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Journal of Proteomics & Bioinformatics

Commentary

Proteomics Approach towards Periodontal Disease Diagnosis

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DESCRIPTION

Periodontal tissue is composed of multi compartmental groups of interacting cells and matrix that provide continuous support, attachment, proprioception and protection to the teeth. The tissue and cellular complexity of periodontal tissue includes submission of a more global experimental approach for determining expression profiles. The complex interactions of cells and matrix within the compartment constitute molecular understanding of periodontal tissue. Visual inspection, tactile inspection, periodontal pocket depth, clinical attachment level, and various periodontal indices are the cornerstones of periodontal diagnosis in routine clinical practice. Periodontitis indices classifies each person as having either mild, moderate or advanced periodontitis, or with no periodontitis, based on the number (or percentages) of teeth showing certain thresholds of probing depth and attachment loss. Proteomic analysis of bone and tooth structures (enamel, periodontal ligament, cementum) and oral fluid diagnostics (saliva and GCF) are the main areas where dental proteomics has shown promising and breakthrough results. To develop screening and diagnostic modalities for early detection of periodontal disease are the basic need right now for better treatment of this diseases. To achieve this, understanding the importance of the underlying science and molecular basis of periodontal complexity is important. The greatest challenge faced by periodontology researchers is to start using proteomic approaches where appropriate and applying those to important and unsolved problems of tooth. Developments over time have brought biomarkers, proteomics, genomics, and metabolomics to the front for diagnosing periodontal disease and the patient's body response to the treatment. Proteins are an important part of the metabolic pathways of living cells, and their entire set, including modifications produced by an organism or system is considered as proteome. Proteomics is defined as the study of all proteins present in a particular cell or organism, in a particular environment, and at a particular stage of the cell cycle. A deeper knowledge of the cellular and matrix protein components of periodontal tissue therefore it provides an excellent starting point for future advances. Diagnosis of the dynamic stage of disease, identification of patients at risk for periodontitis is the main motive of this. Focus on early identification of microbial host inside the tooth is the major thing which is needed for clinical investigation. Therefore, knowledge of periodontal disease indicators is essential to ultimately improve the clinical management of patients with periodontal disease. In recent years, proteins have established themselves as biomarkers which can show confirmed periodontal disease. Studies of the proteome, its composition, protein-protein interactions, systemic elucidation of proteins, interactions with the extracellular matrix, and post-translational modifications are at the all major parts of oral diagnostics. Sections of periodontal tissue prepared for analysis cultured periodontal cells, and matrix fractionation followed by protein isolation are the first steps in proteomics research towards Periodontis. Periodontal proteomic markers range from salivary protein markers such as immunoglobulin G to bone remodelling protein markers. A specific marker is an immunoglobulin that characterizes the presence of chronic or progressive periodontitis.

Non-specific biomarkers include enzymes, proteins, mucins, histatin, lactoferrin, and lysosome peroxidase. Also blood, GCF, serum, serum products, electrolytes, microorganisms, epithelial and immune cells, bacterial degradation products, lipopolysaccharides and periodontal fibroblasts can be used for proteome analysis. Periodontitis-specific biomarkers and changes in their composition may aid in better oral diagnosis and periodontal microbiology is the first step necessary for the discovery of periodontal protein markers for periodontitis. Similar to immunoglobulin subclasses, immunoglobulin isotypes, and antibody levels, the immune components of saliva have also been extensively studied for oral health. Several researchers have focused on single-nucleotide polymorphisms in the study of periodontal disease. There is a genetic susceptibility test for severe chronic periodontitis. Extensive research has been conducted to clarify the role of oral fluid and saliva in oral diagnostics. Periodontitis is caused by a number of inflammatory diseases characterized by periodontal pocket formation that, if left untreated it can lead to tooth loss. The establishment of a robust database of periodontal proteomic expression profiles would be highly desirable for both understanding the therapeutic strategies for periodontitis. Proteomics can provide comprehensive and systematic information about proteins in periodontal tissues. Recent

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Received: 04-Nov-2022, Manuscript No. JPB-22-20360; **Editor assigned:** 07-Nov-2022, PreQC No. JPB-22-20360 (PQ); **Reviewed:** 21-Nov-2022, QC No. JPB-22-20360; **Revised:** 28-Nov-2022, Manuscript No. JPB-22-20360 (R); **Published:** 05-Dec-2022, DOI:10.35248/0974-276X.22.15.617

Citation: Saksena S (2022) Proteomics Approach towards Periodontal Disease Diagnosis. J Proteom Bioinform.15:617

advances have led to the development of more powerful diagnostic tools for physicians to optimize treatment predictability of tooth diseases. Proteomics provides an excellent starting point for future advances in the diagnostic field. Periodontal proteomics are now currently using proteomic techniques, proteomic biomarkers specific to periodontal structures, and applications of proteomics in oral health and disease. The first focus was on early detection of microbial host, disease dynamics diagnosis, patient identification who are at risk for periodontitis are important for the clinical investigation. Protein biomarkers are studied to get the optimal, best possible, novel, non-invasive approach towards this disease. Therefore, knowledge of periodontal disease is an indicator essential for ultimately improving the clinical management of periodontal disease patient.