resistant to wear and tear. Typically, placement is permanent, and many patients and providers are unaware of existing specific options for removal.
Study: Nine female patients were recruited from radiation/oncology with a history of breast cancer with Skin Types I to IV, with prior placement of radiation tattoos on the chest in cosmetically sensitive areas. The tattoo color was black, and 1–2 mm in average size. A single physician performed up to 5 treatments with a Q-switched (QS) 1064 nm laser (Lumenis, Ltd., Yokneam, Israel) with the endpoint of an ash white reaction. Treatment time was less than 5 minutes.
Results: 3–4 treatments sessions were required achieve complete tattoo removal (>90% reduction by blinded assessment) with a minimal side effect profile. No patients reported hypopigmentation or the appearance of scarring. Patient satisfaction was high, with post-treatment questionnaires showing higher self-esteem.
Conclusion: This study demonstrates the efficacy and safety of a platform-based QS Nd:YAG 1064 nm laser for the treatment of chest radiation tattoos. Awareness of treatment options for this entity (when medically appropriate) amongst patients and radiation/oncology providers can lead to successful treatment and improved quality of life.

LASER DENTAL APPLICATIONS

#118

COMBINING SUPER PULSE DIODE TECHNOLOGY AND SMART TEMPERATURE FEEDBACK FOR FAST AND PRECISE SOFT-TISSUE SURGERY
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Background: Laser diodes (LD) have numerous advantages as laser sources for dental applications, including very high efficiency, reliability, compactness, and low cost. Until recently, LDs have been limited in their ability to deliver high peak power levels, which, in turn, limited their clinical possibilities. Fortunately, recent technological developments made possible advent of "super pulse" LDs. Moreover, advanced means of smart thermal feedback offer means of precisely controlling this power, thus ensuring safe and optimally efficacious application. In this work, we have evaluated a prototype super-pulse diode system in both *ex vivo* and clinical settings.
Study: The prototype super-pulse LD system provided up to 25 W average and up to 150 W pulse power at ~975 nm wavelength. The laser was operated in various modes of control, including Automatic Power Control (APC) and Super Thermal Pulse (STP) modes, where power of the laser was varied automatically as a function of real-time thermal feedback to maintain constant tip temperature. *Ex vivo* evaluation methods were designed to assess the following characteristics of the system performance: 1) Speed and depth of cutting; 2) Degree of charring and dimensions of coagulative margin. Furthermore, the system was evaluated in clinical setting under an IRB-approved protocol for a number of relevant soft-tissue procedures, including troughing and gingivectomy.
Results: In *ex vivo* setting, the super-pulse laser diode system was compared with industry-leading conventional diode and CO_2 devices. The results indicated that the super-pulse diode laser system provided increase in speed of controlled cutting by a factor of 2 in comparison with the conventional diode laser and approaching that of CO_2 device. The produced ratio of the depth of cut to the thermal damage margin was significantly higher than conventional diodes and somewhat lower than that of the CO_2 system, suggesting optimal hemostasis conditions. In clinical setting, the super-pulse laser diode system with temperature feedback allowed fast, well-controlled, char-free surgery favorably comparable with the current industry-leading devices.
Conclusion: Super-pulsed diode laser technology with real-time temperature control has a significant potential for creating a new standard of care in the field of precision soft tissue surgery.

#119

A 980 nm DIODE LASER CLOT FORMATION OF THE RABBIT'S DENTAL SOCKETS AFTER TEETH EXTRACTION
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Background: The aim of this research work is to evaluate the use of 980 nm diode laser in clotting the blood in the bone socket after tooth extraction. The objective is to prevent possible clot dislodgement which is a defect that may lead to possible infection.
Study: A number of rabbits were irradiated using 980 nm CW mode diode laser, 0.86 W power output for 9 s and 15 s exposure time. The irradiated groups were studied histopathologically in comparison with a control group.
Results: Results showed that laser photothermal coagulation was of benefit in minimizing the possibility of the incidence of postoperative complications.
Conclusion: The formation of the clot reduces the possibility of bleeding and infection in addition to the benefit of laser enhancing healing and bone formation in the socket area. The results were based on histopathology of bone specimen was carried on for day 1, 3, 10, 14 and 21 post operatively. the conclusion was using 980 nm wavelength laser stimulate healing and bone formation moreover 15 s laser exposure time shows faster healing than 9 s exposure time.

