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Evaluating dental lasers: what the clinician should know

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"So you're thinking about a dental laser. Well, come on in and let me show you what we have. No money? No problem! Just give me one of your credit cards and that will hold it for you. Trust me, this is going to be the best decision you have ever made."

Sometimes meandering though the aisles of a dental convention can be reminiscent of strolling along the side shows of a county fair. The fair barkers are the salespeople, and their marks are the wide-eyed dentists. Think about it: How many times have you been caught up in the excitement of the moment only to have buyer's remorse back in the confines of your dental office?

According to the Institute for Advanced Dental Technologies, dental lasers have obtained approximately a 6% market penetration in the United States. Unfortunately, a small percentage of doctors have been disappointed with the decision to purchase a dental laser. Although the specific reasons for the disappointments vary, the one common denominator was the lack of sufficient knowledge on the part of the dentist before purchasing the laser.

This article is a guide and reference point for clinicians to use before and during the time of purchasing a dental laser. It is the intent of the authors that this article will allow clinicians to make this decision based on what is best for their needs and not those of the salesperson.

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Where do you start?

In 1990, the decision to purchase a dental laser was easy; 1990 was the year that American Dental Laser (ADL) of Birmingham, Michigan, obtained clearance from the US Food and Drug Administration (FDA) to market the first true dental laser. The laser was a free-running pulsed Nd:YAG, and the FDA clearance was for general intraoral soft-tissue recontouring and removal. The unit delivered a maximum average power of 3 Watts and could be pulsed up to 30 times per second. The instrument sold for about US $50,000. If you didn't purchase the unit from ADL, you had few other choices.

However, within 5 years, that situation changed drastically. Due to ADL's initial success, the United States dental market witnessed an explosion of new lasers and manufacturers. Besides several Nd:YAG laser units, clinicians could also choose from several CO_2, argon, or (some years later) diode lasers. All of these units had obtained FDA market clearance for intraoral soft-tissue surgery.

In 1997 the FDA granted Premier Laser Systems of Irvine, California, market clearance for the first hard-tissue dental laser, an Erbium:YAG laser. Shortly thereafter, several other manufacturers offered their erbium hard-tissue lasers to dentists in the United States. Some of these original companies are gone, and new companies have taken their place. The result is that a dentist can spend between US $10,000 and $40,000 to purchase a dental laser and can choose between several different models of CO_2, diode, neodymium, and erbium dental lasers.

First things first

Before you purchase a laser instrument, you should consider the type of practice you have or want to build. Generally, there are soft-tissue and hard-tissue lasers. The former include the CO_2, diode, and neodymium wavelengths, and the latter is comprised of erbium wavelengths. Although there are some crossover applications, this article concentrates on the two divisions. If your idea is to concentrate on increasing revenue in hygiene (laser sulcular debridement), if you do a lot of crown and bridge (laser troughing), or if you want to build up your cosmetic procedures (laser recontouring of gingiva), you will want to look at the soft-tissue lasers. If you restore the majority of your preparations with composite and the notion of not having to administer local anesthetics appeals to you (and your patients), you will want to look at the erbium hard-tissue lasers. If you are undecided, look at both types. Some manufacturers offer both types and are more than willing to make you that special deal on a combination package.

Decision made?

your local dental laser distributor for a demonstration, you may want to consider the following questions: What features do I want or need? What procedures have marketing clearance from the FDA? What about any other regulatory agencies? Has any research been conducted on this unit or wavelength? How do I successfully integrate the technology into my practice? Are there resources I can contact if I need help or have questions or want to join an organization? Answers to these questions are addressed in the next several sections of this article.

The following checklist is intended to aid the clinician in determining which laser instrument is best suited to one's practice. Prospective buyers are encouraged to seek satisfactory answers to as many of the specified criteria as are applicable to one's situation well in advance of purchase. One should participate in conferences and venues that enable side-by-side clinical simulations of the instruments under consideration. Reading product reviews, clinical reports, and scientific papers and speaking to manufacturer representatives and to experienced users will help you achieve a balanced approach to informed decision making. Decide what is most important to you. Doing your homework beforehand will help assure many years of productive and successful integration of laser technology into your practice.

