

Materials legacy – past, present and future

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Past Latin scholars may be familiar with the rhyme ‘Latin is a language as dead as dead can be. It killed the Ancient Romans and now it’s killing me.’¹ Indeed, some whilst at dental school may have replaced Latin with dental material science! Hopefully, with increased dental practising time, materials science has been found to be useful and much alive. I have always found dental materials to be a fascinating subject. It is here that sound adherence to scientific principles makes a big difference to your clinical practice. It is an area where you can contribute – be it through audit, research, or comment upon available products. It is hoped that in preparing this themed edition, a sense of this excitement with practical tips is conveyed. As you will read materials science touches upon many aspects of practice life. It is true that the scope of this themed edition covers much history ranging from the Phoenicians to the present day. Its focus is upon the phasing down, on environmental grounds, of dental amalgam. This material has served the dental profession well and will leave a legacy for many years ahead. As we approach the phase out date, it is appropriate that this is marked. Its initial empirical development was hindered by a lack of understanding of its setting reaction and poor ingredient quality control. Application of rigorous cutting-edge science unravelled the setting reaction and brought with it real quality control possibilities and standardisation. These brought widespread acceptance. Pioneering this was a female scientist (Gayler), unusual for the time, who made such advances, and several societal norms were challenged to make this possible. Also of note, in this 150th anniversary year of the *British Dental Journal*, is that her findings were published in this journal, making possible significant developments in dentistry and far wider.

The development and application of alternative materials has been ongoing for some time. All reputable manufacturers

quality assure these using International Standards. This process is informed by clinical performance, yet it is not apparent to all how such standards are derived and updated. This together with the juxtaposition of associated legislation post-Brexit is covered. The edition looks at alternative materials. Despite the extensive use and inclusion of potentially hazardous chemicals in their compositions, there is a good safety record. With all these, successful and dependable bonding to tooth substance is key and such has brought about a paradigm shift in clinical practice. Innovations to look forward to are the simplification of material systems, development of bioactive



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glasses to promote remineralisation of tooth substance, novel chemistries to improve properties, and of course the potential to develop further minimal intervention dentistry. A particularly exciting area is dental ceramics, where a carefully choreographed comedy of errors balances out to result in a well-fitting restoration. Synergy with appropriate luting agents can reduce the required thickness of the material for optimum strength, thus preserving tooth substance. In addition, the application of CAD/CAM enables materials to be used that ordinarily could not be fabricated by conventional means. Furthermore, the new ISO standards provide a framework of useful cooperation between dentist, manufacturers and scientists. With all such innovations, however, it is important that we see improved biocompatibility and environmental concerns are not overlooked. Until recently, biocompatibility tended to

focus upon individual products, but there is emerging focus on how these may in their handling affect the dental team. As we advance, it is probably inevitable that innovative materials will bring with them ingredients new to dentistry and this, coupled with greater regulatory calls for traceability from raw material to final product, will bring new challenges to manufacturers. As you will read, the World Health Organisation have called for a more robust global reporting system to document adverse reactions to materials. Most intraoral reactions that occur are associated with dental amalgam restorations – these include lichenoid

reactions and tend to occur some time after restoration placement. In cases with lichenoid reaction, amalgam restoration replacement to avoid possible inducement of a future malignancy presents challenges to the restorative dentist.

Although no evidence of an adverse effect of an amalgam alternative has been established upon either the environment or biodiversity, it is prudent to explore this. As well as the practical tips to clinical success that are presented, it is hoped that this themed edition summarises good science in a thought-provoking way. The profession must get correct the transition to new materials so that both our patients and the environment benefit. ■

References

1. Aunt Anna’s Page for Boys and Girls. *Washington DC Post* (Washington) 1919 November 30. pp A12 col 2.

<https://doi.org/10.1038/s41415-022-4247-1>