

Summary of: Dental composite materials and renal function in children

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FULL PAPER DETAILS

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Objective To examine whether greater exposure to resin-based composite materials, which may intra-orally release bisphenol A (BPA), is associated with worse renal function outcomes in children. **Design** Prospective multi-centre study. **Setting** Community health dental clinics in Boston and Maine from 1997–2005. **Subjects and methods** Five hundred and thirty-four New England Children's Amalgam Trial participants aged six to ten years were randomised to treatment with amalgam or resin-based composite restorations over five years of follow-up. **Interventions** Restorations were placed according to treatment arm, and sealants placed per standard of care. Cumulative composite exposure was calculated using surface-years (each treated surface weighted by number years present). **Main outcome measures** Urinary excretion of albumin, gamma-glutamyl transpeptidase (gamma-GT), and N-acetyl-β-D-glucosaminidase (NAG) were available for 417 children. **Results** Analysis of covariance showed no association between exposure to dental composites, polyacid-modified compomer, or flowable composite dental sealants and preventative resin restorations with levels of renal function. There was no association between composite materials and thresholds indicating renal damage in logistic regression models. **Conclusions** This study found no harmful associations between dental composite materials and renal function in children. Therefore, concerns about renal function need not be a consideration in the choice of dental restoration material or placement of preventative dental sealants.

EDITOR'S SUMMARY

Modern life is stressful. No doubt about it. But if you're a dentist you have many additional stresses, not least of which is patient safety. Safety is obviously paramount in providing high quality care for patients and a constant concern for all healthcare professionals.

However, keeping patients out of harm's way isn't just dependent on the healthcare professionals themselves. In providing treatment, general dental practitioners use a variety of materials and equipment which also need to be safe. Yet dentists have little control over the safety of these materials and therefore depend heavily on colleagues in the dental industry and regulatory bodies to ensure that they are safe.

The public is generally wary about chemicals and healthcare products – sometimes this is with good reason but quite often a result of press scare stories and apocalyptic warnings with little evidence backing them up. Bisphenol A (BPA) is one such mate-

rial which has attracted a lot of attention of late. There is concern about the potential effects of BPA on the brain, behaviour, and prostate gland in fetuses, infants, and young children. BPA is one of the monomers used to make bisGMA – composite restoration material.

Composite dental materials degrade over time so there is a possibility that exposure to BPA could cause problems in dental patients in the long term. But does it? That's the important question which we need to be able to answer if asked by patients and our answers should be based on research and valid evidence.

This paper reports the results of an investigation on whether exposure to resin-based composite materials (containing bisGMA) is associated with worse renal function outcomes in children. The result is a 'negative one' in that the authors conclude that there is no need for concern about renal function when choosing a dental restoration material or placing a preventive sealant.

Though a negative result, it is certainly also a reassuring and useful result. Dentists can be assured that if a BPA-dental material scare appears, according to the most recent evidence there is no need for patients to worry about renal function in children. And, equally importantly, there is no need for dentists to worry about their patients' safety with regard to composites and renal function in children. One less worry in this modern life!

The full paper can be accessed from the *BDJ* website (www.bdj.co.uk), under 'Research' in the table of contents for Volume 216 issue 2.

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IN BRIEF

- Investigates concerns that resin-based composite dental materials may intra-orally release bisphenol A (BPA), which has been associated with impaired renal function in children and adults.
- Reports findings that greater exposure to dental composite materials was not associated with worse renal function outcomes in children.

COMMENTARY

The article *Dental composite materials and renal function in children* by Trachtenberg *et al.* investigated the incidence of renal damage/renal failure markers in children who had been previously treated with methacrylate-based resin-based composites (RBCs). The systemic and biological effects of RBCs must not be underestimated, considering their popularity as a restorative material over more conventional materials such as dental amalgam and also their relative longevity in the oral cavity. This study was conducted over a sizeable population group in the New England region of North America, however, its relevance with other regions with similar levels of restorative treatment in children cannot be overlooked.

The methods outlined in this study saw data from over 600 children taken over a period of five years being examined for indications of renal failure markers. The thoroughness of the study included profiling data taken in addition to blood and urine samples. Patients were screened for levels of gamma-glutamyl transpeptidase (gamma-GT), albumin and *N*-acetyl-B-D-glucosamide (NGT).

The implication that dental materials such as RBCs could negatively impact upon systemic wellbeing, in this case renal function, originated from the consideration that bisphenol A (BPA) is employed in the synthesis of bisGMA. When one takes into account that urinary BPA has been directly linked to a loss of renal function in humans, it is not surprising that legitimate concerns exist amongst the dental community. The authors acknowledge a deficiency in their research, in so far as the urinary or blood concentrations of dental monomers or BPA before and directly after treatment were not obtained. This information

would be likely to enhance the otherwise comprehensive body of longitudinal research. The findings of this study show the need for the dental community to be aware and question the potential for dental materials, however commonly employed, to impact negatively upon the systemic health of their patients.

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

Recent research suggests an association between bisphenol-A (BPA) and impaired renal function in children and adults. BPA is used in the synthesis of bisphenol-A-glycidyl-dimethacrylate (bisGMA), a monomer commonly used in composite dental materials. There is concern as to whether composite dental materials release BPA intra-orally, and what effects this may have in both the short term and over time. Secondary analysis of clinical trial data allowed us to test the hypothesis of an association between greater exposure to dental composite materials over time and impaired renal function outcomes in children.

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

Despite the lack of association with renal function, questions remain about the release of components used in dental composites and their long-term safety. To follow on from this work we would like to examine the effects of dental composite materials on children's levels of urinary BPA and related components. Moving beyond prior studies that have examined changes in urinary or saliva BPA within 36 hours of treatment in adults, we would like to evaluate long-term effects, throughout the life of the restoration or sealant. The hypothesis is that there is a chronic low-dose exposure of dental material components as the composite materials degrade over time in the oral environment. Such data on the long-term release and safety of current dental composite materials are needed to inform their continued use and the development of novel composite systems.