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Improving Oral Oncology Optical Diagnosis: Site-Targeted Optical Coherence Tomography Approach

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Objectives Optical Coherence Tomography (OCT) is an imaging method used also in oral carcinogenesis investigations. However, very few research are available on OCT standardized procedures. This study aims to assess if a protocol combining *in vivo* OCT and a site-targeted punch biopsy technique can enhance optical diagnostic accuracy for Oral Squamous Cell Carcinoma (OSCC).
Methods Adult patients with clinically diagnosed OSCC were consecutively enrolled. OCT evaluations before and after site-targeted registration preceding the diagnostic biopsy were performed using standardized OCT diagnostic patterns for OSCC. Scans were evaluated by blinded observers for OCT-based supposed diagnoses. Statistical analysis determined the sensitivity, specificity, positive and negative predictive value of OCT-based diagnoses compared to histopathology.
Results From 7 enrolled patients, a total of 70 selected representative images of OSCC were obtained for each session (pre- and post-target OCT site evaluation). Site post-target OCT scans showed a statistically significant improvement in diagnostic accuracy for OSCC ($p < 0.001$) compared to site pre-target OCT scans. Post-target OCT scan sensitivity values were 98.57, and specificity values were 100.00, with strong inter-observer agreement (Cohen's kappa = 0.84). Positive predictive values for both operators were 100.00, and negative predictive values were 99.29.
Conclusions This pilot study advocates the improvement of diagnostic potential accuracy of *in vivo* OCT for OSCC, using specific OCT patterns and site-targeted procedures. The findings underscore the importance of developing standardized and reproducible protocols for OCT applications in early detection and accurate management of oral oncology.