



Details of the Collaborative Activity

2020-2021

Name of the Collaborating Institute: Post Graduate Institute of Medical Education and Research Chandigarh, India

Name of the Collaborating Department: Yenepoya Research Center

Activities:

Joint Research:

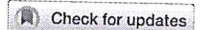
- Dr. T Keshav Prasad from Center for Systems Biology and Molecular Medicine, Yenepoya Research Center collaborated with Dr. Arnab Paul, Post Graduate Institute of Medical Education and Research, Chandigarh for joint research in the area of identifying biomarkers by cancer proteomic profiling during pathogenesis.

Joint Publication:

- Jain A, Kotimoole CN, Ghoshal S, Bakshi J, Chatterjee A, Prasad TSK, Pal A. Identification of a potential salivary biomarker panel for Oral Squamous Cell Carcinoma. *Scientific Reports*. (2021) 11:3365

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Identification of potential salivary biomarker panels for oral squamous cell carcinoma

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Oral squamous cell carcinoma (OSCC) is one of the most prevalent cancers worldwide with the maximum number of incidences and deaths reported from India. One of the major causes of poor survival rate associated with OSCC has been attributed to late presentation due to non-availability of a biomarker. Identification of early diagnostic biomarker will help in reducing the disease morbidity and mortality. We validated 12 salivary proteins using targeted proteomics, identified initially by relative quantification of salivary proteins on LC-MS, in OSCC patients and controls. Salivary AHSB (p = 0.0041**) and KRT6C (p = 0.002**) were upregulated in OSCC cases and AZGP1 (p ≤ 0.0001***), KLK1 (p = 0.006**) and BPIFB2 (p = 0.0061**) were downregulated. Regression modelling resulted in a significant risk prediction model (p < 0.0001***) consisting of AZGP1, AHSB and KRT6C for which ROC curve had AUC, sensitivity and specificity of 82.4%, 78% and 73.5% respectively for all OSCC cases and 87.9%, 87.5% and 73.5% respectively for late stage (T3/T4) OSCC. AZGP1, AHSB, KRT6C and BPIFB2 together resulted in ROC curve (p < 0.0001***) with AUC, sensitivity and specificity of 94%, 100% and 77.6% respectively for N0 cases while KRT6C and AZGP1 for N+ cases with ROC curve (p < 0.0001***) having AUC sensitivity and specificity of 76.8%, 73% and 69.4%. Our data aids in the identification of biomarker panels for the diagnosis of OSCC cases with a differential diagnosis between early and late-stage cases.

Oral cancer, with around 90% cases consisting of squamous cell type, is amongst the top ten prevalent (~0.6 million) cancers in males around the world^{1,2} with approximately 26% cases being reported from India alone. In India, it is one of the most prevalent (~0.2 million) cancer in males^{1,2}. India has an incidence rate of around 0.1 million per year with around 70% mortality rate. Even with the advancement in treatment strategies in the last 2 decades, the survival rate of OSCC is still very poor which is often associated with the late presentation of the disease. Non-availability of a suitable tumour marker could be one of the major attributions towards this. Histopathological evaluation of tumour tissue biopsy along with radiological investigations are currently available diagnostic modality for oral cancer, which is an invasive procedure and advised once visible symptoms start to appear. The multistep, prolonged and invasive procedures of current confirmatory methods render it unsuitable as a screening tool. In this context, a non-invasive biomarker will be extremely useful for screening and early detection of the disease³.

One promising approach to identify the potential biomarkers is to analyse the cancer-related biomolecules in bodily fluids. Saliva, being the potential biofluid for surveillance of general health and diagnosis of disease and in the proximity of the oral cavity, makes a perfect biological fluid for identification of biomarker(s) for oral cancers^{4,5}. In addition, the non-invasive procedure for collection of saliva makes salivary biomarkers ideal as a screening tool for oral squamous cell carcinoma (OSCC).

In this study, we identified potential biomarker panels of salivary proteins identified by estimating the levels of candidate salivary proteins using a targeted proteomics approach. We validated 12 candidate proteins (which were identified through Tandem Mass Tag (TMT) based relative quantification of the salivary proteome of

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