as visual examination of the oral tissue surface or symptoms reported by the patient. Subsurface examinations of tissue with microstructural and microvascular OCT, the latter with its complimentary Doppler and speckle variance modes, can potentially be used as a rapid noninvasive objective tool for treatment response monitoring and optimization of treatment delivery in patients with oral pathologies.

5. Conclusion

An SD-OCT system and an oral imaging probe have been developed, enabling the visualization of various oral tissue features and layers, such as the epithelium (including basal layer), lamina propria and blood vessels in *ex vivo* swine and *in vivo* human imaging scenarios. The ability to image an ulcer, as a prototypical oral pathology and the feasibility of applying Doppler technique for visualizing the microvasculature in human labial mucous membrane with diameters as small as ~16 μm were presented. Moreover, svOCT was used for *in vivo* imaging of healthy and pathologic oral sites for the first time, highlighted an increase in the vasculature in scar tissue. Based on the acquired structural, Doppler, and svOCT images, the developed SD-OCT system potentially provides a noninvasive and quantifiable subsurface imaging tool to monitor oral diseases and their complications, which cause alterations in the structure and layer definition of oral tissue (such as inflammation and mucosal atrophy) as well as changes in the blood dynamics and vasculature (such as telangiectasia). Such an objective structural and functional tissue assessment tool can also be used as a rapid noninvasive method to monitor specific oral pathologies and gauge the response of these pathologies to various treatments, with potential for therapeutic feedback and optimization.

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