

New approaches to the diagnosis of oral cancer

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NEW ORLEANS - Oral cancer is diagnosed in more than 30,000 individuals in the US annually, claiming 10,000 lives each year. Early detection remains the best way to ensure patient survival and quality of life. Today, during the 85th General Session of the International Association for Dental Research, scientists from the University of California- Irvine present two novel, non-invasive, ultra-fast imaging approaches to oral cancer detection, diagnostic screening, and mapping.

More than 2/3 of all oral cancer cases documented by the National Cancer Institute are diagnosed at an advanced stage. The five-year survival rate is 75% for those with localized disease at diagnosis, but only 16% for those with cancer metastasis. Earlier detection of oral lesions would greatly improve the prognosis of these patients. Accurate delineation of lesion margins would ensure effective removal of all the tissue that presents a threat to the patient's long-term health. Two basic facts indicate that early detection of oral malignancy should be possible to a far greater extent than is currently seen: (1) Accounting for 96% of all oral cancers, squamous cell carcinoma is often preceded by lesions on the oral mucosa. Malignant transformation, which is quite unpredictable, occurs in 1-90% of lesions over five years. Thus, oral cancer is often preceded by lesions which are visible to the naked eye prior to transformation. A non-invasive diagnostic modality would permit regular monitoring of these lesions, detection of lesion transformation, and the identification of treatment needs at a very early, relatively harmless stage. (2) High-risk populations are clearly defined: tobacco use, alcohol abuse, urban environment, specific ethnicities, poor diet, and frequent exposure to sunlight. A fast, mobile, relatively inexpensive and non-invasive diagnostic modality would permit the early detection and monitoring of oral lesions.

The researchers describe Three-dimensional Optical Coherence Tomography (3-D OCT) and Optical Doppler Tomography (ODT), which show surface and subsurface tissues at near-microscopic levels of resolution, with the potential for replacing conventional surgical biopsy and histopathology techniques. Combined with polarimetry, accurate delineation of lesion margins becomes possible. Scanning is painless and non-invasive, lasting less than one minute with a pen-sized hand-held probe. This device's resolution or diagnostic capability may dictate its primary use as an indicator of the need for biopsy. Later, this modality may progressively reduce the need for biopsy, define surgical margins, and permit the direct evaluation of cancer treatments. In combination with OCT-visible molecular probes, this modality will greatly advance cancer diagnostics.

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