



RIGHT ON TARGET

Periodontist Rana Al-Falaki looks at the use of lasers in periodontics by DH&Ts

There are many advantages of using lasers in periodontal therapy, but the key point is that these are adjuncts to conventional therapy and not a replacement. The first line of any periodontal therapy should include implementing a prescriptive oral hygiene protocol for the patient, and carrying out supra- and subgingival debridement. The aim of treatment is to reduce oral inflammation, eliminate pockets, and ideally achieving a gain in clinical attachment level.

Here, we look at two types of lasers used in periodontal therapy – the diode (940nm wavelength, Epic 10, Biolase), and Er-Cr:YSGG Waterlase MD laser (2780nm). They can be used separately, or together as dual-wavelength therapy.

Diode laser

The diode laser has a particular affinity for pigment, and is a great tool for achieving haemostasis, due to its absorption by haemoglobin in the blood. Its other advantage is that periodontal bacteria are mostly pigmented and, therefore, the diode effectively 'targets them' so can be used in periodontal pockets to kill periodontal pathogens. Its use following subgingival debridement is, therefore, to reduce bacteremias, to help prevent cross contamination of periodontal pockets through probing or scaling and to help reduce the risk of contamination of periodontal pockets through probing or scaling and to help reduce the risk of periodontal abscesses after hygiene visits for patients. Studies have suggested that, by killing the bacteria in the pockets, the pocket resolution may be greater than conventional treatment alone. If the tip is used uninitiated, then the bacteria are killed through cell lysis of the cell membranes, without significant ablation of tissue. This makes it ideal for use by hygienists and therapists. Once the tip has become initiated (in contact with blood for a

while), then it can be used to ablate the pocket epithelial lining and remove granulation tissue. This is known as laser curettage and becomes a grey area as to whether only dentists or hygienist and therapists are permitted to use it in this way.

Waterlase

The Er-Cr: YSGG, referred to from now on as the Waterlase, uses hydrophotonics to ablate tissues. This effectively means that water does the cutting. This wavelength has a particular affinity for both hydroxyapatite (tooth and bone) and water (the water in the soft tissues). As the laser beam hits the tissues, laser energy turns the water in individual cells to vapour, causing them to explode (which we see as tissue being cut). It does this without heat, pressure or vibration, so no damage is caused to the tissues. Also, the depth of necrosis to the surrounding tissues is only 5-10 cell layers, compared to 100-300 cells if a scalpel is used, and 1000-1500 with electrosurgery. The diode affects 15-25 cell layers. The implications of this means that tissues are 'cut' or ablated with very little damage, which leads to faster and much less painful healing.

Like the diode, the Waterlase can be used in periodontal pockets. The waterlase has radial firing tips, so the laser beam is projected laterally, which makes them ideal for use in pockets. This laser can be used for removal of biofilm, removal of calculus, removal of granulation tissue and the pocket lining, and is also used outside the pocket to disrupt the epithelium. This follows the principals of new attachment formation, delaying the downgrowth of epithelium, to allow time for formation of new connective tissue as part of the healing process rather than that of a long junctional epithelium. Studies have found that indeed, regeneration (new cementum, bone and periodontal ligament) have

Soft and hard facts

- 1** A soft-tissue laser, which may be a CO₂ laser, a diode laser (wavelengths vary from 800-940nm), or ND: YAG
- 2** Hard and soft tissue lasers – which may be either Er-YAG, or Er-Cr:YSGG. These are able to cut both hard and soft tissues, so tooth tissue, bone, and gingivae or oral mucosa



Rana Al-Falaki has been on the UK specialist list in periodontics for more than 10 years. She has worked in the hospital system helping with the undergraduate and post-graduate tuition, and as an associate specialist. Most of her time is now

spent in specialist practice, as well as lecturing. Her areas of interest lie in stress and nutrition related to periodontal diseases, and cosmetic periodontal procedures. She was the first UK periodontist to use lasers in her daily practice. She is conducting research on its applications and also lectures both in the UK and internationally on the subject and is pioneering its use in this field.

