

it is our recommendation to report this illegal practice to the GDC.<sup>3</sup> Additionally, protecting patients by providing adequate advice and information is crucial to help avoid a national dental health catastrophe.

O. O'Brien, I. Jones,  
Newcastle-upon-Tyne, UK

## References

1. General Dental Council. Tooth whitening position statement. July 2016. Available at: <https://www.gdc-uk.org/docs/default-source/what-is-the-legal-position/tooth-whitening-position-statement.pdf> (accessed June 2024).
2. General Dental Council. What is illegal practice? Available at: <https://www.gdc-uk.org/raising-concerns/illegal-practice-and-reporting-it> (accessed May 2024).
3. General Dental Council. Raising concerns. Available at: <https://www.gdc-uk.org/raising-concerns> (accessed May 2024).

<https://doi.org/10.1038/s41415-024-7631-1>

## Heavy metal toxicity

### Exploring the impact of dental metal ions

Sir, a literature review was conducted on dental metal ions using 2024 publications from the National Library of Medicine. Topolska *et al.* investigated the chemical impact of metal orthodontic appliances on human enamel in which 107 enamel samples underwent a 12-month simulation of orthodontic treatment, experiencing metal exposure and pH changes.<sup>1</sup> Analysis using ICP-MS and LA-ICP-MS revealed increased levels of Fe, Cr, and Ni in samples with metal contact, particularly in the outer enamel and fissures, compared to sealed samples. It concluded that metal leakage during orthodontic treatment can chemically alter the enamel surface and create microlesions.<sup>1</sup>

In periodontitis, research highlighted the antibacterial properties of metal and metal oxide nanoparticles (NPs) against various bacteria, including drug-resistant strains. Green synthesis of NPs was favoured for its low toxicity and environmental safety. Gold NPs (AuNPs) showed low toxicity to cells, while silver NPs (AgNPs) offered multiple benefits like stability and conductivity. Zinc oxide (ZnO) and copper (Cu) NPs effectively inhibited periodontitis-causing bacteria. Additionally, certain metallic NPs can boost the antimicrobial effectiveness of periodontitis treatments.<sup>2</sup>

In dental prosthetics, chromium-cobalt and chrome-nickel steels were widely

used but can cause allergies and have poor corrosion resistance.<sup>3</sup> To enhance their properties, amorphous silicon carbide nitride (Si(C,N)) coatings were applied to these alloys using magnetron sputtering. The coatings, varying in carbon to nitrogen ratios, were analysed for structure, chemical composition, wettability, and roughness. Results showed that such coatings, ranging from 2 to 4.5 µm thickness, increased surface free energy, suggesting their potential as protective films in dental prosthetics.<sup>3</sup>

The impact of stannous ions from sodium-fluoride-dentifrice on oral biofilms was assessed, comparing it to zinc-based dentifrice and a control.<sup>4</sup> Results showed that stannous ions did not significantly alter the overall microbiome but increased beneficial commensals and reduced pathogens. Specifically, stannous ions were found to selectively bind to and reduce periodontitis-associated bacteria, suggesting their potential in maintaining oral health and preventing disease by targeting harmful bacteria.<sup>4</sup>

Polysaccharides as functional foods or drugs offered a natural remedy for heavy metal toxicity, employing chelation and antioxidant mechanisms.<sup>5</sup> They effectively bind toxic metals, safeguarding organs and aiding in the prevention of degenerative conditions. Compounds such as methionine, cysteine, N-acetylcysteine, S-adenosylmethionine, α-lipoic acid, and glutathione played a crucial role in detoxification and tissue healings.<sup>5</sup>

Y. Takefuji, Tokyo, Japan

## References

1. Topolska J M, Jagielska A, Motyl S *et al.* Metal leakage from orthodontic appliances chemically alters enamel surface during experimental *in vitro* simulated treatment. *Sci Rep* 2024; doi:10.1038/s41598-024-56111-4.
2. Kiarashi M, Mahamed P, Ghotbi N *et al.* Spotlight on therapeutic efficiency of green synthesis metals and their oxide nanoparticles in periodontitis. *J Nanobiotechnology* 2024; doi:10.1186/s12951-023-02284-5.
3. Klimek L, Makówka M, Sobczyk-Guzenda A, Kula Z. Characteristics of Si (C,N) Silicon carbonitride layers on the surface of ni-cr alloys used in dental prosthetics. *Materials (Basel)* 2024; doi:10.3390/ma17102450.
4. Chen D, Chew D, Xiang Q *et al.* Interactions and effects of a stannous-containing sodium fluoride dentifrice on oral pathogens and the oral microbiome. *Front Microbiol* 2024; doi:10.3389/fmicb.2024.1327913.
5. Iddrisu L, Danso F, Cheong K-L, Fang Z, Zhong S. Polysaccharides as protective agents against heavy metal toxicity. *Foods* 2024; doi:10.3390/foods13060853.

<https://doi.org/10.1038/s41415-024-7632-0>

## Periodontology

### Removable dentures and Alzheimer's disease

Sir, recent studies have indicated that periodontal pathogens that are present in the oral cavity and can enter the bloodstream through the oropharyngeal port have the potential to cross the blood-brain barrier and potentially accelerate Alzheimer's disease (AD)-specific neuropathology. This acceleration occurs through increased neuroinflammation, plaque formation, and dysregulation of iron homeostasis, ultimately leading to ferroptosis, neuronal death, and neurodegeneration.<sup>1,2</sup>

It is disconcerting to note that the use of removable dentures (RDs) over time can lead to an increased presence of these bacteria.<sup>3,4</sup> Furthermore, in patients with poor oral hygiene, RDs can also serve as a source of infection.<sup>4</sup>

Given the relatively higher prevalence of RDs use among elderly patients and the fact that AD often occurs in this age group, it is imperative to conduct comprehensive research to establish any potential link between these two factors.

Therefore, in today's ageing society, the identification and characterisation of modifiable risk factors associated with AD, including RDs, have the potential to significantly reduce its prevalence. In addition, prosthodontists must place patient safety as a top priority and guarantee that prosthetic treatments are both efficient and safe for extended periods.

E. Veseli, Pristina,  
Kosovo and Chennai, India

## References

1. Liu S, Butler C A, Ayton S, Reynolds E C, Dashper S G. *Porphyromonas gingivalis* and the pathogenesis of Alzheimer's disease. *Crit Rev Microbiol* 2024; **50**: 127–137.
2. Li R, Wang J, Xiong W *et al.* The oral-brain axis: can periodontal pathogens trigger the onset and progression of Alzheimer's disease? *Front Microbiol* 2024; doi: 10.3389/fmicb.2024.1358179.
3. Veseli E, Staka G, Tovani-Palone M R. Evaluation of red-complex bacteria loads in complete denture patients: a pilot study. *BDJ Open* 2023; doi: 10.1038/s41405-023-00133-z.
4. D'Ambrosio F, Santella B, Di Palo M P *et al.* Characterization of the oral microbiome in wearers of fixed and removable implant or non-implant-supported prostheses in healthy and pathological oral conditions: A narrative review. *Microorganisms* 2023 doi: 10.3390/microorganisms11041041.

<https://doi.org/10.1038/s41415-024-7633-z>