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The role of oral bacteria in COVID-19

We read with interest the Correspondence by Michael J Cox and colleagues,¹ highlighting the relevance of co-infections in the clinical outcomes and mortality of patients with coronavirus disease 2019 (COVID-19). We believe the role of oral bacteria in facilitating co-infections in COVID-19 is pertinent, yet overlooked. We concur with the need for whole-genome metagenomics to capture the data relevant to co-infections, but this should also warrant consideration for the bacterial species comprising the oral microbiome.

Poor oral hygiene is considered to be a major ecological pressure that steers complex microbial communities in the mouth into dysbiosis. Ecological shifts in a dysbiotic ecosystem favour an increased prevalence of pathogenic oral bacteria. Daily activities such as mastication, flossing, and tooth brushing can induce bacteraemia, which facilitate haematogenous dissemination of oral bacteria and inflammatory mediators, inducing systemic inflammation in some patients. Individuals with periodontal disease show micro-ulcerated sulcular epithelia and damaged periodontal tissues, and thus seem more susceptible to bacteraemia. Good oral hygiene is therefore essential for controlling the total bacterial load in the mouth, maintaining or re-establishing the oral symbiotic equilibrium, and preventing the dissemination of oral bacteria to other sites in the body.²

Metagenomic analyses of patients infected with severe acute respiratory syndrome coronavirus 2 have frequently reported high reads of

cariogenic and periodontopathic bacteria,³ endorsing the notion of a connection between the oral microbiome and COVID-19 complications. Evidence suggests that periodontopathic bacteria are involved in the pathogenesis of respiratory diseases, such as those implicated in COVID-19, and are associated with chronic inflammatory systemic diseases including type 2 diabetes, hypertension, and cardiovascular disease. These diseases are frequently reported comorbidities associated with an increased risk of severe complications and death from COVID-19. Suggested mechanisms that might explain the role of oral bacteria in the pathogenesis of respiratory infections are via the aspiration of oral pathogens into respiratory organs, the alteration of the respiratory epithelium by periodontal-associated cytokines, and oral mucosal surfaces rendered to promote the adhesion of respiratory pathogens.⁴ Numerous studies^{5,6} report that oral hygiene interventions in patients with pneumonia have substantially improved clinical outcomes and reduced mortality. One in ten pneumonia-related deaths of older nursing home residents (≥ 65 years) are considered preventable by improving oral hygiene.⁷ Improved oral care has been shown to significantly reduce the incidence of ventilator-associated pneumonia in patients in an intensive care unit.⁸ Further metagenomic studies and clinical trials are required for the characterisation of co-infections in COVID-19 and the potential connection between the role of the oral microbiome and complications arising from the virus.

These data are vital to ascertain whether poor oral hygiene is a

modifiable risk factor for COVID-19 complications and if there is a place for the promotion of good oral hygiene as a preventive public health intervention during the pandemic.

We declare no competing interests.

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