Predicting a Cancerous Outcome: Creating a Novel Test for Assessing Risk of Human Papilloma Virus-Associated Oropharyngeal Cancer

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A non-invasive risk-analysis tool was developed for assessing HPV-associated oropharyngeal cancer using oral-rinse samples. The idea for this tool came from work that showed evidence of abnormal numbers of chromosomes (aneuploidy) in HPV-related bladder-cancer cells. Studies indicated fluorescent in-situ hybridization (FISH) was the best tool to effectively visualize chromosomes within cells, and detect aneuploidy. This method was re-engineered for use with oropharyngeal cells by creating an oral cell rinse protocol and choosing to analyze specific chromosomes (3, 7, 8, and 20), based on work by King et al. (unpublished). Additionally, a BioView Duet Microscope was altered for effective oral cell visualization, and an online cell classification tool, TeleGene™, was reformatted for oral cell categorization. This protocol was used to establish a baseline for aneuploidy in 59 oral-rinse samples from healthy patients, which was compared to aneuploidy in 10 oral-rinse samples from HPV-positive patients. There was no significant difference in the number of aneuploid cells among chromosomes in healthy patients both when blocked and not blocked by gender ($p > 0.05$). However, there was a significant difference in aneuploidy between HPV-positive and HPV-negative samples ($p < 0.05$), suggesting that the created test is effective in analyzing for potential risk for oropharyngeal cancer in individuals with HPV. As a result of our work, our research site has patented and sold the process outlined in this paper for mass clinical application.

Awards Won:
Intel ISEF Best of Category Award of $5,000
First Award of $5,000
Intel Foundation Cultural and Scientific Visit to China Award
Sigma Xi, The Scientific Research Honor Society: Second Award of $1,500