

**SCIENTIFIC
SECTION**

Commentaries on scientific papers published in this edition

Fluorides, orthodontics and demineralization: a systematic review of RCTs and CCTs

**P. E. Benson, D. T. Millett, A. A. Shah,
F. Dyer, N. Parkin and R. S. Vine**

Fluoride has long been recognised as an important means of improving dental health. Despite controversial arguments about mass medication, the evidence that fluoride can reduce caries and protect the enamel is robust and extensive. As a result, orthodontists use fluoride in a number of different ways, in the hope of reducing demineralization during orthodontic treatment. However, is there good evidence to justify this? This article addresses this very important question.

The authors have reviewed the literature in the style of a Cochrane systematic review. This follows a strict methodology ensuring only high quality evidence is assessed. Randomized or controlled clinical trials that investigated the prevention of white spot lesions by using fluoride during fixed appliance treatment were assessed. A thorough, reproducible and transparent search strategy was followed and only those studies that fulfilled strict inclusion criteria were included.

The authors chose the presence or absence of white spot lesions as a clinically relevant primary outcome. Secondary outcomes included the size and severity of white spot lesions, quantitative assessment of enamel mineral loss and patient-based outcomes, such as quality of life data.

Fifteen trials were identified, but none fulfilled all the requirements for the review. This was due to deficiencies in the methodology of these studies, which was discussed. The authors concluded that there is some evidence to suggest that a daily sodium fluoride mouthwash or the use of glass ionomer cement for bonding brackets may reduce white spot lesions during fixed appliance treatment. However, these conclusions should be accepted with caution due to the deficiencies discussed in the paper.

The final conclusion that more high quality, clinical research is required is a common conclusion in a number of recent systematic reviews of the orthodontic

literature. This at first can be a disappointing conclusion for the busy clinician in search of high quality evidence and answers to common clinical questions. However, like many other papers of this type, this excellent paper serves not only to review what already exists, but describes how future high quality research in this area could be undertaken. This paper will be useful to researchers designing future clinical trials investigating the use of fluoride in orthodontics.

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Clinical trials in Orthodontics III: reporting of ethical issues associated with clinical trials published in three orthodontic journals between 1989 and 1998

J. E. Harrison

The last decade has seen an increase in awareness among healthcare professionals, researchers, patients and the public of ethical issues and the need for informed consent. In the UK, the public are aware of the media debate around complicated ethical issues, such as stem cell research, cloning and genetic screening. Recent changes in clinical research procedures in my own university hospital have involved the introduction of a new, formalised multi-stage system of research governance in addition to the basic requirements of consent and ethical approval.

The authors of this paper undertook a thorough hand search of 3 orthodontic journals and the findings may surprise the reader. Seventy per cent of 155 reported controlled clinical trials did not include a statement confirming that either ethical approval or consent had been obtained, and only 11% included both. These findings are disappointing in comparison with similar papers in medical journals. Nevertheless, the authors acknowledge that a limitation of their study is that assessing the validity of the findings would require contacting researchers directly to assess whether consent and ethical approval had actually been obtained. It is

encouraging, however, that there was some evidence that the frequency of reporting ethical issues was improving with time.

My personal experience is that the ethical approval and consent process is a valuable part of the discipline of planning, executing and publishing a controlled clinical trial. This paper is a timely reminder to us all as clinicians and researchers that we are required to seek appropriate ethical approval and informed consent when planning and carrying out clinical trials. Together with this journal's policy of rejecting studies that do not meet the instructions and requirements on these issues, this paper can only help to ensure that future trials are not commenced without the appropriate ethical issues being addressed at the outset.

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**British Orthodontic Society, Chapman
Prize Winner 2003
A novel *in vitro* culture model to
investigate the reaction of the dentine-
pulp complex to orthodontic force
A. A. Dhopatkar, A. J. Sloan, W. P. Rock,
P. R. Cooper, A. J. Smith**

Orthodontic treatment results in the translation of teeth through alveolar bone and modern fixed orthodontic appliances are highly adept at providing efficient force delivery to the dentition. This treatment response relies upon the underlying biology of the dental tissues and whilst historically investigators have paid much

attention to the periodontal structures, less is known about the dentine-pulp complex. This investigation has addressed the issue of changes in the pulp of teeth exposed to orthodontic force at both the cellular and molecular levels. By developing a novel method of culturing mandibular sections derived from the rat and being able to apply external force to molar teeth within these sections, Ash Dhopatkar and colleagues have been able to analyse the biological response *in vitro*. The tooth sections remained viable throughout the period of culture and, interestingly, those subjected to orthodontic force demonstrated significant changes within the dentine-pulp complex. Specifically, these changes manifested as an increase in fibroblast density, accompanied by up-regulation in transcription of genes known to be involved in regulating cell proliferation and collagen synthesis. It would seem, therefore, that externally applied orthodontic forces are transmitted to the dentine-pulp complex and this tissue is able to respond. What is not known is the true significance of this response, how detrimental it may be upon the pulp or how these effects may vary under differing levels of force. Overall, this study raises a number of interesting issues, in particular, how mechanical forces are received and interpreted by the fibroblast population of the dentine-pulp complex and what the significance of this response is with regard to successful orthodontic tooth movement. Once again, a study based in the laboratory has provided a useful starting point for further research of direct relevance to the clinic.

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