently, dental lasers have been investigated for the treatment of bisphosphonate-induced osteonecrosis, and research is being conducted on the influence of laser therapy on the rate of orthodontic tooth movement.^{9,10} The specific procedures that can be performed depend on the type of laser and its wavelength. The focus of this article is on the use of lasers for oral soft-tissue procedures.

Soft-tissue Dental Lasers

Soft-tissue procedures are currently performed using one of several types of FDA-cleared laser devices. The soft-tissue lasers available are carbon dioxide lasers, Nd:YAG lasers, argon lasers, H:YAG lasers, Er,Cr:YSGG lasers and diode lasers; they differ in what is used to produce the energy, the wavelength of the light emitted from the laser, and whether the energy is supplied in a continuous or pulsed manner.

The Technology Behind Lasers

The main factor involved in the absorption, scattering, reflection or transmission of the light energy emitted from a laser is its wavelength. In turn, the wavelength dictates the potential uses of specific lasers. By using an active element to excite atoms to emit photons, a very focused beam of light with a specific wavelength can be produced from the laser.¹¹ The wavelength determines the depth of penetration of the emitted light into hard or soft tissues, with shallower penetration resulting in superficial effects and deeper penetration resulting in effects throughout the area of tissue penetrated. The absorption of the light results in the production of heat, and depending on the temperature change and tissue, the end result may be superficial (such as charring) or deeper, such as vaporization or the melting of enamel and subsequent recrystallization¹² (which can also increase acid resistance).¹³ As a result of these fundamental laser physics, lasers of different wavelengths are used for different types of procedures. For soft-tissue procedures,¹⁴ carbon dioxide lasers have the highest wavelength, at around 10,600 nm, while Nd:YAG, Er:YAG and Er,Cr:YSGG lasers operate in wavelengths of 1,064 nm, 2,950 nm and 2,780 nm, respectively.¹² Diode lasers typically operate with a wavelength in the 810–980 nm range.¹⁵ The lowest-wavelength lasers used for soft-tissue procedures in dentistry are the argon lasers, with a wavelength of 457–502 nm.¹² At a wavelength of 810 nm, the diode laser gently removes targeted soft tissue without impacting neighboring tissue. Clinically, the author has found it possible to effortlessly remove undesired tissue, such as granulation tissue, precisely and accurately. At low power levels, tissue removal at very precise tolerances can be achieved, often requiring magnification to view the procedure. This type of accuracy is highly suited to sulcular troughing, in which the primary goal is to expose a margin for impressions and to achieve a functional and esthetic result.

Table 1. Soft-tissue lasers and wavelengths

| | |
|-----------------------|------------|
| Carbon dioxide lasers | 10,600 nm |
| Er:YAG lasers | 2,950 nm |
| Er,Cr:YSGG lasers | 2,780 nm |
| Nd:YAG lasers | 1,064 nm |
| Diode lasers | 810-980 nm |
| Argon lasers | 457-502 nm |

Laser Soft-tissue Procedures

Soft-tissue lasers can be used for gingival contouring, leveling, troughing, gingivectomy, other periodontal procedures, exposure of unerupted teeth, operculectomy, frenectomy, treatment of oral aphthous ulcers,¹⁶ soft-tissue incision, ablation and removal of soft-tissue lesions.^{4,5,17}

Figure 1. Frenectomy



Pre-treatment



Laser treatment



One week post-treatment

Gingival troughing and contouring are two of the most common soft-tissue procedures, frequently performed using a diode laser, and esthetic treatment can be enhanced with exquisitely managed gingival contouring using the laser. Adequate exposure of crown margins is an integral part of practicing restorative, reconstructive dentistry, and in those patients who have been treated by the author using the laser for gingival troughing, there is a noticeable reduction in post-treatment inflammation compared with the use of retraction cord. Concurrently, the operator can effectively remove

granulation tissue that may be present as a result of existing improperly positioned or contoured restorations. The health of the soft-tissue matrix around naturally shaped restorations can be readily enhanced by the biocidal effect of laser energy. This antimicrobial effect is an often-overlooked positive attribute of laser therapy. Laser gingival troughing also offers excellent hemostasis, and the removal of soft tissues such as fibromas or frenulae can be easily accomplished with minimal collateral damage, again with excellent hemostasis.

