

Oral presentation

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Diagnosis of head & neck malignancy using fluorescence spectroscopy and imaging

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Upper aerodigestive tract (UADT) carcinomas continue to be the 5th most common cancer. Early diagnosis is often delayed as tumour precursors or early cancers are hardly visible and not picked up by common imaging methods. Fluorescence spectroscopy and imaging seems able to improve the detection and delimitation of these lesions.

Fluorescence diagnostic methods usually pick up a "mixed bag" of signals from endogenous fluorophores such as tryptophan, collagen, elastin, NADH and FAD. As some of these show a tumour specific distribution, this can be exploited to distinguish tissues *in vivo*. The fluorescence contrast is even slightly enhanced by using exogenously applied fluorescent markers or their precursors (e.g., 5-aminolevulinic acid induced Protoporphyrin IX). Even though the sensitivity to detect malignant lesions seems to be improved by combining fluorescence diagnostic methods with normal inspection according to the literature and to our own experience, the methods are rather unspecific as chronic inflammations cause results similar to neoplastic disease.

Recent advances include the possibility to extract true spectra of single fluorophores ("intrinsic spectra") by mathematically eliminating the undesired influences of scattering and absorption. As well, tumour-specific enzymes are about to be specifically targeted by fluorescent markers (so called "smart probes") in order to improve both sensitivity and specificity.

Due to the lack of specificity, fluorescence spectroscopy and imaging are so far mostly feasible for screening purposes. If combined with other optical techniques such as ESS or OCT, however, a comprehensive non-invasive tissue diagnosis seems possible.