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Confocal imaging of carbon dioxide laser-ablated basal cell carcinomas: An ex-vivo study on the uptake of contrast agent and ablation parameters.

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ABSTRACT

BACKGROUND AND OBJECTIVES: Laser ablation can be an effective treatment for the minimally invasive removal of superficial and early nodular basal cell carcinomas (BCCs). However, the lack of histological confirmation after ablation results in high variability of recurrence rates and has been a limitation. Reflectance confocal microscopy (RCM) imaging, combined with a contrast agent, may detect the presence (or absence) of residual BCC tumors directly on the patient and thus provide noninvasive histology-like feedback to guide ablation. The goal of this ex vivo bench-top study was to determine effective ablation parameters (fluence, number of passes) for a CO₂ laser that will allow both removal of BCCs and control of the underlying thermal coagulation zone in post-ablated tissue to enable uptake of contrast agent and RCM imaging. **MATERIALS AND METHODS:** We used 72 discarded fresh normal skin specimens and frozen BCC tumor specimens to characterize the depth of ablation and to evaluate uptake of contrast agent and image quality. Acetic acid was used to enhance nuclear brightness ("acetowhitening") during imaging pre- and post-ablation. Histology sections of the post-ablated imaged surface were visually examined for the appearance of nuclear and dermal morphology and compared to the RCM images. **RESULTS:** Results for 1-3 passes of 5.5 J/cm², 6.5 and 7.5 J/cm², and 1-2 passes of 8.5 J/cm² showed the uptake of acetic acid for contrast and RCM imaging of the presence and absence of residual BCC tumors in post-ablated tissue. Morphologic details in the images were validated by the histology.

CONCLUSION: The use of effective ablation parameters may enable RCM imaging to guide ablation.