#120

PERIODONTAL TREATMENT COMBINED TO ANTIMICROBIAL PHOTODYNAMIC THERAPY: EXPERIMENTAL MODEL
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Background: Antimicrobial photodynamic therapy (APDT) has been used as an adjuvant treatment for periodontitis. It combines a photosensitizer (PS) with a light source to induce reactive oxygen species (ROS) and kill microbial cells. PpNetNI is a protoporphyrin derivate, and it has a chemical binding site at biofilm and great affinity to microbial cells. The aim of this study was to investigate the effects of APDT as an adjuvant treatment for periodontitis.
Study: Ten healthy male rats Wistar (Rattus norvegicus) were used in this study (Approved by UNINOVE Ethical committee AN0029/2015). Periodontitis was induced by placing a cotton ligature around the first mandibular molar in a subgingival position. The contralateral mandibular first molar received neither a ligature nor any treatment, and was used as a control. After 7 days, the ligature was removed and all animals received scaling and root planning (SRP) and were divided according to the following treatments: SRP group (received SRP and irrigation with PpNetNI, 10 μM) and PDT group (PpNetNI 10 μM followed by LED irradiation). PDT was performed with a LED (630 nm) with an output power of 400 mW (fluence-rate 200 mW/cm^2; fluence 18 J/cm^2). Rats were euthanized at 7 days postoperatively. The bone loss was measured by Optical Coherence Tomography (OCT, THORLABS LTD., Newton, US). Data were analyzed statistically (Mann-Whitney test, $p<0.05$). in vestibular region of the first molar
Results: The animals treated by APDT showed a bone gain of approximately 30% compared to the SRP group following 7 days from the treatment. OCT was able to detect bone loss in the samples and it was nondestructive method for this experimental model.
Conclusion: In conclusion, within the parameters used in this study, APDT was an effective alternative to held periodontal health after treatment, and it was able to regenerate supportive periodontal tissue.

#121

OCT AND FLUORESCENCE INFLUENCE ON SCREENING DECISIONS FOR ORAL MALIGNANT LESIONS

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Background: Optical instruments for diagnosis are based on the light interaction with tissue. The physical characteristics of light onto tissue can be optimized with regard to several parameters. The chemistry, the morphology, and the structure of the tissue interact with the light revealing for example epithelial thickness, cellular density, nuclear/cytoplasmic ratios blood vessels, and collagen matrix. The aim of the present study was to assess the value of OCT for imaging abnormal changes in tissue architecture and ultraviolet detector system (LED Dental Ltd.) for visualizing the tissue auto-fluorescence of potentially malignant oral lesions and to establish the diagnostic accuracy, sensitivity, and specificity of these methods.
Study: 10 patients were evaluated by conventional oral examination (COE) followed by direct visual fluorescence evaluation (DVFE) using the ultraviolet detector. Areas clinically suspicious detected by COE or with positive DVFE (visual fluorescence loss (VFL)) were further investigated using surgical biopsy. The tissue samples were also investigated with OCT. The association between COE, DVFE and OCT was assessed and compared with histopathology.
Results: Areas of OSCC of the buccal mucosa were identified in the OCT images by the disruption of the basement membrane, an epithelial layer that was highly variable in thickness, with areas of erosion, extensive epithelial down-growth and invasion into the sub-epithelial layers. Eight positive biopsies for malignant lesions were detected by COE and DVFE. Only one positive biopsy for a premalignant lesion was not in accordance with COE and DVFE. One lesion seen on the ultraviolet detector and COE as non-malignant lesion was confirmed by the biopsy. Therefore, the ultraviolet detector system had a sensitivity of 100% and specificity of 50% in discriminating *in situ* normal mucosa from carcinoma or invasive carcinoma, compared with histology. The predictive positive value was 88.89% and the negative predictive value was 100% (95% CI).
Conclusion: OCT seems to be a highly promising imaging modality. DFVE allows for a simple and cost-effective margin determination, for the detection and screening of oral precancerous and early cancerous disorders. It was found that for the moment OCT and the ultraviolet detector system couldn't replace the histopathology procedure. Nonetheless, we determined its usefulness for clinical examination, monitoring oral lesions and guiding the biopsy. Therefore, these methods may add sensitivity to the oral tissue examination and be an effective adjunct for high-risk patients.

#122

EVALUATION OF HARDNESS OF BOVINE DENTAL ENAMEL WITH WHITE SPOT LESIONS FOLLOWING IRRADIATION WITH CARBON DIOXIDE LASER: A PILOT STUDY

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Background: CO_2 lasers have a greater absorption coefficient in enamel than erbium lasers, which makes the interaction more efficient from the energy standpoint and surface changes. However, some issues have not been fully clarified, such as the adequate dose on white spots. The use of laser on tooth enamel promotes changes in its physicochemical properties, solubility and surface characteristics; however, it is important to know whether these effects also occur on white spots. Thus, this study was conducted to evaluate a novel dosimetric protocol for the promotion of the remineralization of white spots on bovine dental enamel with the use of ultra-short pulsed carbon dioxide laser with a wavelength of 10,600 nm. The aim of this study was to evaluate, *in vitro*, the microhardness on artificial carious lesions in bovine dental enamel irradiated with CO_2 laser
Study: Caries-like, lesions were formed in 20 bovine teeth and randomly distributed into two groups ($n = 10$): Control group (with no caries) and Experimental group with dental caries (white spots). Irradiation was performed with a wavelength of 10600 nm, manual scanner with a diode coaxial laser as the guide, a focal distance of 75 mm, pulse interval of 0.99 s, pulse duration of 0.005 s, energy pulse of 5 mJ, pulse repetition of 1 Hz, duty cycle of 6,36%, and average power of 1 W, radiant