Figure 2. Treatment of an oral aphthous ulcer



Pre-treatment



Laser treatment



One day post-treatment

Lasers, electrosurgery and scalpels

Soft-tissue procedures can be performed using lasers, electrosurgery units and scalpels. Each of these devices has advantages and disadvantages. Scalpels have been the traditional instrument used, and dentists all learned how to use scalpels in dental school (which is not the case for lasers or electrosurgery). However, while tactile sensation is good, control and visibility can be awkward depending on the clinical site and amount of bleeding. In addition, local (and topical) anesthesia is almost always required, scalpels have no capacity for hemostasis and, depending on the procedure, sutures or a periodontal pack will be required. Scalpels are readily available and inexpensive, and the blades or the whole unit are single-use for infection control.

Lasers and electrosurgery units have some advantages over scalpels. Both lasers and electrosurgery units offer the ability to effectively and efficiently incise or remove soft tissue (once the learning curve is completed), and they provide excellent hemostasis. Lasers and electrosurgery units use a handpiece or pen-style holder to deliver the light or heat, which – together with hemostasis – provides for good visualization of the clinical site. While there is a burning flesh odor with lasers and electrosurgery, this can be mitigated using suction and is brief.¹⁸ Postoperative pain is reported to be less using a laser compared to using a scalpel and reduced inflammation has been observed.^{19,20,21} Due to the end-cutting characteristic of the laser tip, or minimal contact of an electrosurgery tip, there is reduced tactile sensation compared to use of a scalpel.

In comparing electrosurgery units and lasers, electrosurgery units have traditionally been substantially less expensive than lasers, although the introduction of moderately priced lasers and their versatility have diminished this factor as a consideration. Electrosurgery units are safe and effective when used correctly.²² The electrodes on electrosurgery units can be curved, which can be an advantage for clinical sites with difficult access, and cutting using the sides as well as the tip of the electrode can be achieved (which, depending on the access and site, could perhaps also be seen as a disadvantage). With respect to the learning curve referenced above for electrosurgery and laser units, in the case of lasers this includes learning to safeguard the eye health of the patient and operator staff by always wearing protective glasses when laser units are in use. Failure to do so has been reported to be one of the most common factors in injuries associated with laser use.²³ Provided that laser units are well maintained and safety protocols are consistently followed, however, this potential drawback is easily overcome.

When using a laser, local anesthesia may not be required for pain control and sutures/periodontal packs may also not be required.²⁴ This is a distinct advantage for all patients, including pediatric patients. Lasers enable soft-tissue procedures to be performed on infants and young children in cases that might otherwise require a general anesthetic. In

addition, swelling, discomfort and scarring are reduced.²⁴ A recent case study reported on the use of a diode laser for an upper labial frenectomy performed in a young orthodontic patient. Only topical anesthesia was required and the procedure took five minutes, complete hemostasis was achieved, and no suturing or periodontal pack was required. The clinical site healed uneventfully and optimally over a ten-day period.²⁵ It has been found that use of lasers results in less recession following troughing than traditional methods used for margin exposure.^{26,27} Lasers also have the ability to remove endotoxins and offer antimicrobial activity.

Table 2. Scalpels, lasers and electrosurgery

| |
|------------------------------------------------------|
| Scalpels |
| Traditional method learned |
| Good tactile sensation |
| No heat generation |
| Safe around implants |
| Inexpensive |
| Disposable blades/unit |
| Almost always requires local anesthesia |
| Requires use of sutures or periodontal pack |
| Electrosurgery unit |
| Care required around implants |
| Excellent hemostasis |
| Good visibility with pen-style holder |
| Curved electrodes aid visibility |
| Efficient and effective soft-tissue removal |
| Lasers |
| Excellent hemostasis |
| Good visibility with pen-style holder |
| Efficient and effective soft-tissue removal |
| Safe around implants |
| Typically requires no/topical anesthesia |
| No periodontal pack or suturing is required |
| Reduced post-operative pain |
| Reduced gingival recession following margin exposure |
| Reduced swelling and discomfort |

