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Current Munich status concerning in-vivo optical coherence tomography for differentiating lesions of the upper aerodigestive tract

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Objective

Non-invasive differentiation of pre- and early malignant mucosal changes may be helpful to reduce the morbidity and shorten the time to diagnosis for the patients concerned. Optical Coherence Tomography (OCT) seems to be well suited to reach this goal.

Methods

61 patients with a total of 82 primary leukoplakic or erythroplakic mucosal lesions of the upper aerodigestive tract (OADT) were prospectively examined using an in-vivo, time-domain OCT (Niris®, Imalux Corporation, USA; lateral resolution 25 μm / axial resolution 15 μm) so far. The results were subsequently correlated to histopathology of tissue biopsies taken from the same areas. Additionally, intensity profiles of OCT images were evaluated concerning their ability to differentiate dysplasia from hyperplasia.

Results

Down to a depth of 1.5 mm, microanatomical structures were clearly identifiable on the OCT images. Concerning the ability to differentiate non- and early invasive lesions, OCT reached a sensitivity of 100% and a specificity of 92% or 75% (investigator unblinded or blinded to visual inspection), respectively. False positive findings were mostly hyperplastic lesions with a significant broadening of the epithelial layer. Epithelial thicknesses measured on OCT images and histological slides correlated well (κ=0.63), but were no indicators of either epithelial hyperplasia or different grades of dysplasia. Yet, OCT intensity profiles showed a statistically significant difference between dysplastic and hyperplastic lesions in a subset of cases (n=44).

Conclusions

The method seems highly promising for early, non-invasive tumour diagnosis in the UADT. Technical advances and an increase in patient numbers will help to define its clinical value in the near future.

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