

PROTECTING THE NATURAL ORAL MICROBIOME - A PARADIGM SHIFT

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THE ORAL MICROBIOME IN HEALTH

The mouth is colonised naturally by a diverse microbiota: a dynamic community of commensal microorganisms that have co-evolved with us, growing together with a few potentially harmful bacteria on oral surfaces as biofilms.^{1,2} In recent years, new technologies have provided further insights into both the diversity of the resident microbiota and the benefits provided by the oral microbiome.²

The relationship between the microbiota and its host is dynamic and, whilst in the healthy mouth the composition of the microbial communities is remarkably stable, biological changes such as eruption of teeth, flow of saliva, diet, smoking, hygiene and lifestyle factors can all affect the balance of the species within these communities.¹

As our understanding increases, it is becoming clear that a balanced microbiome has many beneficial functions for us and can help to protect against disease.^{1,5,6}

THE ORAL MICROBIOME IN DISEASE - DYSBIOSIS

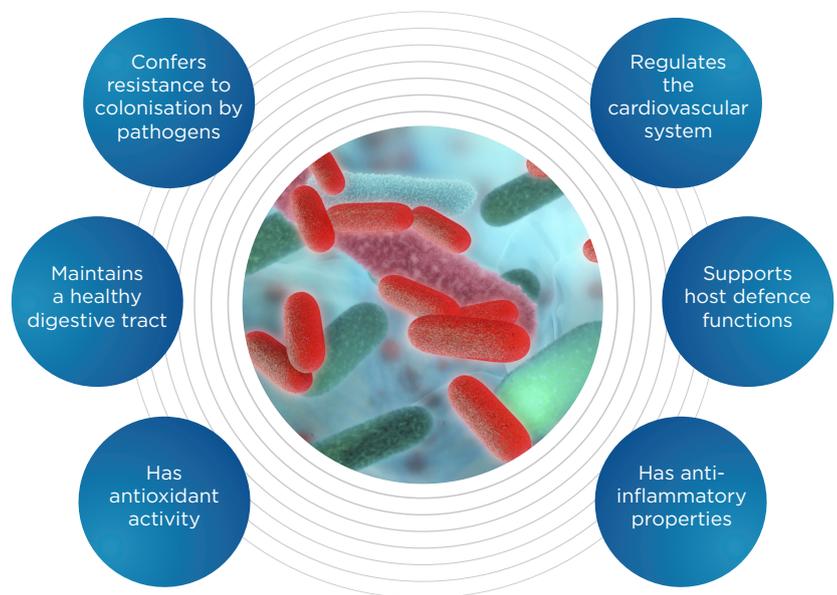
Many bacteria associated with disease can be found on occasions in low numbers at healthy sites.¹

Changes in lifestyle or diet can shift the balance between beneficial symbionts and harmful microorganisms, resulting in alterations in the composition and metabolism of the oral microbiota, leading to dysbiosis and the development of pathogenic states such as caries and periodontal disease.^{1,7}

Oral microbiota describes the community of microbes that live in the mouth.³

Oral microbiome refers to the genetic make-up of the whole of the microbiota, as well as the products of the microbiota and the host environment.^{3,4}

BENEFICIAL FUNCTIONS OF A BALANCED ORAL MICROBIOME



INFLAMMATION AND DYSBIOSIS IN PERIODONTAL DISEASE

In periodontal disease, inflammation resulting from plaque accumulation causes an increased flow of the nutrient-rich gingival crevicular fluid, and the site to become more anaerobic. These changes favour the growth of anaerobic and protein-dependant bacteria that reside in the gingival crevice, driving a shift from a symbiotic microbiome to dysbiosis.¹ The dysbiotic microbiota induces the destruction of the periodontal tissue, which in turn provides new tissue breakdown-derived nutrients for the bacteria.⁹ This dysbiotic microbial community subverts the host response so that most tissue damage is attributable to an inappropriate and uncontrolled level of inflammation. Dysbiotic bacterial communities have evolved to take advantage of this source of nutrients, which promotes further dysbiosis and tissue disruption, creating a self-perpetuating pathogenic cycle.⁹

Dysbiosis is the breakdown of the symbiotic relationship between the host organism and its resident microbiota.⁸

Because of the many health benefits provided by the oral microbiota, it is important to protect its synergistic relationship with the host and to nurture its beneficial members by maintaining their relative proportions in the mouth.¹

THE ROLE OF SALIVA IN KEEPING A BALANCED MICROBIOME

Saliva is an important source of growth substrates for bacteria and plays a vital role in maintaining a benign commensal microbiota in the mouth.¹⁰

Proteins such as lysozyme, lactoperoxidase, lactoferrin and other antibacterial components in saliva help to keep the oral microbiota balanced by protecting against overgrowth by pathogenic species.¹⁰

A PARADIGM SHIFT IN MANAGING ORAL DISEASE: PRACTICAL IMPLICATIONS FOR THE DENTIST

Our improved insight into the beneficial role and complex composition of the oral microbiome has increased our focus on holistic approaches to address the dysbiosis that drives oral disease.

- The traditional oral healthcare approach includes adding exogenous bactericidal agents to products, aiming to kill the resident microbiota and reduce plaque. Based on recent research, the next evolution in plaque management aims to use antimicrobial agents to stabilise the natural and beneficial oral microbiome, as part of preventative care¹
- Other strategies to protect the ecosystem in the mouth and prevent conditions like caries include reducing frequency of sugar consumption (for example, by replacing sugar with non-fermentable sweeteners), boosting saliva flow (for example, with sugar-free chewing gum), using agents that reduce acid production and promoting remineralisation with fluoride¹
- It is also important to keep the biofilm thin by mechanical means such as tooth brushing and flossing, rather than letting it accumulate and mature to create conditions for pathogenic bacteria to flourish
- Patients are recommended to follow a healthy lifestyle, for example, by eating a good balanced diet rich in antioxidants, reducing the frequency of dietary sugars and avoiding smoking^{7,11}
- For periodontal control, treatment strategies should aim to remove the mature biofilm, thereby reducing inflammation and the accompanying flow of gingival crevicular fluid, and to promote a favourable microenvironment to support formation of a balanced microbiome¹
- Strengthening the healthy oral microbiota by including probiotics and prebiotics in oral healthcare products has shown promise and is currently in the spotlight of research¹²
- **Oral health care approaches to enhance the naturally occurring microbial protection systems in the mouth should be considered**

SUMMARY

The balanced oral microbiome has a symbiotic relationship with its host, and provides important health benefits.

At times, the finely tuned ecosystem in the mouth can become perturbed, leading to dysbiosis and disease.

An appreciation of the diverse ecosystem of the mouth helps the oral healthcare professional to take a holistic approach to treatment, which should consider factors that can affect the balance and activity of the oral microbiome, such as habits and lifestyle choices (e.g. smoking, diet) and patient characteristics (e.g. genetic factors, general well-being).

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