

Title: Identification of key signaling pathways and novel computational drug target for oral cancer, metabolic disorders and periodontal disease

Author: Mohammad Khursheed Alam, Md. Faruk Hosen, Kiran Kumar Ganji, Kawsar Ahmed, Francis M. Bui

Abstract: Due to conventional endocrinological methods, there is presently no shared work available, and no therapeutic options have been demonstrated in oral cancer (OC) and periodontal disease (PD), type 2 diabetes (T2D), and obese patients. The aim of this study is to determine the similar molecular pathways and potential therapeutic targets in PD, OC, T2D, and obesity that may be used to anticipate the progression of the disease. Four Gene Expression Omnibus (GEO) microarray datasets (GSE29221, GSE15773, GSE16134, and GSE13601) are used for finding differentially expressed genes (DEGs) for T2D, obese, and PD patients with OC in order to explore comparable pathways and therapeutic medications. Gene ontology (GO) and pathway analysis were used to investigate the functional annotations of the genes. The hub genes were then identified using protein-protein interaction (PPI) networks, and the most significant PPI components were evaluated using a clustering approach. These three gene expression-based datasets yielded a total of seven common DEGs. According to the GO annotation, the majority of the DEGs were connected with the microtubule cytoskeleton structure involved in mitosis. The KEGG pathways revealed that the concordant DEGs are connected to the cell cycle and progesterone-mediated oocyte maturation. Based on topological analysis of the PPI network, major hub genes (CCNB1, BUB1, TTK, PLAT, and AHNK) and notable modules were revealed. This work additionally identified the connection of TF genes and miRNAs with common DEGs, as well as TF activity. Predictive drug analysis yielded concordant drug compounds involved with T2D, OC, PD, and obesity disorder, which might be beneficial for examining the diagnosis, treatment, and prognosis of metabolic disorders and Oral cancer.

Keywords: Oral cancer, Periodontal disease, Metabolic Disorder, Biomarker Identification, Molecular pathway, Drug compound, Signaling pathway

DOI: <https://doi.org/10.1016/j.jgeb.2024.100431>

<https://www.sciencedirect.com/science/article/pii/S1687157X24001343>