Soft-tissue lasers can also be safely used in the peri-implant area,²⁸ while monopolar electrosurgery units should not be used due to the risk of heat-induced damage²⁹ and bipolar units require particularly careful use at these sites. One report cited damage to an intraoral prosthesis during

use of a bipolar electrosurgery unit to remove a basal cell carcinoma on the cheek – the prosthesis had functioned intraorally as an electrode during the procedure – and the author cautioned the reader to avoid similar damage to dental implants and other prostheses during use of these devices.³⁰

Soft-tissue Laser Cases

The first case below demonstrates the use of a diode laser (NV Microlaser™, Discus Dental, LLC) for gingival troughing during restorative treatment, the second case demonstrates gingival contouring in an orthodontic patient and the third case addresses the use of the diode laser for a gingivectomy.

Case 1. Gingival troughing

The patient, a middle-aged healthy male, had received bonded composites ten years earlier to restore his anterior worn and chipped teeth. Now the patient wanted a more esthetic solution, and a treatment plan was developed that included full-coverage Empress restorations on five upper anterior teeth. After a preoperative wax-up was performed to discuss with the patient and determine the optimal form for the new crowns, an appointment was made for preparations and impressions. After the preparations were completed, gingival troughing was performed using the diode laser set at continuous wave, 1.2 Watts, to expose the margins for impression taking that would enable the laboratory to properly prepare the ideal emergence profile. Following the troughing procedure, hydrogen peroxide (Super-Oxal) on a Microbrush was used to help clean the margins prior to taking the final impressions. Use of the laser enabled gentle and conservative exposure of the margins and also provided for excellent hemostasis. Preparation shades were taken, and provisional restorations were constructed with Luxatemp using a shrink-wrap procedure then cemented in place. At the seat appointment for the permanent restorations, the gingival margins were found to be healed and healthy. The final restorations were tried in, then bonded in place. The end result was a satisfied patient.

Figure 3. Upper anterior teeth before treatment



Figure 4. Gingival troughing with diode laser



Figure 5. Use of Super-Oxal with Microbrush



Figure 6. Exposed margins following gingival troughing



Figure 7. Provisional restorations seated



Figure 8. Gingival tissue at seat appointment



Figure 9. Final bonded Empress restorations



Case 2. Removal of bunched gingival tissue interproximally

This case illustrates use of the diode laser to recontour and resect hyperplastic gingival tissues, secondary to orthodontic treatment. A young lady presented with a median diastema that she did not like and wanted to have treated and closed. On examination, it was found that in addition to the diastema there was a one-tooth-width arch discrepancy, with spacing evident primarily, but not exclusively, in the anterior dentition. After discussion with the patient, it was decided to treat this case orthodontically to close the median diastema and simultaneously create space for a third bicuspid to avoid exacerbating an existing tongue posture and constricted airway. In any orthodontic case, good oral hygiene and a healthy periodontium are essential. One of the potential problems that can be encountered during orthodontic treatment is the bunching of interproximal tissue during space closure, such that the tissue mimics gingival hyperplasia. In this particular case, the patient's oral hygiene and compliance were suboptimal, exacerbating the problem. The interproximal tissue and pseudopocket that resulted increased the retention of plaque and also made it more difficult for the patient to perform oral hygiene in that area. As orthodontic treatment progressed, the interproximal tissue bunched further together from the o-chain elastomers. As a result, gingival recontouring was indicated prior to completion of orthodontic treatment. Following the use of topical local anesthesia, the Discus diode laser, set at 1.4 Watts continuous wave, was used to make the initial incisions. The author has found that keeping the wattage low, yet high enough to cut and coagulate soft tissue, results in the least discomfort, with pain control achieved using no anesthesia or just topical anesthesia. When the "char" was created, the patient reported no discomfort. Following the desired laser "incisions" to remove the excess tissue and the creation of a balanced height-to-width ratio, the patient was then dismissed after the replacement of the orthodontic wires secured with a new elastomeric o-chain. The one-week postoperative clinical image illustrates healed, well-contoured gingival tissues, even given the difficult access for oral hygiene and the patient's suboptimal home care. A similar technique can be used to recontour gingival tissue that has discrepancies within one tooth or across several teeth, as well as to expose sufficient length of crown to place a bracket and elastomeric chains.

