A Critical Re-Evaluation of Paradigms in Caries Management: Integrating Microbial Ecological Perspectives into Clinical Practice

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Abstract. In recent years, the approach to dental caries management has undergone significant scrutiny, emphasizing the need for a paradigm shift towards a microbial ecological model. This study examines the traditional restorative paradigm and argues for an integrative approach that considers the microbial dynamics influencing caries progression and reversal. Utilizing a systematic review of contemporary literature coupled with clinical case studies, we propose a framework that centers on the role of biofilm management and the modulation of oral microbiota as pivotal components in caries therapy. Our findings suggest that adopting this model not only enhances patient outcomes but also aligns dental practices with contemporary scientific understanding. The implications for clinical guidelines and educational practices are profound, heralding a transformative era in caries management.

Keywords: dental caries, microbial ecology, biofilm management, oral health, preventive dentistry, caries management, clinical practice, restorative dentistry

Introduction

Dental caries remains one of the most prevalent chronic diseases worldwide, affecting individuals across all age groups and socioeconomic backgrounds. Despite substantial advancements in restorative materials and techniques, the incidence of caries continues to

rise, prompting a critical evaluation of established management paradigms. Traditionally, dental caries has been viewed predominantly through a mechanical lens, emphasizing restorative interventions that address the lesions after they occur. However, this approach has failed to account for the complex interplay of microbial ecology that fundamentally drives caries development. Recent research highlights the importance of understanding the oral microbiome's role in caries pathogenesis and the potential for biofilm management to influence the cariogenic process. Given the rising antibiotic resistance and the increasing public health burden associated with untreated caries, there is an urgent need to reframe our strategies towards prevention and treatment. This paper explores the implications of integrating microbial ecological perspectives into routine dental practice, providing a comprehensive overview of innovative methodologies and clinical applications. We will systematically dissect the existing literature to elucidate the transformative potential inherent in this paradigm shift. Furthermore, we will discuss case studies that illustrate the practical integration of these concepts in clinical settings, underscoring the necessity for dental professionals to evolve their understanding and practices in response to new scientific discoveries. By aligning clinical practices with contemporary research findings, we aim to propose a robust framework for caries management that prioritizes the modulation of the oral microbiome. This framework not only aligns with the current scientific consensus but also fosters a more sustainable approach to oral health care. We will conclude with recommendations for clinicians and implications for future research avenues aimed at refining caries management protocols.

References

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