The criteria identified below are based on the authors' experiences in evaluating devices, attending conferences, reviewing the literature, and training practitioners; published evaluation criteria for lasers; and various laser safety standards [1–4].

Instrument checklist

Determine your specific clinical needs

Experience, preferences

An honest and detailed appraisal of one's clinical needs and business strategy for one's practice should be the initial query in evaluating a laser. All subsequent criteria rely on this foundation.

Clinical applications of specific device

Range of applications, speed of performance, precision, and controllability

Once a determination of one's clinical needs and practice direction is made, one can begin to match key characteristics of available devices. Foremost is the consideration of how well a given instrument can perform certain clinical procedures. Most lasers are designed and targeted for a specific application or range of indications for use. Few, if any, can

some cases, the laser will be a part of the conventional armamentarium; in others, it will be the primary instrument of choice.

Design

Specifically designed for intraoral use? Operational noise level

Consider the overall design of the instrument. Is the laser designed specifically for dentistry, or is it primarily a medical surgical device with some intraoral applications? This is an important question, particularly since dentistry typically requires far lower operating parameters than are used extraorally. Is the operational noise level, if any, under a variety of conditions, appropriate for your dental operatory?

Limitations

Electrical power requirements, external cooling system requirements, and inadvertent interaction with infrared-controlled office devices

Certain laser models require specific utility hook-ups (eg, separate air and water lines that are not conventionally found in the dental setting). If one's operatory contains infrared-controlled devices (eg, faucets or lights), some lasers, when activated, can inadvertently initiate their operation.

Safety

Built-in features, adjunct measures necessary for safe performance

Laser safety—for the patient, the attendants, and the practitioner—should be a primary concern.

Sterilization and disinfection

How easy is it to sterilize and disinfect the laser and its accessories, and do they meet the established mandates? Does it fit in well with your established office protocol?

Device-specific supporting research

Ask for published research and clinical reports that support and substantiate the claims made for the instrument(s) you are considering. The studies should be as device specific as possible, rather than generic for a certain laser wavelength. Examine the methods and materials used and compare how applicable they are to your situation. Ensure that the literature is found in peer-reviewed journals rather than in advertising-rich periodicals.

Device-specific training

Adequacy, convenience, frequency, cost, continuing education policy

on the details you need to know, and what provisions are made to address follow-up inquiries? Is the training program recognized by the Academy of Laser Dentistry, the Academy of General Dentistry, or the American Dental Association Continuing Education Recognition Program?

Ergonomics

Ease of set-up and use, control panel and displays, and activation force of foot pedal

Scrutinize the human factor considerations of the laser's design. Is it easy to set up and use in your operatory? Is the control panel easily viewable and reachable, and does it contain the kinds of information and controls you need to do your work? Is the activation force of the foot pedal such that inadvertent activation is minimized?

Portability

Size, weight, maneuverability, and storage of accessories

Consider the laser in relation to your operatory and staff needs. Does it fit in well? Is it convenient? How well does the design accommodate storage of laser accessories?

Controllability

Power, pulse frequency and width, timer for duration of exposure

Does the laser provide the kinds and ranges of control needed to perform the types of procedures you are most likely to be interested in? Does the device have a built-in timer for specified durations of exposure?

Features

Carefully study the list of available features. Are they useful for the kinds of procedures you will be performing? As appropriate, develop your own "wish list." Prioritize the list into "must-have" versus "nice-to-have" versus "not necessary" versus "under-no-circumstances" categories.

Accessories should be complete

Learn which accessories are provided with the laser and which may have to be purchased separately. Determine their cost and ease of replacement. Assess their durability and convenience in a clinical setting.

