

# Summary of: Thirty-five year review of a mercury monitoring service for Scottish dental practices

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## FULL PAPER DETAILS

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**Aims and objectives** To review a long-standing mercury monitoring service offered to staff in dental practices in Scotland. **Methods** During the first 20 years of the service, dentists and their staff were contacted by letter and invited to participate. Respondents were asked to collect samples of head hair, pubic hair, fingernail and toenail for analysis of mercury. After 1995, head hair samples were collected initially and further samples were only measured if head hair mercury was elevated. **Results** At the start of this scheme many staff, including administrative staff, had systemic exposure to mercury (defined as increased mercury in all four samples). Incidents of exposure have decreased over the 35 years and are now very rare. Male staff were found to have higher mercury concentrations than female staff and dentists tended to have higher concentrations than other staff. Staff working in dental practices more than five years old had small but discernible increases in head hair mercury concentration. In recent years the use of reusable capsules such as Dentomats has been associated with a slight but statistically significant increase in head hair mercury concentrations when compared to the use of encapsulated amalgam systems. Staff wearing open-toed footwear had significantly higher toenail mercury concentrations compared to those who wore shoes. **Conclusions** Exposure of staff to mercury in Scottish dental practices is currently now very low. This is probably as a result of increased awareness to the toxicity of mercury and improved methods of preparing amalgam. It may be possible to reduce exposure further, although probably only slightly, by upgrading practices and using encapsulated mercury amalgam.

## EDITOR'S SUMMARY

The debate and controversy surrounding dental amalgam and mercury exposure continues to rumble on. Regular readers of the Journal will recall previous articles and editorials covering environmental, economic and health aspects of the amalgam argument<sup>1-3</sup> and urging a measured and evidence-based approach to future regulation.

More recently the United States Food and Drug Administration (FDA) convened an Advisory Panel on Dental Amalgam to discuss several scientific issues that may affect the regulation of dental amalgam in the USA. The hearing, which followed a 2009 FDA final ruling that reclassified dental amalgam from a Class I to a Class II device, was held in December 2010 and at its conclusion, the Panel voted to recommend that

the FDA conduct further review of the safety of the material.

The publication of this paper by Duncan *et al.* is therefore timely and the article provides a fascinating insight into mercury exposure in dental professionals over a period of time during which technology, safety awareness and dental materials have all developed rapidly. As might be expected, mercury exposure in dental practice staff has decreased markedly since the monitoring scheme studied was begun and is now very low. However it is the detail on different staff members, instrumentation and even different footwear that makes the paper so interesting, presenting a picture of changing dental practice created through long-term data collection.

The authors hope to obtain further information from additional investi-

gations into the health implications of dentists' exposure to mercury, as they mention in their answers to our questions (right). The availability of such a dataset provides a useful and interesting contribution to the great amalgam debate.

The full paper can be accessed from the *BDJ* website ([www.bdj.co.uk](http://www.bdj.co.uk)), under 'Research' in the table of contents for Volume 210 issue 3.

Rowena Milan  
Managing Editor

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**IN BRIEF**

- Dental practices not currently using encapsulated amalgam systems may achieve a small reduction in mercury exposure by upgrading to them.
- A further reduction of exposure to mercury may be achieved by upgrading the fabric of the workplace.
- Systemic mercury poisoning is now very rare and so the continued routine monitoring of dentists and their staff is difficult to justify.

**COMMENTARY**

This paper contains formidable amounts of data of interest to anyone handling dental amalgam. The investigators report a substantial decrease in mercury concentrations in samples of four tissues over a 35-year period, corroborating observations in a comparable longitudinal study from the USA.<sup>1</sup> It should be emphasised that this paper considers exposure to amalgam particulates and possibly elemental mercury rather than mercury body burden. The latter is better appraised if hair measurements are complemented with blood specimens and urine samples.<sup>2</sup>

The investigators propose that elevated concentrations in all four samples indicated 'mercury exposure' and give possible explanations for high/low concentrations in the four tissues. However, one factor that most senior dentists would recognise is left out. For decades, post-placement polishing of restorations made from coarse lathe-cut alloys was a routine procedure until smoother alloys in the mid-1980s made this additional visit redundant. The ubiquitous dental amalgam 'dust' generated during the process was everywhere and considered harmless.

The discussion considers why extreme mercury concentrations in tissues from dental staff are rarer now than before, including the potential effect of the change from hand preparation to Dentomats to prepackaged capsules, as well as handling liquid mercury and potential contamination due to spills. Classic examples of occupational contamination episodes that may account

for extreme mercury exposure are mercury thermometers not meant to be used inside dry sterilisers that break, or thermometers accidentally crushed between instruments. Collecting a mercury spill with a vacuum cleaner was another effective way of redistributing the mercury droplets by heating and thus vaporising the spill.

The authors suggest that the main reason for the decrease of mercury concentrations is the increased awareness of the dangers of mercury and consequent safer way of preparing the amalgam. I concur, that a higher awareness of ecology and presence of toxins in our environment has encouraged more careful handling of chemical compounds. The second major reason I believe is the rapid decrease of the use of dental amalgam due to less time being spent in the operatories on placing fillings relative to other interventions combined with the increased use of alternative restorative materials.

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**AUTHOR QUESTIONS AND ANSWERS****1. Why did you undertake this research?**

The study was done partly opportunistically because we had accumulated over the 35 years of the mercury monitoring service a huge amount of information which could be analysed retrospectively. As far as we are aware no other dental mercury monitoring scheme based on hair analysis has been established. Most schemes are based on urine collections; there is a significant problem with such schemes since mercury is lost from urine. There were several aspects of the data available that made it too good to ignore: it gave a perspective over a large number of years during which mercury handling in dental practices has been transformed, the number of records was vast, and various interesting studies had been done at various stages during the 35 years such as the effect of footwear, age of practices, amalgamator used.

**2. What would you like to do next in this area to follow on from this work?**

We are keen to investigate the health implications to dentists of the exposure to mercury. We plan to identify two groups of dentists from our data – one who suffered significant mercury exposure during the earlier years of the scheme, and an age- and sex-matched control group who had no evidence of exposure.