Oral presentation

Early experience with in-vivo optical coherence tomography for differentiating lesions of the upper aerodigestive tract

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Objective

In vivo detection of dysplastic or early invasive mucosal changes is expected to greatly reduce both morbidity and mortality of oral and pharyngeal cancer. Optical Coherence Tomography (OCT) seems to be well suited for this application.

Methods

In this ongoing study, 28 patients with a total of 34 primary, flat mucosal lesions of the upper aerodigestive tract (OADT) were prospectively examined using a time-domain, in vivo OCT (Niris®, Imalux Corporation, USA; lateral resolution 25 µm/axial resolution 15 µm) and the results were compared to the histopathological reports on subsequent tissue biopsies from the same areas. Additionally, an intraoral screening was performed on 52 healthy volunteers.

Results

On the OCT images, surface structures such as the keratin and epithelial layer, the epidermal/dermal junction and areas of cellular crowding were clearly identifiable and showed a good correlation to the histopathological slides down to a depth of approximately 1.5 mm. Of 34 lesions investigated so far, 2 out of 2 early malignant lesions as well as 29 out of 32 non-/premalignant lesions could be correctly differentiated using OCT. The screening resulted in a high degree of variability in the physiological thickness of intraoral epithelium (ø126 µm at the floor of mouth to ø487 µm at the lateral border of tongue).

Conclusion

From these results, the method seems to hold great promise for early in vivo tumour diagnosis and depth measurement in early invasion. Further efforts are currently being undertaken for an enhancement of image quality and contrast.