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# CO2 and diode laser for excisional biopsies of oral mucosal lesions. A pilot study evaluating clinical and histopathological parameters.

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## Abstract

**PURPOSE:** The present pilot study evaluates the histopathological characteristics and suitability of CO2 and diode lasers for performing excisional biopsies in the buccal mucosa with special emphasis on the extent of the thermal damage zone created.

**PATIENTS AND METHODS:** 15 patients agreed to undergo surgical removal of their fibrous hyperplasias with a laser. These patients were randomly assigned to one diode or two CO2 laser groups. The CO2 laser was used in a continuous wave mode (cw) with a power of 5 W (Watts), and in a pulsed char-free mode (cf). Power settings for the diode laser were 5.12 W in a pulsed mode. The thermal damage zone of the three lasers and intraoperative and postoperative complications were assessed and compared.

**RESULTS:** The collateral thermal damage zone on the borders of the excisional biopsies was significantly smaller with the CO, laser for both settings tested compared to the diode laser regarding values in pm or histopathological index scores. The only intraoperative complication encountered was bleeding, which had to be controlled with electrocauterization. No postoperative complications occurred in any of the three groups.

**CONCLUSIONS:** The CO2 laser seems to be appropriate for excisional biopsies of benign oral mucosal lesions. The CO2 laser offers clear advantages in terms of smaller thermal damage zones over the diode laser. More study participants are needed to demonstrate potential differences between the two different CO2 laser settings tested.

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# Surface alterations of polished and sandblasted and acid-etched titanium implants after Er:YAG, carbon dioxide, and diode laser irradiation.

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## Abstract

**PURPOSE:** Laser treatment has become a popular method for resolving peri-implantitis, but the full range of its effects on implant surfaces is unknown. The purpose of the present investigation was to analyze the influence of different clinically applicable erbium:yttrium-aluminum-garnet (Er:YAG), carbon dioxide (CO2), and diode laser parameters on titanium surfaces that were either polished or sandblasted, large-grit, acid-etched (SLA).

**MATERIALS AND METHODS:** Six polished and six SLA titanium disks were irradiated at nine different power settings (n = 54 polished, 54 SLA) with Er:YAG, CO2, or diode lasers. The CO2 and diode lasers were used in continuous wave mode, and the Er:YAG laser was used in a pulsed manner. The surface of each disk was analyzed by scanning electron microscopy and confocal white light microscopy. Each disk was irradiated on six circular areas of 5 mm in diameter with the same specific laser setting for 10 seconds.

**RESULTS:** Within the chosen parameters, the CO2 and diode laser did not cause any visible surface alterations on either the polished or SLA disks. In contrast, both polished and SLA disks showed surface alterations when irradiated with the pulsed Er:YAG laser. The SLA surfaces showed alteration after 10 seconds of irradiation with Er:YAG laser at 300 mJ/10 Hz. The surfaces of the polished disks did not show alteration with the Er:YAG laser until they were irradiated at the higher energy of 500 mJ/10 Hz for 10 seconds. The results of confocal white light microscopy were in agreement with scanning electron micrographs.

**CONCLUSION:** In contrast to continuous-wave diode and CO2 laser irradiation, pulsed Er:YAG laser irradiation caused distinct alterations with power settings beyond 300 mJ/10 Hz on the SLA surface and 500 mJ/10 Hz on the polished surface. Thus, it is only safe to use the Er:YAG laser for implant surface irradiation with settings no higher than 300 or 500 mJ/10 Hz.