Rajagopalan et al. (2017) Can J Biotech, Volume 1, Special Issue, Page 70
https://doi.org/10.24870/cjb.2017-a57

Canadian Journal of Biotechnology

ISSN 2560-8304

Poster Presentation **OPEN ACCESS**

Category: Cancer Genomics

Molecular alterations associated with chronic exposure to cigarette smoke and chewing tobacco in normal oral keratinocytes

Pavithra Rajagopalan[1,2], Ankit P. Jain[1,2], Krishna Patel[1,3], Vishalakshi Nanjappa[1], Kiran K. Mangalparthi[1,3], Anjali Kumari[4], Malini Manoharan[4], Coral Karunakaran[4], Saktivel Murugan[4], Bipin Nair[3], T.S. Keshava Prasad[1,5,6], Premendu P. Mathur[2], Ravi Gupta[4], Rohit Gupta[4], Arati Khanna-Gupta[4], David Sidransky[7], Harsha Gowda[1*] and Aditi Chatterjee[1*]

[1]Institute of Bioinformatics, International Tech Park, Bangalore, INDIA

[2]School of Biotechnology, KIIT University, Bhubaneswar, INDIA

[3]Amrita School of Biotechnology, Amrita University, Kollam, INDIA

[4]Medgenome Labs Pvt. Ltd., Bangalore, INDIA

[5]NIMHANS-IOB Bioinformatics and Proteomics Laboratory, Neurobiology Research Centre, National Institute of Mental Health and Neurosciences, Bangalore, INDIA

[6]YU-IOB Center for Systems Biology and Molecular Medicine, Yenepoya University, Mangalore, INDIA

[7]Department of Otolaryngology-Head and Neck Surgery, Johns Hopkins University School of Medicine, Baltimore, MD, USA

*Corresponding author: aditi@ibioinformatics.org

Abstract

Tobacco usage is a known risk factor associated with development of oral cancer. It is mainly consumed in two different forms (smoking and chewing) that vary in their composition and methods of intake. Despite being the leading cause of oral cancer, molecular alterations induced by tobacco are poorly understood. To investigate the adverse effects of cigarette smoke/chewing tobacco exposure in oral keratinocytes, we developed two cellular models where normal oral keratinocytes were chronically exposed to cigarette smoke and chewing tobacco for a period of 8 months. Cellular assays reveal that OKF6/TERT1 cells acquire an oncogenic phenotype after chronic exposure to cigarette smoke/chewing tobacco. We employed both whole exome sequencing (WES) and quantitative proteomics approaches to investigate the molecular alterations in oral keratinocytes (OKF6/TERT1) chronically exposed to smoke and chewing tobacco. Exome sequencing revealed a much higher rate of C>A transversions in smoke exposed cells in conjunction with previous studies. In contrast, C>G transversions were observed to be higher in chewing tobacco exposed cells. Diverse mutations in both treated cells further highlight the distinct effects of each exposure. Distinct proteomic alterations were observed in smoke and chewing tobacco exposed cells compared to parental cells. In addition, we observe enrichment of different signaling cascades in transformed oral cells upon chronic exposure to either cigarette smoke or chewing tobacco. Current analysis defines a clear distinction in the molecular dysregulation in oral cells in response to different tobacco-based insults. Future studies are needed to validate some of the genetic and proteomic alterations unique to each form of tobacco exposure. This study can serve as a reference for fundamental damage on oral cells as a consequence of exposure to different forms of tobacco.

Citation: Rajagopalan, P., Jain, A.P., Patel, K., Nanjappa, V., Mangalparthi, K.K., Kumari, A., Manoharan, M., Karunakaran, C., Murugan, S., Nair, B., Prasad, T.S.K., Mathur, P.P., Gupta, R., Gupta, R., Khanna-Gupta, A., Sidransky, D., Gowda, H. and Chatterjee, A. Molecular alterations associated with chronic exposure to cigarette smoke and chewing tobacco in normal oral keratinocytes [Abstract]. In: Abstracts of the NGBT conference; Oct 02-04, 2017; Bhubaneswar, Odisha, India: Can J biotech, Volume 1, Special Issue, Page 70.
https://doi.org/10.24870/cjb.2017-a57