ABSTRACT

Oral cancer is a major health problem. The five-year survival rate for oral cancer has not improved significantly over the past 20 years and remains at about 50%. Patients diagnosed at an early stage of the disease typically have an 80% chance for cure and functional outcomes, yet most patients are identified when the cancer is advanced. Early detection of oral cancer will greatly improve patient morbidity and quality of life. The need for quantum advances in technology and methods for cancer screening and diagnostics is well recognized.

We propose an interdisciplinary, exploratory effort to develop non-invasive, inexpensive, mass-producible, molecular-signature-based, microfluidic devices for early detection of human oral cancers. These devices will accept saliva samples, will be operable by minimally trained personnel, and will provide an answer in an automated, timely fashion. The detection will take advantage of membrane-associated cell proteins that are singularly expressed on cancer cells' membranes and of the unique gene transcription profile of cancer cells. Similar methodology to the one described in this proposal (using appropriate samples such as blood, lung and breast aspirations, stool, urine, and lymph node fluids) will be applicable for the early detection of many other types of cancers such as colon, lung, stomach, and prostate as well as other diseases and conditions that alter the gene expression of cells. By facilitating non-invasive, early screening of cancer, the proposed project will profoundly improve the quality of life of cancer patients as well as reduce healthcare costs.