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ROLE OF A MICROBIOLOGIST IN PERIODONTAL DIAGNOSIS

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ABSTRACT

Microbiologists play a crucial role in periodontal diagnosis by identifying, quantifying, and assessing the susceptibility of specific subgingival pathogens, such as the "Red Complex" bacteria (*P. gingivalis*, *T. forsythia*, *T. denticola*). They enable personalized treatment by analyzing samples for specific pathogens in cases of refractory, aggressive, or non-responsive periodontal disease. Core Functions in Periodontal Diagnosis are: 1) Sample Management: Proper collection, transport, and analysis of anaerobic, fastidious bacteria within the subgingival biofilm, 2) Pathogen Identification: Using techniques like culture, PCR, and DNA-DNA hybridization to detect periodontal pathogens in subgingival plaque samples, 3) Risk Assessment: Identifying patients with high-risk microbiota profiles before clinical sign such as pocket deepening, fully manifest, 4) Antibiotic Susceptibility Testing: Determining the most effective antimicrobial therapy, particularly for aggressive or refractory periodontitis and 5) Treatment Monitoring: Evaluating the efficacy of periodontal therapy (SRP - Scaling and Root Planing) by assessing the reduction or eradication of pathogens.

INTRODUCTION

A microbiologist is a scientist who studies microscopic organisms such as bacteria, viruses, fungi, algae, and parasites to understand how they live, grow and affect their environment. They are involved in researching microbes, laboratory analysis and medical and environmental impact.[1]

Periodontal diseases are a group of multifactorial diseases affecting the periodontium (viz a viz gingiva, periodontal ligament, cementum and alveolar bone) primarily caused by a plethora of periodontal pathogens which may include anaerobes & fusospirochetes like Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans, Tannerella forsythia and Treponema denticola etc. So, a microbiologist plays a vital role in the identification and treatment plan of the periodontal disease & their causative agents.[2]

Sample Collection & Identification

It is a challenge to collect a microbiologic sample for diagnosing periodontal infections because an anaerobic sample is to be collected for laboratory testing. A microbiologist has to collect the sample from microbial biofilm or gingival crevicular fluid from the periodontal pocket or saliva. This sample collection has to be done under strict anaerobic conditions from the deepest part of periodontal pocket which involves immediate transfer of the sample in reduced transport fluid (RIF) to prevent oxygen exposure. Identification of the micro-organism involve culturing in anaerobic chambers (e.g. Mc Intosh and Fildes'Jar). The process is technique sensitive, needs expertise, expensive and requirestrained personnel.[2]

Disease Activity Assessment

Disease activity has been determined using traditional methods and advanced molecular methods evaluating GCF contents, tissue changes, circulating factors and sulcular microbiota. These are non invasive in nature and have the ability to determine disease activity through

identification of substances or changes in the systemic circulation which prove to be useful to the clinician. Examination of sulcular microbiota provides evidence that suggest that active periodontal disease is associated with specific group of pathogens with elevated counts of motile organism. A microbiologist plays a crucial role in determination of disease activity by identification and culturing of periodontal pathogens whether the disease is in active state or quiescent state.[4]

Antibiotic Susceptibility Testing (AST)

AST is a laboratory procedure used to determine which antibiotic or antifungal drug will most effectively stop the growth of bacterial or fungal infection. It identifies the pathogen's resistance or susceptibility, helping clinicians to select the best treatment for patients. AST in periodontics is used for identification of specific periodontal pathogens in areas of severe, refractory or rapidly progressing periodontitis. It is used to guide personalized targeted antibiotics therapy. Many methods have been advocated which includes CLSI (Clinical and Laboratory Standards Institute, Pennsylvania US) approved Kirby Bauer disc diffusion method, MIC (MinimumInhibitory Concentration) and molecular methods (PCR and DNA probe techniques). This targeted approach helps clinicians particularly in difficult cases, choose antibiotics that effectively inhibit specific pathogens often measured by 90% or greater pathogen inhibition (MIC90).[5]

Monitoring treatment Efficacy

Monitoring treatmentefficacy in periodontics is the key to assess the stabilization of periodontal tissues, evaluate healing response to active therapy (such as scaling and root planning or surgery) and detect early signs of disease recurrence. A microbiologist analyzes plaque samples to determine the effectiveness of therapy by pre and post therapy evaluation. He / she also assess the risk of disease progression by analyzing the various dental samples like dental plaque (biofilms and gingival crevicular fluid or saliva).[6]

CONCLUSION

A microbiologist and a periodontist work in unison to identify, diagnose and treat the periodontal diseases.

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