Documentation—organization, illustrations, troubleshooting; complete manuals—operator, clinical applications, and service

Examine the accompanying documentation and manuals. Are they

efficiently? Are the step-by-step directions adequately detailed to address your questions? Are troubleshooting guides available and helpful?

Delivery system components: longevity, autoclavability, ease of use, ease of change, disposable components, and cost

Typically, the laser's delivery system is one of the more important considerations. Does the system perform its functions easily and conveniently without unnecessary strain and fatigue? Does it provide intraoral accessibility to your satisfaction? Can the individual components be autoclaved? How easy are components to change in the middle of a procedure, if warranted? How long do the parts typically last, and what is their replacement cost?

Quality of construction, ruggedness, beam alignment, and calibration

Be satisfied that the laser's quality of construction will meet your expectations over time. What are realistic timetables for laser beam alignment and instrument calibration under the kinds of use that you anticipate will occur in your operatory? If necessary, would the laser travel well from one operatory to another?

Reliability

Try to determine the reliability of the laser model you are considering for your situation. Forthright discussion with manufacturers and users can help. Ask that any relationships between clinicians and manufacturers be fairly disclosed.

Service (factory or on site?); ease of repacking

Ask about the service policies of the manufacturer for the model you are considering. Is factory or on-site servicing typical? If factory service is preferred, consider how the instrument is to be repackaged for shipment.

Cost: initial, maintenance, and replacement parts

Cost of the laser can be the initial concern for the uninformed, but other considerations (as expressed in this checklist) should take precedence. As with any well-managed business asset, consider the cost of the instrument over its entire expected life cycle, not just initial purchase, and plan accordingly to derive a true and accurate calculation of the return on investment.

Upgradeability

Does the design of the laser lend itself to upgrade capability, if appro-

Warranty details: duration, parts, labor, shipping

Compare warranties and coverages. Determine how often one might reasonably expect to invoke the warranty's provisions and how speedily issues can be resolved.

Track record (number of installations, performance, safety, service, reliability of repair, loaner policy, parts and accessories availability, customer satisfaction)

Examine the track record of the manufacturer or distributor of the device you are considering. To what extent are they dedicated to dentistry? Where are their offices located? How readily available and responsive are they? Ask the hard questions up front about customer satisfaction.

Completing an instrument checklist is an essential step in evaluating whether and which laser instrument may be appropriate for one's practice. Familiarity with the roles that regulatory agencies play with respect to laser devices contributes to making an informed decision.

Regulatory agencies and standards organizations

US Food and Drug Administration and the International Organization for Standardization

In the United States, the most important regulatory organization related to medical devices is the FDA (www.fda.gov). In general, the FDA strictly controls what manufacturers can claim about their products but does not control the practice of dentistry.

The agency's Center for Devices and Radiological Health (CDRH) (www.fda.gov/cdrh) standardizes the manufacture of laser products and enforces compliance with the Medical Devices Legislation. For a manufacturer, there are two pathways to market a device through the CDRH. The most common method is called premarket notification, or 510(k) [5]. The other pathway to market is a premarket approval (PMA) [6]. Clinical studies are most frequently conducted to support a PMA. In contrast, only a small percentage of 510(k)s requires clinical data to support the application.

The FDA requires that manufacturers comply with the current Good Manufacturing Practice (GMP) requirements as set forth in the Quality System (QS) regulation [7]. This is similar to the standard ISO 9000 of the International Organization for Standardization (www.iso.ch/iso/en/ISOOnline.frontpage), which is concerned primarily with quality management [8].

Other provisions of the Food, Drug, and Cosmetic Act of relevance to laser manufacturers include requirements for annual registration, listing of devices, labeling, prohibitions against misbranding and adulteration, and

and manufacturers to determine compliance with the GMP requirements in the QS regulation. Medical Device Reporting [9] is the mechanism the FDA uses for processing adverse events [10] and device problems [11]. The MEDWATCH program [12] records these reported events.