Figure 10. Median diastema prior to orthodontic therapy



Figure 11. Anterior view of teeth orthodontically moved mesially



Figure 12. Initial lasing of the tissues and the creation of an initial "char"



Figure 13. Gingival tissues immediately postoperatively



Figure 14. One-week postoperative view with the wire and elastomeric o-chain in place.



Notice the amount of healing that has taken place even with suboptimal oral hygiene.

Case 3. Minor gingivectomy

In this case, the patient was undergoing treatment for a porcelain inlay in an endodontically treated tooth (tooth #12). The patient lost the provisional restoration and did not return until the seat appointment, as she did not experience any pain. On examination it was found that the gingival tissue had overgrown the margins of the restoration, and a minor gingivectomy was required to expose the margins. This was easily achieved in less than one minute, together with hemostasis, using the diode laser on continuous wave. Following this, Super-Oxal was used to clean the area of any residual debris and the restoration was seated.

Figure 15. Overgrown gingival area



Figure 16. Use of the diode laser



Figure 17. Preparation margins after laser use



Figure 18. Final restoration



Considering Technology Adoption

Each time new technology is introduced, today's dental practitioner must decide whether or not to embrace it. Considerations in making this decision include the effectiveness and safety of the new technology compared to existing technology and, from a financial perspective, the return on investment. Not all new technologies live up to their promise, with the result that clinical performance may not be improved or that efficiency remains the same or decreases. Such technologies may end up being dust collectors and "stands" for other more useful technologies that actually do work in our hands, and the practitioner may have unwittingly been an early adopter for an obsolete technology. The treatment we provide using newly acquired technology should not

only work in our hands to provide improved patient care in the short term, but it must also help patients and our laboratories in the long term. Financial considerations may dictate not only whether or not to acquire technology, but also the right time to acquire it – when will the price be at a reasonable level for the investment to provide a return?

In the case of lasers, they have been proven over time to be a safe and effective technology for numerous intra-oral procedures. The initial cost of lasers following their introduction was, for most practitioners, prohibitive. Since then, newer and more versatile models have been introduced with increased applicability for the practitioner and a significantly lower acquisition cost. A further consideration in determining whether to acquire a laser is marketing and patient acceptance. New technology gives an office a state-of-the-art appearance, and for some patients this is an important factor. The author does not go through a single day of practice without hearing a patient mention how up-to-date the office appears. Patient acceptance of laser therapy has been found to be high, including in pediatric patients, with one study of pediatric patients finding that acceptance of laser treatment for hard- and soft-tissue procedures combined was 75%.³¹

Finally, if a decision is made to acquire laser technology, the practitioner must determine which procedures the laser would be used for and from there select the laser. Recently introduced lasers have smaller footprints, reducing the need for space in the dental office, and can be placed on the countertop (SoftLase Pro[®], Discus Dental, LLC; Odyssey[®] Navigator[™], Ivoclar). Truly portable wireless lasers in the form of a pen have also recently been introduced (NV Microlaser[™], Discus Dental, LLC). LED readouts are also used, and a further consideration here is versatility for use with both left- and right-handed operators. Wireless technology also seems to help sell in today's market, and practitioners are already accustomed to using foot pedals. This feature eliminates one more item that can clutter the dental operatory. Considerations in the final choice include cost, size of the unit, versatility, ease of use and support from the manufacturer.

Summary

Careful consideration must be given to the decision as to whether or not to incorporate a laser, and to the benefits of specific lasers and their place in your practice. The use of lasers in dentistry has contributed to an increase in patient comfort and office efficiency, as well as offered safe and effective treatment. Soft-tissue procedures such as gingival troughing and gingivectomies can be achieved in less time with lower patient discomfort than when using more traditional techniques.

References

- 1 Blanken JW, Verdaasdonk RM. Laser treatment in root canals. Effective by explosive vapour bubbles. *Ned Tijdschr Tandheelkd.* 2009;116(7):355-60.
- 2 Goldman L, Hornby P, Meyer R, Goldman B. Impact of the laser on dental caries. *Nature* 1964;25:417.

