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In 2008, Dr. Gordon Christensen wrote an article in JADA comparing lasers to those of electrosurgery (radiosurgery) units. In comparing these two technologies against each other, he found that both dental lasers and the less expensive electro-surgery 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.
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 diode lasers” and he questioned what diode lasers could cost in the range of $10,000 to $15,000, they are now available and durable lasers, and are portable. Where a few short years ago, lasers have a small footprint, are reliable, 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.

Advantages of the diode laser over electrosurgery

Ability to work around metals intraorally
Diode lasers in the range of 802-1,064 nm are well absorbed in hemoglobin and to some degree water. 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 tool of the surgical site with a reduced reliance on suction. Diode lasers have features that make them attractive as mentioned earlier, but they also have several advantages in function over electrosurgical units (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 electrosurgery 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. Bone loss due to intraoral burns, and that within three seconds of exposure to a dental implant electrosurgical unit can cause failure of osseointegration and loss of an implant.

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 nominal ocular hazard zone (NOHZ) during laser operation.
This zone is most often between 3 and 7 feet, but some diodes can have extended ranges of 40 feet or more. Orthodontic patients will often exhibit overgrowth of tissue between their teeth, as well as protrusion out of orthodontic brackets that can make it difficult to work on them. This overgrowth of soft tissue can occur 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 with 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 action. Bacterial reduction with the diode laser can lead to an almost sterile operation. Proponents have mentioned that, once treated with the laser, the tissue is often significantly reduced in terms of length of time they are present. In addition, it has been the author’s experience that, once treated with the laser, the lesions are often less likely to reappear in the same area. In fact, some evidence suggests that the risk of high bacterial loads in periodontal pockets and in particular in endodontic situations may be reduced by lasers.

This recent innovation has implications for improving traditional methodologies locally where used, and in helping to reduce the potential greater systemic health risks generally. The role of lasers continues to be researched today, but research has shown that diode lasers can be safely used within root canals with minimal fear of development of antiseptic complications when conservative settings are used.

Conclusion The diode laser has become the “soft-tissue handpiece” in many dental offices. The advantages of being able to work around metals including dental implants, a reduced need for anesthetic, a reduced risk of recession postoperatively, the ability to reduce bacterial and even fungal infections. The excellent antibacterial capabilities make lasers effective and desirable in many areas in the oral cavity where the risk of post-operative infection may be reduced. However, diode lasers do not possess the same ability to provide biostimulatory reduction as lasers do. Particular interest is now occurring to the role of lasers in endodontic, peri-odontic and peri-implantitis cases where there is need to reduce bacterial loads without such a great reliance on antibiotics. Although more research is needed on how the bactericidal capabilities of the diode laser might be beneficial in these areas, there is no question that all lasers can help healing through decreasing the risk of infection through laser light alone (Figs. 21-31). In addition, growing research has demonstrated that the risk of high bacterial loads in periodontal pockets and in particular in endodontic situations may be reduced by lasers.
Lasers have two added benefits in that they do not require a pad to be placed under the patient for ground- ing and there can be used safely with pacemakers. Diode lasers have found their place in dentistry. Once consid- ered an application looking for a purpose, these small, cost-effective and powerful lasers have discovered their niche as the new go to solution for many soft tissue problems in our daily dental practice.

References