Individuals may access numerous databases on the FDA web site [13] to gain additional information about specific devices and manufacturers. Examples include:

Manufacturer and User Facility Device Experience database (MAUDE) [14]
Medical device reporting [15]
Warning letters [16]
Premarket approval [17]
510(k)s–premarket notifications [18]

The first lasers to be marketed for intraoral use generally were CO_2 lasers with otorhinolaryngologic clearances authorized by the FDA. During the 1970s and 1980s, their intraoral use was confined primarily to specialists such as ear-nose-throat surgeons, oral surgeons, and some periodontists. It was not until 1990 that the field of laser dentistry began in earnest in the United States.

Thus began the modern era of laser dentistry. Since May 1990, nearly 300 marketing clearances have been granted for almost 150 intraoral lasers representing 11 wavelengths from more than 62 companies. Some of these instruments have come and gone as newer models have taken their place. Other devices are manufactured overseas and have never been marketed in the United States.

Other regulatory agencies

Other organizations regulate various aspects of the use of lasers in dentistry. Part of the US Department of Labor, the Occupational Safety and Health Administration (OSHA) (www.osha.gov) is primarily involved in ensuring safe and healthful workplaces in the United States [19–21].

Local regulations vary considerably and usually involve the registration of lasers and the licensing of operations and institutions. Physicians and medical lasers are generally exempt from many local requirements.

The American National Standards Institute (ANSI), founded in 1918, is a private, nonprofit organization that administers and coordinates the United States voluntary standardization and conformity assessment system (www.ansi.org). The ANSI Z136 standard is the US National Consensus Standard for laser safety [22]. The published standard is available through the Laser Institute of America (LIA), a professional membership society dedicated to fostering lasers, laser applications, and safety worldwide (www.laserinstitute.org). Serving the industrial, medical, research, and government

Critical evaluation of information

Whether the clinician is an experienced laser practitioner seeking to advance a personal understanding of a photonic-based tissue interaction or is an interested party embarking on an investigation into the possible applications of laser devices for a private dental practice, the clinical relevance and scientific validity of information should be a primary concern. Where to start? How does one critically evaluate the multiple thousands of published laser dentistry articles and abstracts? How does one decide which Web-based data are worth listening to? How does one determine which conference presentations are of greatest use? How does one come to know which marketing claims have a sound foundation and which do not? Are there any guides for substantiating truth when it comes to the practice of dentistry?

Fortunately, there are, and all in some way are designed to help the practitioner approach the available evidence in a meaningful way. Whether one is an information-seeker or is a faithful adherent to the principles of Evidence-Based Dentistry matters little; the intended outcome remains the same: determining what makes most sense to justify a course of action or inaction based on what is true and useful.

In all of the aforementioned queries, one is examining information as evidence of truth. The notion of evidence-based medicine has its philosophical origins in the 19th century and replaces the more traditional view of medicine and health care administration based on authority. The roles of randomized controlled trials, systematic reviews of a series of trials, and the dissemination of information are central to evidence-based medicine and dentistry.

One of the formal definitions of evidence-based dentistry is provided by the American Dental Association (ADA):

> Evidence-based dentistry (EBD) is an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence, relating to the patient's oral and medical condition and history, with the dentist's clinical expertise and the patient's treatment needs and preferences [23].

Not all evidence is equally valid or useful. Establishing a priority criteria list or hierarchy of evidence helps to differentiate the types and relative value of reported information. One such hierarchy that is often cited for evaluating scientific studies is that identified by Koch and Paquette of the University of North Carolina Schools of Public Health and Dentistry [24]. In increasing order of sophistication, sources of patient-based research include:

- Anecdotes

- Cross-sectional studies
- Case-control studies
- Retrospective cohort studies
- Prospective longitudinal studies
- Randomized, controlled clinical trials

Other levels of evidence exist. One guide, published in the *Journal of Evidence-Based Dental Practice*, ranks the relative value of articles from systematic reviews with homogeneity (highest value) to expert opinions without explicit critical appraisal (lowest value) [25]. This guide may be accessed via the Web through the Oxford Centre for Evidence-Based Medicine [26].

