

A Paradigm Shift in Understanding the Microbiome-Host Interactions in Oral Health and Disease

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Abstract. The intricate relationship between the oral microbiome and systemic health has garnered increasing attention, yet established concepts remain under scrutiny. This study embarks on a critical re-evaluation of conventional paradigms, employing advanced metagenomic sequencing and bioinformatics to elucidate the dynamic interactions within the oral cavity. Through a systematic analysis involving diverse cohorts, our findings reveal significant correlations between dysbiosis and prevalent oral diseases, challenging the traditional views of microbial roles in health. We advocate for a paradigm shift towards a more integrated understanding of oral health, emphasizing the necessity for interdisciplinary approaches that encapsulate microbiological, immunological, and clinical perspectives. The implications of these findings extend beyond oral health, suggesting potential systemic impacts that warrant further investigation.

Keywords: microbiome, oral health, dysbiosis, systemic disease, oral diseases, interdisciplinary approaches, preventive strategies, clinical implications

Introduction

Oral health is a critical component of overall health, yet it remains a neglected area in public health initiatives globally. The World Health Organization has emphasized the significance of oral diseases, which affect a vast majority of the population and contribute

to increased morbidity and healthcare costs. Dentists and oral health professionals are often confronted with patients suffering from conditions such as periodontitis, caries, and oral cancer, yet the underlying biological mechanisms remain partially understood. Recent advancements in microbiome research have shed light on the complex interplay between the oral microbiome and systemic diseases, sparking a renewed interest in the microbial ecology of the oral cavity. In recent years, the traditional view of the oral microbiome as merely a collection of pathogens has been challenged. Instead, contemporary studies suggest that the microbiome plays a pivotal role in maintaining oral health and that dysbiosis, or microbial imbalance, serves as a precursor to various oral and systemic diseases. Despite these revelations, clinical practices often remain rooted in outdated paradigms, hindering the advancement of effective preventive and therapeutic strategies. The aim of this paper is to critically re-evaluate the established concepts surrounding oral health and the microbiome. We will explore how emerging research can reshape our understanding of microbial roles, emphasizing the necessity of interdisciplinary approaches. The article is structured to first provide an overview of the evolving definitions of oral health, followed by a discussion of current methodologies used to assess microbial dynamics. Subsequently, we will highlight key findings from recent studies, linking microbial dysbiosis to common oral diseases while proposing a new framework for understanding these interactions. Finally, we will conclude with recommendations for future research directions and clinical implications.

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References

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