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Special Edition
"Oral Infections and Microbiology"

Editorial

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Special Edition on Oral Infections and Microbiology

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The oral flora is composed of a wide array of organisms, with members belonging to all three domains of life: Bacteria, Archaea, and Eucarya.[1] Bacteria are the predominant organisms in the oral cavity, numbering over 6 billion, and comprising over 700 species, half of which are non-cultivable.[2,3] The surfaces of the oral mucosa (floor of the mouth, hard palate, buccal and vestibular mucosa, periodontium, and tongue) are continuously exposed to this multitude of microorganisms.[4] In most cases, a constant turnover of oral epithelium prevents the accrual of large masses of bacterial deposits and debris on these surfaces.

Changes in local environmental conditions, such as when host defenses are compromised, may favor the establishment and proliferation of opportunistic pathogens. Such opportunistic pathogens may be commensal organisms regularly found in the oral cavity of healthy individuals. For example, yeasts are opportunistic fungi which are frequently isolated from a variety of locales in the oral cavity, and carriage is often asymptomatic. Indeed, yeast colonization in the oral cavity has been reported from over a third of healthy adults.[5] Perturbations in host immune status, as well as other factors (e.g. antibiotic therapy, xerostomia, denture wearing) may favor oral colonization by yeasts, and increase susceptibility to local oral mucosal infections such as pseudomembranous candidiasis and denture stomatitis.[6]

The tooth surface, however, is incapable of shedding and renewal, and this allows an extensive build-up of microorganisms.[7] These deposits of microorganisms on tooth surfaces have been termed "plaque", and its etiological role in periodontal diseases and dental caries (a chronic endogenous infection) has been well established.[8,9] Plaque is a complex and dynamic ecosystem, and not just a haphazard aggregation of bacterial deposits.[10,11] Structurally, plaque exists as a biofilm, which is defined as "matrix-enclosed bacterial populations adherent to each other and/or to surfaces or interfaces".[12] A biofilm lifestyle may have a number of biochemical and clinical implications for the bacteria within the community. For example, bacteria within the biofilm may exhibit unique phenotypes not exhibited in the planktonic counterpart, due to shifts in gene expression and other pathobiological changes. Bacteria may also communicate with each other through quorum sensing mechanisms.[13] Benefits that bacteria may receive from being integrated into a microbial community include a broader habitat range and a more efficient metabolism. In addition, a biofilm lifestyle may offer increased resistance to antimicrobial agents.[14]

While oral microbes are primary etiological agents in dental caries, periodontal diseases, as well as local mucosal infections, it is important to acknowledge the potential of the oral cavity as a portal of entry for systemic infection. The location of subgingival microbial biofilms puts them in close proximity to the dentogingival junction, and disruption (e.g. due to trauma from tooth brushing or operative dental procedures such as scaling and tooth extractions) of the integrity of this barrier permits access for microbes to the underlying periodontal vasculature, and systemic circulation.[15] Indeed, the potential for seeding of oral bacteria such as *viridans* Streptococci on pre-existing heart lesions and prosthetic heart valves, and the development of bacterial endocarditis is a widely acknowledged concern,[6] and has spurred the development and continual re-modification of guidelines for pre-operative antibiotic prophylaxis.[16-18]

End organ infections with oral bacteria may also involve the central nervous system[19,20]

and skeletal system.[21-23] Fungal sepsis associated with preceding oral colonization has also been reported in medically compromised patient groups.[24-26] Furthermore, aspiration of oral respiratory pathogens such as aerobic and facultative anaerobic Gram-negative bacilli, *Staphylococcus aureus*, and *Streptococcus pneumoniae*, has been demonstrated to be a prime etiological cause of pneumonia in frail elderly and hospitalized patients.[27-30] This has, in turn, stimulated an increased interest in the development of protocols to improve oral hygiene and reduce the incidence of pneumonia in vulnerable patients.[31-33]

The goal of this special edition is to provide a comprehensive collection of research articles documenting new findings in relation to oral microbiology, and its relevance for local to systemic infections. It is also hoped that this collection will be of great translational value, and be of benefit to dental practitioners and other healthcare professionals with regards to the clinical care of patients.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

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