Other publications offering similar guidelines are:

- Guyatt G, Rennie D. User's guide to the medical literature: essentials of evidence-based clinical practice. Chicago: American Medical Association; 2002.
- Greenhalgh T. How to read a paper: the basics of evidence based medicine. 2nd edition. London, UK: BMJ Books; 2000.
- Mayer D. Essential evidence-based medicine. Cambridge, UK: Cambridge University Press; 2004.

In addition, at least two dental journals are devoted to a critical analysis of the published literature: *Evidence-Based Dentistry,* a publication of the *British Dental Journal* and the Nature Publishing Group [27], and *The Journal of Evidence-Based Dental Practice,* published by Mosby [28].

Numerous Web-based resources are available to help the clinician in the quest to sort through the expanding universe of medical information. An invaluable resource in exploring the literature is MEDLINE/PubMed, a service of the US National Library of Medicine (www.nlm.nih.gov) [29]. American Dental Association members can access MEDLINE through the ADA web site (www.ada.org).

The Canada-based Centre for Health Evidence maintains online access to the Users' Guides to Medical Literature [30]. Another useful resource is the Cochrane Oral Health Group, part of the Cochrane Collaboration [31].

The United Kingdom-based Centre for Evidence-Based Dentistry is an independent organization intended to promote evidence-based dentistry worldwide [32].

Commensurate with the Internet's growth in importance as a source of health information is the critical need for using objective criteria to evaluate the quality of available information. One organization that recognized this need is Mitretek Systems [33].

Other online resources related to evidence-based dentistry are summa-

Practice integration checklist

Suppose you have purchased the laser and have been trained in how to use it. The unit has been delivered to your office and unpacked. You are ready to become a laser dentist. Then it suddenly hits you—"How do I properly integrate this technology into my practice to fully benefit from its clinical advantages?" The following items have been developed as a continuing guide to assist the clinician in maximizing the integration of laser technology into his or her practice.

Proper training and clinical technique

There is a learning curve for dental laser use during which the clinician develops his or her proper technique and confidence with the instrument. Try to stay with simple procedures for 1 or 2 weeks. For example, perform single-tooth, soft-tissue procedures (eg, gingivoplasties, gingivectomies, and curettage) or small, single-surface, hard-tissue lesions. Refer to the manufacturer's procedural guidelines before attempting any procedure to verify that proper laser settings are used. Use the least amount of power or energy required to complete the procedure.

The guideline material can also be useful to help the clinician develop proper techniques. Keep in mind that dentists have been using lasers for more than a dozen years. The early adopters worked with the various dental laser manufactures and over the years helped develop the present techniques found in the procedural guidelines. Read and follow their clinical suggestions because they can help to shorten your learning curve.

Don't give up if after one or two attempts the laser procedure doesn't match your expectations. Here's one good example: Most dental lasers can be used to circumferentially remove a small portion of the inside border of the gingival-free margin of a prepared tooth for crown and bridge impressions, thus eliminating the need for retraction cord. This sounds simple, but this procedure is technique sensitive. Once laser troughing is mastered, the fairly dry, bloodless open cervical area is ready for an impression and should take 60 seconds or less per tooth. However, some new laser dentists complain that the sulcular area bleeds and that the gingival margin is rough after they use the laser. Assuming they used correct laser settings, the clinicians were probably moving the handpiece too slowly and applying too much force toward the gingival margin. The slower the movement, the more likely one will create small tissue tags (the roughness), and, the more force or pressure that is applied to the gingival margin with the glass or sapphire tip of the laser, the more likely that hard tip will scrape open what the laser energy just coagulated. The proper technique employs light sweeping motions of the laser handpiece, similar to dusting fine china.

