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### Microneedle fractional radiofrequency-induced micropores evaluated by in vivo reflectance confocal microscopy, optical coherence tomography, and histology.

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#### ABSTRACT

**BACKGROUND:** Microneedle fractional radiofrequency (MNRF) is a minimally invasive technique that delivers radiofrequency (RF) energy into the skin via microneedles. Reflectance confocal microscopy (RCM) and optical coherence tomography (OCT) enable the characterization of device-tissue interactions in in vivo skin. The aim of this study is to describe MNRF-induced micropores using RCM and OCT imaging. **MATERIALS AND METHODS:** Five healthy participants were treated with a 7 × 7 array of 1500 μm microneedles on two adjacent areas of the right hip. One area received MNRF using high RF energy while the other underwent MNRF at low RF energy. Micropore morphology was evaluated qualitatively and quantitatively with RCM and OCT. To relate imaging with histology, one participant underwent punch biopsy in both areas. **RESULTS:** Reflectance confocal microscopy visualized shape, content, and thermal-induced coagulation zone (CZ) of MNRF micropores. At high RF energy, micropores showed concentric shape, contained hyperreflective granules, and coagulated tissue from epidermis to dermo-epidermal junction (diameter 63-85 μm). Micropores at low RF energy, presented with a stellate shape, no content and CZs that were visible only in epidermis (CZ thickness 9 μm, IQR 8-21 μm). Evaluating OCT, high RF energy showed deeper (150 μm), more easily identifiable micropores compared to low RF energy micropores (70 μm). Histology showed tissue coagulation to a depth of 1500 μm at high RF energy, while at low RF energy, disruption was only visible in epidermis. **CONCLUSION:** Microneedle fractional radiofrequency micropores show distinct characteristics in both RCM and OCT, depending on RF energy. These in vivo imaging modalities are complementary and allow combined, qualitative, and quantitative evaluation. © 2019 John Wiley & Sons A/S. Published by John Wiley & Sons Ltd. **KEYWORDS:** histology; microneedle fractional radiofrequency; micropore; optical coherence tomography; reflectance confocal microscopy PMID: 30659657 DOI: 10.1111/srt.12676