- 3 <http://en.wikipedia.org/wiki/Laser>
- 4 Boj JR, Poirier C, Espasa E, Hernandez M, Espanya A. Lower lip mucocele treated with an erbium laser. *Pediatr Dent.* 2009;31(3):249-52.
- 5 Hamadah O, Thomson PJ. Factors affecting carbon dioxide laser treatment for oral precancer: a patient cohort study. *Lasers Surg Med.* 2009;41(1):17-25.
- 6 Marcondes M, Paranhos MP, Spohr AM, Mota EG, da Silva IN, et al. The influence of the Nd:YAG laser bleaching on physical and mechanical properties of the dental enamel. *J Biomed Mater Res B Appl Biomater.* 2009;90(1):388-95.
- 7 Kravitz ND, Kusnoto B. Soft-tissue lasers in orthodontics: an overview. *Am J Orthod Dentofacial Orthop.* 2008;133(4 Suppl):S110-4.
- 8 Pretty IA, Maupomé G. A closer look at diagnosis in clinical dental practice: part 5. Emerging technologies for caries detection and diagnosis. *J Can Dent Assoc.* 2004;70(8):540, 540a-540i.
- 9 Vescovi P, Merigo E, Manfredi M, Meleti M, Fornaini C, et al. Surgical treatment of maxillary osteonecrosis due to bisphosphonates using an Er:YAG (2940 nm) laser. Discussion of 17 clinical cases. *Rev Belge Med Dent.* 2009;64(2):87-95.
- 10 Yoshida T, Yamaguchi M, Utsunomiya T, Kato M, Arai Y, et al. Low-energy laser irradiation accelerates the velocity of tooth movement via stimulation of the alveolar bone remodeling. *Orthod Craniofac Res.* 2009;12(4):289-98.
- 11 <http://en.wikipedia.org/wiki/Laser>
- 12 Dederich DN, Bushick RD. Lasers in dentistry: Separating science from hype. *J Am Dent Assoc.* 2004;135:204-12.
- 13 Chen CC, Huang ST. The effects of lasers and fluoride on the acid resistance of decalcified human enamel. *Photomed Laser Surg.* 2009;27(3):447-52.
- 14 Olivi G, Genovese MD, Caprioglio C. Evidence-based dentistry on laser paediatric dentistry: review and outlook. *Eur J Paediatr Dent.* 2009;10(1):29-40.
- 15 Orthodontic Laser Chart. www.orthotown.com. June 2009.
- 16 Demetriades N, Hanford H, Laskarides C. General manifestations of Behçet's syndrome and the success of CO₂-laser as treatment for oral lesions: a review of the literature and case presentation. *J Mass Dent Soc.* 2009;58(3):24-7.
- 17 Yagüe-García J, España-Tost AJ, Berini-Aytés L, Gay-Escoda C. Treatment of oral mucocele-scalpel versus CO₂ laser. *Med Oral Patol Oral Cir Bucal.* 2009;14(9):e469-74.
- 18 Moore DA. Electrosurgery in dentistry: past and present. *Gen Dent.* 1995;43(5):460-5.
- 19 Romanos G, Nentwig GH. Diode laser (980 nm) in oral and maxillofacial surgical procedures: clinical observations based on clinical applications. *J Clin Laser Med Surg.* 1999 Oct;17(5):193-7.
- 20 Haytac MG, Ozcelik O. Evaluation of patient perceptions after frenectomy operations: a comparison of carbon dioxide laser and scalpel techniques. *J Periodontol.* 2006;77(11):1815-9.
- 21 Tuncer I, Ozçakır-Tomruk C, Sencift K, Cöloğlu S. Comparison of Conventional Surgery and CO₂ Laser on Intraoral Soft Tissue Pathologies and Evaluation of The Collateral Thermal Damage. *Photomed Laser Surg.* 2009 Aug 29. Epub ahead of print.
- 22 Buzina DS, Lipozencić J. Electrosurgery—have we forgotten it? *Acta Dermatovenerol Croat.* 2007;15(2):96-102.
- 23 Sweeney C. Laser safety in dentistry. *Gen Dent.* 2008;56(7):653-9; quiz 660-1, 767.
- 24 Kotlow L. Lasers and soft tissue treatments for the pediatric dental patient. *Alpha Omegan.* 2008;101(3):140-51.
- 25 Kafas P, Stavrianos C, Jerjes W, Upile T, Vourvachis M, et al. Upper-lip laser frenectomy without infiltrated anaesthesia in a paediatric patient: a case report. *Cases J.* 2009; 2: 7138.
- 26 Bennani V, Schwass D, Chandler N. Gingival retraction techniques for implants versus teeth. *J Am Dent Assoc.* 2008;139(10):1354-63.
- 27 Scott A. Use of an erbium laser in lieu of retraction cord: a modern technique. *Gen Dent.* 2005;53(2):116-9.
- 28 Azzeh MM. Er,Cr:YSGG laser-assisted surgical treatment of peri-implantitis with 1-year reentry and 18-month follow-up. *J Periodontol.* 2008;79(10):2000-5.
- 29 Wilcox CW, Wilwerding TM, Watson P, Morris JT. Use of electrosurgery and lasers in the presence of dental implants. *Int J Oral Maxillofac Implants.* 2001;16(4):578-82.
- 30 Skaria AM. Electrocoagulation and hazardous damage to a dental prosthesis. *J Am Acad Dermatol.* 2006;54(3):543-4.
- 31 Genovese MD, Olivi G. Laser in paediatric dentistry: patient acceptance of hard and soft tissue therapy. *Eur J Paediatr Dent.* 2008;9(1):13-7.