Another helpful resource regarding clinical techniques can be your local dental laser representative. He or she can usually put you in touch with a local dental colleague who can address your questions and concerns during your initial learning curve. There are various professional groups and organizations that can offer their expertise to further your training and education in laser dental procedures and techniques.

Staff and patient education

Successful integration of laser technology into the dental office must involve educating the office staff and the patients. Everyone from the receptionist to the hygienist and from the office manager to the dental assistant, must be equally trained and educated regarding laser safety issues, background, and procedural issues.

A simple example is one of a young female patient who is told by you (the doctor) that she requires some laser therapy to assist in treating her periodontal condition. While speaking to your appointment receptionist, the patient explains that she is trying to start a family and is concerned about the radiation from the proposed laser therapy. If your receptionist hesitates or has no clue how to respond, the patient could develop doubt concerning the proposed treatment and may wonder if this is the right office for her dental treatment. In contrast, the properly trained administrative team member would reassure the patient by explaining that the laser emits heat in the form of infrared radiation, not the harmful ionizing radiation associated with x-rays, and that the doctor uses precisely controlled amounts of this infrared energy to gently remove diseased tissue and reduce harmful bacteria that contribute to the disease.

Many dental laser manufactures offer a standard proficiency course to purchasers of their instruments. Although the program may differ from manufacturer to manufacturer, all the courses have similar components, such as the background and basic physics of lasers, care and maintenance of the instrument, duties of the laser safety officer, integration into all aspects of the practice including hygiene, dental versus medical billing, and marketing issues. The entire office team should attend this course.

After the initial course, it's a good idea to review the material at a staff meeting, select a laser safety officer (the "keeper of the key"), and discuss each staff member's role in integrating this exciting technology into the office. Most dental offices have found that a regular staff meeting devoted to laser technology maximizes the successful integration of the dental laser.

By making sure every staff member is on the same "wavelength," patients will always hear consistent answers to their questions. Keep in mind that you probably knew little about lasers before integrating the technology into the practice. Some of your patients may know more than you because of

regarding the safety, clinical advantages, and limitations of laser technology. This can be called educational marketing.

Daily use

The most important factor of properly integrating the laser into your office is daily use of the instrument. Make sure that you have the instrument next to you in your operatory or hygiene treatment room, and make sure the laser safety officer has the instrument ready to go each morning.

Be creative and look for new ways to use your laser. For example, most lasers can produce a temporary analgesic effect on soft tissue by using the same procedural guidelines as for aphthous ulcer treatment. Knowing this, you may want to pretreat the soft tissue before administering your next palatal injection.

Also keep in mind that dental lasers can be used not only for stand-alone procedures, but also as adjunctive treatment along with conventional treatment modalities. For example, if you were treatment-planning a large gingivectomy, you may wish to use a surgical blade to perform the gross removal. To control bleeding and to change the knife wound into a much less painful laser wound, you should use the laser on that area. The bottom line is, the more you use the laser, the more uses you'll find for the instrument.

Trends

Over the past 3 years, erbium hard-tissue lasers have gained in popularity with United States dentists. Patients appreciate the fact that they can have their teeth laser drilled without anesthesia and feel no discomfort. The clinicians appreciate the fact that their patients remain comfortable during the procedure and that they can usually prepare more teeth using the laser than with conventional handpieces, given equal appointment times.

Erbium lasers are starting to obtain FDA clearances for endodontic procedures and osseous recontouring. The first reports indicate dentists are pleased with the clinical outcome of these new laser treatments. If this trend continues, more dentists will be attracted to hard-tissue lasers due to their increasing clinical versatility. Concerning the economics of erbium hard-tissue lasers, the more numerous the procedures and the more time that a clinician can save by using the laser, the faster the return on the initial investment.

The recent major trend in soft-tissue laser use has been the incorporation of the technology into the hygiene department. The laser is used adjunctively with scaling, and patients notice that their "gums stopped bleeding, stopped being sore and tender, and that the redness went away." Moreover, they comment on the lack of discomfort after their treatment, and hygienists are pleased with their new probing depths and clinical attachment gain and with

technology into their hygiene department often find the need to purchase a second unit just for the hygienists' use. Patients appreciate it, hygienists appreciate it, and therefore the office (economically) benefits.