What can a diode do?

- ▶ Can be used in pockets to administer low level laser therapy (LLLT) which can help to reduce pain and discomfort after treatment
- ▶ Helps to reduce post-operative sensitivity and inflammation
- ▶ Speeds up healing by two days
- ▶ A bleaching wand attachment can also be used to target more generalised areas rather than just within the pockets
- ▶ Effective and quick technique to help reduce post-operative pain and swelling following any dental procedures
- ▶ Can even be used on the TMJs after long procedures
- ▶ And lastly. . . patients will love you for reducing sensitivity!



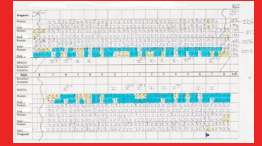
A 32-year-old lady with aggressive periodontitis



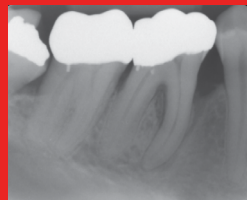
The same patient just two months after full-mouth non-surgical periodontal treatment including laser deep pocket therapy



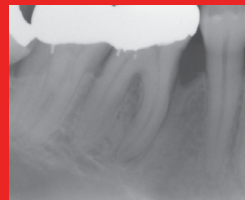
One year later – the teeth have continued to move back to their original position



Six-point pocket chart showing the original pocket depths (blue- deep pockets of 6mm+; yellow are moderate pockets of 4-5mm), and the response after two months, as well as a five month and nine month follow up showing continued good stability



Class II furcation defect with 6mm pocket into the buccal furcation



Eight months after following non-surgical laser treatment, showing bony infill in the furcation and mesially. The pocket resolved completely



Epic 10 diode laser



Waterlase MD

Rana will be running some introductory 'taster' courses for hygienists and therapists.
For more, email jackie.cooper@henryschein.co.uk

formed after scaling and root planning, followed by use of the Er-Cr: YSGG laser.

The protocol used would consist of carrying out conventional therapy, and then entering the pockets with a radial firing tip to treat the pockets. You can then also use the diode to further reduce bacterial load and have the added advantage of LLLT (for pain relief, accelerated healing, and sensitivity).

Case study

The first case illustrated in the box above is that of a 32-year-old female, who was treated non-surgically using ultrasonics, followed by laser treatment in the

same visit with the Waterlase. The pocket resolution after just two months is almost complete, and because there seem to be bony changes, the teeth also moved back into position over the course of a year. The suggestion is also that stability following laser treatment is perhaps better than following conventional treatment. The radial firing tips allow you to re-shape the tissues at the same time, so you can thin tissues and improve access for oral hygiene purposes with simultaneous gingivectomies in the same visit. This is otherwise something that would have to be done through periodontal surgery. Indeed, the tips are also up to 14mm long and thinner than a periodontal probe, so can clean deeper down and into furcations more effectively than through conventional scaling and, therefore, the need for periodontal surgery is greatly reduced. We are even seeing spontaneous bony in-fill in infra-bony defects following non-surgical laser treatment (deep pocket therapy), so there is very little

need for expensive and potentially painful regenerative surgery (as illustrated in the second case). Coupled with the advantages of less post-operative pain, less bleeding and so better visibility, and less if not permanent desensitisation, one would think lasers periodontics if the only way forward. Of course, this same laser can be used to cut bone and, therefore, if surgery is indicated, the laser is a one-stop tool, able to raise the flap, remove the granulation tissue, remove the biofilm, re-contour the bone without heat damage and desensitize the root surface. Also, following surgery, we have certainly found far less post-operative pain than through conventional surgery. The last advantage to perhaps mention, is the ability to treat peri-implantitis with this laser, due to its ability to remove biofilm from the implant surface without damage to the implant surface or bone. Again, this can be carried out non-surgically with radial firing tips in many cases. **DH&T**