Author Profile



Raymond J. Voller, DMD, MAGD

Dr. Voller graduated from the University of Pittsburgh School of Dental Medicine in 1980, and also holds a Mastership in the Academy of General Dentistry. He practices general, esthetic, reconstructive dentistry and orthodontics and is the owner of VollerDentistry, LLC with offices in Kittanning, PA and Pittsburgh, PA. Dr. Voller has earned his Fellowships in the Academy of Comprehensive Esthetics and the Academy of Dentistry International. He is a member of the Academy of Cosmetic Dentistry and the American Dental Association, as well as their constituent societies. Dr. Voller lectures nationwide and has published numerous articles on reconstructive dentistry and orthodontics. Dr. Voller can be reached at drvoller@comcast.net.

Disclaimer

The author of this course has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

Reader Feedback

We encourage your comments on this or any PennWell course. For your convenience, an online feedback form is available at www.ineedce.com.

Online Completion

Use this page to review the questions and answers. Return to www.ineedce.com and sign in. If you have not previously purchased the program select it from the "Online Courses" listing and complete the online purchase. Once purchased the exam will be added to your Archives page where a Take Exam link will be provided. Click on the "Take Exam" link, complete all the program questions and submit your answers. An immediate grade report will be provided and upon receiving a passing grade your "Verification Form" will be provided immediately for viewing and/or printing. Verification Forms can be viewed and/or printed anytime in the future by returning to the site, sign in and return to your Archives Page.

