

A protein, human beta-defensin-3 (hBD-3) has been the subject of research for its potential role as a biomarker for cancerous lesions of the oral cavity and its ability to serve as both a diagnostic and possibly therapeutic marker for head and neck cancers.

A Protein as Biomarker for Cancer

Potential as Tool to Predict, Monitor and Treat Oral, Head and Neck Cancers

A collaboration between **Chad Zender, MD, FACS**, *Otolaryngology, UH Case Medical Center; and Assistant Professor, Otolaryngology – Head and Neck Surgery, Case Western Reserve University School of Medicine* and **Aaron Weinberg, DMD, PhD**, *Associate Dean for Research; Professor and Chair, Department of Biological Sciences, Case Western Reserve University School of Dental Medicine, Professor of Pathology, Case Western Reserve University School of Medicine*, has focused on several unique qualities of hBD-3. They have found elevated levels of this protein in some oropharyngeal (tongue-based and tonsil) cancers and it may provide early identification of these frequently asymptomatic tumors. They are also exploring hBD-3 in relation to cancers caused by the human papilloma virus (HPV).

hBD-3 is unusual in that it is a secretory protein, measurable in both the saliva and the bloodstream. Drs. Zender and Weinberg are trying to correlate specific levels in patients who are cancer-free, those with cancer, and those who have been treated for cancer of the head and neck. They believe that hBD-3 may also help differentiate, and predict, premalignant tumors from malignant, as well as differentiate between benign vs. premalignant or malignant oral cavity lesions or growths.

Dr. Weinberg's lab has developed an assay to measure hBD-3 levels in saliva and serum. The goal of the research is to determine if that technique has **potential to identify high-risk lesions** in patients as well as differentiate them from lesions that

are unlikely to possess potential for malignancy. They hope, eventually, to use this technology to identify patients with oral cancer, correlate it with their response to therapy and help monitor them for recurrence.

It does appear that hBD-3 levels decrease *in vitro* when cell lines are treated with certain chemotherapeutic agents like cisplatin, cetuximab and others. They are currently trying to expand some of these experiments to animal models in which patient-derived xenografts are used to attempt to create a more *in vivo* model to look at how hBD-3 levels change in response to cancer treatments such as chemotherapy and radiation therapy.



Dr. Chad Zender