

QuitPuff: A Point-of-Care Diagnostic for Early Risk Detection of Oral Pre-Cancer and Cancer in Chronic Smokers

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Smoking, the leading cause of oral cancer in India, kills over 5 people every hour. As high mortality is due to late diagnosis, early detection is vital. Free radical induced lipid peroxidation (LP) is known to promote multistep oral carcinogenesis. Free radicals generated by smoking, damage polyunsaturated fatty acids releasing end-product Malondialdehyde (MDA). A simple, home-based test was devised to determine salivary Malondialdehyde to assess early risk of oral pre-cancer and cancer. It was hypothesized that heavier smokers would exhibit greater degree of salivary LP. A highly sensitive QuitPuff reagent was formulated which when heated with saliva, produces a colour change, directly proportional to the amount of MDA. The MDA level was measured by matching the color change with a colorimetric Lipid Peroxidation Index (LPI) chart. QuitPuff was tested on 500 subjects and validated using UV Spectroscopy, the gold standard for the test. The mean LPI was consistently and significantly elevated ($P < 0.001$) in smokers with oral pre-cancer and cancer (4.34), smokers who smoked more than 20 (4.12), between 10-20 (3.43) and less than 10 cigarettes per day (2.43) as compared to non-smokers (0.26). The mean LPI's of the test and validation methods correlated. Spearman's correlation indicated significant positive association between color changes and UV spectroscopy readings ($r = 0.93$). QuitPuff detected the salivary MDA levels with 96% accuracy. Smokers exhibited greater degree of salivary LP as compared to non-smokers, the heavier the smoker, greater was the degree of LP. QuitPuff has great potential as a point-of-care test for oral pre-cancer and cancer.

Awards Won:

Third Award of \$1,000

National Institute on Drug Abuse, National Institutes of Health & the Friends of NIDA: Honorable Mention