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In Vivo Noninvasive Imaging of Healthy Lower Lip Mucosa: A Correlation Study between High-Definition Optical Coherence Tomography, Reflectance Confocal Microscopy, and Histology.

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ABSTRACT

In recent years, technology has allowed the development of new diagnostic techniques which allow real-time, in vivo, noninvasive evaluation of morphological changes in tissue. This study compares and correlates the images and findings obtained by high-definition optical coherence tomography (HD-OCT) and reflectance confocal microscopy (RCM) with histology in normal healthy oral mucosa. The healthy lip mucosa of ten adult volunteers was imaged with HD-OCT and RCM. Each volunteer was systematically evaluated by RCM starting in the uppermost part of the epithelium down to the lamina propria. Afterwards, volunteers were examined with a commercially available full-field HD-OCT system using both the "slice" and the "en-face" mode. A "punch" biopsy of the lower lip mucosa was obtained and prepared for conventional histology. The architectural overview offered by "slice" mode HD-OCT correlates with histologic findings at low magnification. In the superficial uppermost layers of the epithelium, RCM imaging provided greater cellular detail than histology. As we deepened into the suprabasal layers, the findings are in accordance with physiological cellular differentiation and correlate with the images obtained from conventional histology. The combined use of these two novel non-invasive imaging techniques provides morphological imaging with sufficient resolution and penetration depth, resulting in quasihistological images.