

Potential Diagnostic Markers for Oral Cancer Identified In Tumor Tissue and Saliva

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C Mason

Oral squamous cell carcinoma (OSCC) is one of the most common cancers worldwide, but survival rates remain extremely poor and the current staging system has limited usefulness for predicting survival.

In an effort to identify a biomarker that could improve early detection and prognosis of OSCC, graduate student Marni Stott-Miller, Dr. Chu Chen and colleagues in the Public Health Sciences Division recently investigated whether tissue gene expression and salivary protein concentrations of specific matrix metalloproteinases (MMPs) could help identify cases of OSCC. MMPs are a protease group that causes degradation of the extracellular matrix and basement membranes and is thought to play a role in cancer initiation and progression.

Tissue and saliva samples were collected from three groups of patients during the same time period: previously untreated patients with primary OSCC, patients with precancerous lesions, and cancer-free controls scheduled for oral surgery such as a tonsillectomy. After identifying a subset of the MMP genes that were the most disparate between cases and controls, investigators compared tissue gene expression levels across the three groups of patients. Protein concentrations of MMP1 and MMP3, the most differentially expressed MMP genes, were then also measured in saliva.

Compared to tissue from control patients, *MMP1* expression was more than 200-fold higher in OSCC tumor tissue, and showed exceptionally strong ability to discriminate OSCC cases from controls. The expression of *MMP1* and *MMP3* also increased with higher stages of disease, suggesting that MMPs could be a useful molecular marker for monitoring progression from dysplasia to invasive OSCC. Likewise, salivary protein concentrations of MMP1 in OSCC patients were 6.2 times higher and MMP3 concentrations were 14.8 times higher than in controls, and also displayed an increasing trend with higher disease stage. Higher *MMP1* and *MMP3* gene expression levels were only modestly associated with greater risk of death.

The ability of MMP gene expression to clearly identify OSCC suggests that MMP genes may be important in the pathogenesis and progression of OSCC, with potential as a biomarker for disease

development. The ability to measure MMP proteins in saliva could be a particularly promising non-invasive means to assist in monitoring change from dysplasia to OSCC.

[Stott-Miller M, Houck JR, Lohavanichbutr P, Mendex E, Upton M, Futran ND, Schwartz SM, Chen C.](#)

2011. Tumor and salivary matrix metalloproteinase levels are strong diagnostic markers of oral squamous cell carcinoma. *Cancer Epidemiology, Biomarkers & Prevention*. Epub ahead of print, doi: 10.1158/1055-9965.EPI-11-0503.