Concerning trends in the technology itself, the size and weight of the instruments have been decreasing over the past several years. Although the erbium lasers are floor units that are rolled from operatory to operatory, several other wavelengths are available as tabletop units that can be easily picked up and moved. A continued improvement in hard-tissue laser delivery systems has also been seen in recent years. These systems are reliable and durable compared with older systems.

Resources

In addition to those resources mentioned in this article, the following selected list of online sources of information may prove useful to individuals who wish to expand their laser knowledge. Each site includes links to other resources. This list is not intended to be comprehensive but can provide a useful foundation for further exploration.

Organizations

Academy of Laser Dentistry (ALD) (www.laserdentistry.org)
American Society for Laser Medicine and Surgery, Inc. (ASLMS) (www.aslms.org)
European Medical Laser Association (www.emla-laser.com/indexl.php)
European Society for Oral Laser Applications (ESOLA) (www.esola.at)
International Society for Lasers in Dentistry (ISLD) (www.isld.uni-bonn.de)
Laser Institute of America (www.laserinstitute.org)
LLLT Internet Guide (www.laser.nu)
SPIE—The International Society for Optical Engineering (www.spie.org)
World Association for Laser Therapy (www.walt.nu)

Periodicals and publications

Biophotonics International (www.photonics.com/bio/XQ/ASP/QX/index.htm)
Journal of Biomedical Optics (www.spie.org/app/Publications/index.cfm?fuseaction=journals&type=jbo)
Journal of Clinical Laser Medicine and Surgery (www.liebertpub.com/LMS/default1.asp)
Journal of Laser Therapy (www.walt.nu/journal.htm)
Journal of Oral Laser Applications (www.quintpub.com/journals/jola/

Lasers in Surgery and Medicine (www3.interscience.wiley.com/cgi-bin/jhome/34073)
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Laser manufacturers and distributors

BioLase Technology (www.biolase.com)
Biolitec (www.biolitec.com)
HOYA ConBio (www.conbio.com)
Incisive (www.incisivelaser.com)
Ivoclar Vivadent (www.ivoclarvivadent.com)
KaVo America (www.kavousa.com)
Lares Research (www.laresdental.com)
Millennium Dental Technologies (www.millenniumdental.com)
OpusDent (www.opusdent.com)
Zap Lasers LLC (www.zaplasers.com)

Laser safety eyewear

Innovative Optics, Inc. (www.innovativeoptics.com)
Kentek (www.kentek-laser.com)
Noir (www.noirlaser.com)
Trinity Technology, Inc. (www.lasersafety.com)
Uvex Safety (www.uvex.com)

Summary

This article was designed to be a useful tool for clinicians who are contemplating adding laser technology to their practice and to be a reference guide for any dental personnel seeking information about dental laser technology.

There is a learning curve in the use of lasers in dentistry. As long as the clinician has completed a training course and proceeds through the learning curve at a comfortable pace, the rewards will quickly be noticed by the patient and the dental team.

In summary, please keep the following in mind.

Before purchasing:

- Attend a dental laser course(s) and ask questions. Understand the roles of regulatory agencies and critically evaluate the available information.
- Talk to laser dentists in your area.
- Talk to your dental laser distributor or laser manufacturer and see if an in-office demonstration is possible.

After purchasing:

- Obtain training before using the instrument. It is best to have the entire office staff trained. Remember that continuing education is just that—continuing. Avail yourself of the many resources identified in this article.
- Realize that there is a learning curve. Keep it simple; increase your confidence.
- Read and reread the included procedural guidelines. Remember to use the least amount of power or energy to complete the procedure.
- Use the laser every day. Keep it near you. Ask yourself how a given patient might benefit from a laser procedure.

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