Questions

- Lasers for use in dentistry have been generally available for approximately _____.
 - a decade
 - two decades
 - four decades
 - none of the above
- The first diode laser had a wavelength of 950 nm and was developed in 1972.
 - True
 - False
- The amount of ultra-violet light emitted from a laser is the main determinant of how the light energy is absorbed.
 - True
 - False
- The absorption of light from lasers results in the production of heat, and it is the thermal effects as a result of the _____ that determine whether the end result is superficial or deep.
 - degree of absorption
 - degree of reflection
 - degree of specificity
 - degree of sensitivity
- For soft-tissue procedures, _____ lasers have the highest wavelength.
 - Nd:YAG
 - argon
 - carbon dioxide
 - Er:YAG
- The lowest-wavelength lasers used for soft-tissue procedures in dentistry are the diode lasers.
 - True
 - False
- At low power levels, tissue removal at very precise tolerances can be achieved using a laser.
 - True
 - False
- Soft-tissue lasers can be used for _____.
 - gingival troughing
 - operculectomy
 - exposure of unerupted teeth
 - all of the above
- Laser gingival troughing offers excellent hemostasis.
 - True
 - False
- Soft-tissue procedures can be performed using _____.
 - scalpels
 - electrosurgery units
 - lasers
 - all of the above
- Tactile sensation, control and visibility are all poor using a scalpel.
 - True
 - False
- Scalpels are _____.
 - inexpensive
 - a soft-tissue cutting tool that was learned in dental school by all dentists
 - readily available
 - all of the above
- Lasers and electrosurgery units offer the ability to effectively and efficiently incise or remove soft tissue, and provide excellent hemostasis.
 - True
 - False
- Good visualization can be obtained using a laser or electrosurgery unit due to _____.
 - their pen-style holders
 - the good hemostasis that is obtained when using them
 - the cleared area after using them
 - a and b
- Healing has been found to be quicker using a laser than using a scalpel.
 - True
 - False
- Postoperative pain is reported to be less compared to using a scalpel and reduced inflammation has been observed with use of a laser.
 - True
 - False
- Electrosurgery units and lasers are both safe and effective when used correctly.
 - True
 - False
- The electrodes on electrosurgery units _____.
 - can be curved
 - offer less tactile sensation than a scalpel
 - can cut soft-tissue using the tip and the sides of the electrodes
 - all of the above
- Protective glasses must be worn to safeguard eye health when using a laser.
 - True
 - False
- Sutures or a periodontal pack are usually required when using a laser.
 - True
 - False
- Local anesthesia is rarely required when using a scalpel.
 - True
 - False
- _____ can safely be used around implants.
 - Monopolar or bipolar electrosurgery units
 - Scalpels
 - Soft-tissue lasers
 - b and c
- According to this article, keeping the wattage low, yet high enough to cut and coagulate soft tissue, _____.
 - results in the fastest procedure
 - results in the least discomfort
 - results in the least charring
 - all of the above
- A consideration in deciding whether to adopt new technology is _____.
 - the effectiveness of the new technology compared to existing technology
 - the safety of the new technology compared to existing technology
 - the return on investment
 - all of the above
- Treatment provided using newly acquired technology should not only work in our hands to provide improved patient care in the short term, but it must also help patients and our laboratories in the long term.
 - True
 - False
- Financial considerations may dictate whether and when to acquire technology.
 - True
 - False
- New technology gives an office a state-of-the-art appearance.
 - True
 - False
- In one study of pediatric patients, it was found that acceptance of laser treatment for hard- and soft-tissue procedures combined was _____.
 - 55%
 - 65%
 - 75%
 - 85%
- A consideration in determining which laser to acquire is _____.
 - the procedures it would be used for in the office and the space required
 - its ability to be used by right- and left-handed operators
 - incorporated features such as wireless technology
 - all of the above
- The use of lasers in dentistry has contributed to an increase in patient comfort and office efficiency.
 - True
 - False

Soft-Tissue Lasers and Procedures

Name: _____ Title: _____ Specialty: _____

Address: _____ E-mail: _____

City: _____ State: _____ ZIP: _____ Country: _____

Telephone: Home () _____ Office () _____ Lic. Renewal Date: _____

Requirements for successful completion of the course and to obtain dental continuing education credits: 1) Read the entire course. 2) Complete all information above. 3) Complete answer sheets in either pen or pencil. 4) Mark only one answer for each question. 5) A score of 70% on this test will earn you 4 CE credits. 6) Complete the Course Evaluation below. 7) Make check payable to PennWell Corp. **For Questions Call 216.398.7822**

Educational Objectives

- List the wavelengths of the different types of dental lasers that are available
- List the soft-tissue procedures that can be performed using a soft-tissue laser
- List and discuss the relative advantages and disadvantages of lasers, scalpels and electrosurgery units
- List and discuss the considerations involved in deciding whether to purchase a laser and specific attributes of lasers.

Course Evaluation

Please evaluate this course by responding to the following statements, using a scale of Excellent = 5 to Poor = 0.

| | | | | | | |
|-----------------------------------------------------------------------------------------------|-------------------|-----|-------------------|----|---|---|
| 1. Were the individual course objectives met? | Objective #1: Yes | No | Objective #3: Yes | No | | |
| | Objective #2: Yes | No | Objective #4: Yes | No | | |
| 2. To what extent were the course objectives accomplished overall? | 5 | 4 | 3 | 2 | 1 | 0 |
| 3. Please rate your personal mastery of the course objectives. | 5 | 4 | 3 | 2 | 1 | 0 |
| 4. How would you rate the objectives and educational methods? | 5 | 4 | 3 | 2 | 1 | 0 |
| 5. How do you rate the author's grasp of the topic? | 5 | 4 | 3 | 2 | 1 | 0 |
| 6. Please rate the instructor's effectiveness. | 5 | 4 | 3 | 2 | 1 | 0 |
| 7. Was the overall administration of the course effective? | 5 | 4 | 3 | 2 | 1 | 0 |
| 8. Do you feel that the references were adequate? | | Yes | No | | | |
| 9. Would you participate in a similar program on a different topic? | | Yes | No | | | |
| 10. If any of the continuing education questions were unclear or ambiguous, please list them. | | | | | | |

11. Was there any subject matter you found confusing? Please describe.

12. What additional continuing dental education topics would you like to see?

If not taking online, mail completed answer sheet to
Academy of Dental Therapeutics and Stomatology,
 A Division of PennWell Corp.
 P.O. Box 116, Chesterland, OH 44026
 or fax to: (440) 845-3447

**For IMMEDIATE results,
 go to www.ineedce.com to take tests online.
 Answer sheets can be faxed with credit card payment to
 (440) 845-3447, (216) 398-7922, or (216) 255-6619.**

Payment of \$59.00 is enclosed.
(Checks and credit cards are accepted.)

If paying by credit card, please complete the following: MC Visa AmEx Discover

Acct. Number: _____

Exp. Date: _____

Charges on your statement will show up as PennWell

- | | |
|-----------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|
| 1. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 16. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 2. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 17. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 3. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 18. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 4. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 19. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 5. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 20. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 6. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 21. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 7. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 22. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 8. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 23. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 9. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 24. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 10. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 25. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 11. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 26. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 12. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 27. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 13. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 28. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 14. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 29. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |
| 15. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D | 30. <input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D |

AGD Code 135

PLEASE PHOTOCOPY ANSWER SHEET FOR ADDITIONAL PARTICIPANTS.

AUTHOR DISCLAIMER
 The author of this course has no commercial ties with the sponsors or the providers of the unrestricted educational grant for this course.

SPONSOR/PROVIDER
 This course was made possible through an unrestricted educational grant. No manufacturer or third party has had any input into the development of course content. All content has been derived from references listed, and/or the opinions of clinicians. Please direct all questions pertaining to PennWell or the administration of this course to Machele Galloway, 1421 S. Sheridan Rd., Tulsa, OK 74112 or macheleg@penwell.com.

COURSE EVALUATION AND PARTICIPANT FEEDBACK
 We encourage participant feedback pertaining to all courses. Please be sure to complete the survey included with the course. Please e-mail all questions to: macheleg@penwell.com.

INSTRUCTIONS
 All questions should have only one answer. Grading of this examination is done manually. Participants will receive confirmation of passing by receipt of a verification form. Verification forms will be mailed within two weeks after taking an examination.

EDUCATIONAL DISCLAIMER
 The opinions of efficacy or perceived value of any products or companies mentioned in this course and expressed herein are those of the author(s) of the course and do not necessarily reflect those of PennWell.

Completing a single continuing education course does not provide enough information to give the participant the feeling that s/he is an expert in the field related to the course topic. It is a combination of many educational courses and clinical experience that allows the participant to develop skills and expertise.

COURSE CREDITS/COST
 All participants scoring at least 70% (answering 21 or more questions correctly) on the examination will receive a verification form verifying 4 CE credits. The formal continuing education program of this sponsor is accepted by the AGD for Fellowship/Mastership credit. Please contact PennWell for current term of acceptance. Participants are urged to contact their state dental boards for continuing education requirements. PennWell is a California Provider. The California Provider number is 4527. The cost for courses ranges from \$49.00 to \$110.00.

Many PennWell self-study courses have been approved by the Dental Assisting National Board, Inc. (DANB) and can be used by dental assistants who are DANB certified to meet DANB's annual continuing education requirements. To find out if this course or any other PennWell course has been approved by DANB, please contact DANB's Recertification Department at 1-800-FOR-DANB, ext. 445.

RECORD KEEPING
 PennWell maintains records of your successful completion of any exam. Please contact our offices for a copy of your continuing education credits report. This report, which will list all credits earned to date, will be generated and mailed to you within five business days of receipt.

CANCELLATION/REFUND POLICY
 Any participant who is not 100% satisfied with this course can request a full refund by contacting PennWell in writing.

© 2010 by the Academy of Dental Therapeutics and Stomatology, a division of PennWell