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SCIENTIFIC SECTION

# Commentaries on scientific papers published in this edition

## 'Effect of inbreeding and endogamy on occlusal traits in human isolates' by T. Lauc, I. Rudan, H. Campbell and P. Rudan

A malocclusion is the sum of a number of complex occlusal traits. These traits demonstrate multifactorial inheritance and are not the result of any single gene. Genetic factors clearly play a role, but superimposed upon these are the local effects of environment. The advantage of an isolated genetic community in the analysis of complex traits is a subject of much debate, but theoretically, the presence of alleles for certain recessive traits may result in the frequency of these alleles being higher in the isolated community when compared to the total population.

The present study by Tomislav Lauc and co-workers has used an isolated population of schoolchildren from the island of Hvar in Croatia to investigate the genetic basis of several identifiable occlusal traits. Because of the relative isolation of these islanders, the investigators were able to utilize the effect of inbreeding at both individual and population levels, and apply them in analysing the genetic basis of malocclusion. The comparison of children demonstrating complete grandparental endogamy (namely, all grandparents being resident within the same village) with those demonstrating incomplete endogamy provided an indicator of inbreeding at the individual level. In contrast, children selected from geographically distinct villages produced a range of inbreeding levels for comparison within the population. Crucially, the nature of this sample ensured that inbreeding levels were maintained within equitable environmental influences.

At the individual level, aberrant molar relationships, and increases of overjet and overbite were more frequent in relation to inbreeding, whilst no significant differences were observed with respect to crowding. At the population level, the authors reported increased frequencies between inbreeding, and increases of overjet and overbite, but little association with respect to molar relationship and no notable effect for crowding. Overall, therefore, an effect of inbreeding was only observed for certain occlusal traits, but of great significance were the findings that those traits where an effect was observed were ones previously identified by other workers as having a significant genetic basis. In simple terms, this means that the genetic component for an increased overjet is likely to be much higher than that for dental crowding.

So what are these genetic influences that underlie inheritable occlusal traits? The authors suggest that multiple rare recessive genetic variants may well exist across the human genome. Each having a minor effect in isolation, but together they are numerous enough to partially influence some occlusal phenotypes.

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## 'Clinical trials in orthodontics II: assessment of the quality of reporting of clinical trials published in three orthodontic journals between 1989 and 1998' by J. E. Harrison

In the orthodontic specialty, among all the types of research found in our journals, clinical trials hold the greatest appeal and have the most influence. This is not altogether surprising and is quite proper as clinical trials deal with real patients. Since they have such a powerful effect on what we do as clinicians, it is crucial that both the conduct and reporting of clinical trials are of the highest order. This paper is therefore timely, as it closely scrutinizes the quality of reporting of clinical trials in the orthodontic literature. Although the author quite rightly highlights the fact that the quality of reporting is not a direct measure of the inherent quality of a trial, this could be considered a generous assertion. Another interpretation could be that failure to report important details of the methodology reflects an underlying lack of rigour in applying the scientific method.

In this paper, the author assessed 155 orthodontic clinical trials over a 10 year period and concluded that the reporting of clinical trials is generally inadequate. Four key problem areas were identified:

- failure to recognize the potential for selection bias when allocating patients to treatment groups;
- failure to report on patients who withdrew from the trial;
- failure to randomize correctly;
- insufficient use of blinding procedures where this would have been appropriate.

Since all of these can lead to bias in both the results and interpretation of clinical trials it is vital that researchers, referees, and the editors of journals share responsibility in addressing the problems identified by this paper.

It is the purpose of commentaries not only to summarize the findings of the associated paper, but also to help the reader to decide whether the paper is important, the methods used were correct and the conclusions drawn accurately reflect the results reported. As the author has shown, reviewing other peoples' research is an exact science in itself. This means that the same quality rules apply to this type of paper as apply to conventional research papers. In this spirit, one minor criticism might be that a key orthodontic journal (*Angle Orthodontist*) was not included in the analysis although this is unlikely to have changed the results greatly. In addition, the measurement technique used (Jadad scale) is clearly well suited for use in medical drug trials. However, it could present difficulties when applied to some orthodontic clinical trials particularly in correctly assessing the level of appropriate blinding.

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## 'Fluoridated elastomers: *in vivo* versus *in vitro* fluoride release' by D. Tinsley, J. J. O'Dwyer and P. E. Benson

This deceptively simple study reminds us that laboratory and life are not the same! The authors ask, 'How much fluoride do fluoridated-modules release clinically compared with the laboratory situation?' and 'Can fluoridated-modules take up fluoride from oral hygiene products?' The laboratory investigation measured fluoride release from fluoridated-modules (in distilled water) over a 6 month period. In the clinical investigation, six male volunteers underwent two experimental periods where four premolars were bonded with a bracket upon which fluoridated-modules were placed for 1 week, the four modules were then removed and analysed. On the first occasion fluoride mouthwash/toothpastes were used, for the second, they were excluded. All fluoridated-modules were observed in distilled water *in vitro* for a further 6 month period, until further fluoride release was minimal. In the first week, 13 per cent of the fluoride within the fluoridated-modules was released in the mouth, compared with a dramatic 90% in the laboratory! When the two clinical regimen were compared (using paired *t*-tests) use of fluoride hygiene products resulted in a significantly higher concentration of fluoride remaining in the module after one week.

The authors raise some interesting issues. Fluoridated-modules are known to be efficacious, but it may be that this is further enhanced by fluoride mouthwash, resulting in beneficial prolonged leaching of fluoride. However, a clinical dilemma could be faced if high concentrations of fluoride are released shortly after placement, which may have a toxic effect in small children. Just how great is that initial release? The authors suggest placing fluoridated-modules on at risk teeth only in very young subjects.

The study sample is very small, but is supported with power calculations. It would be very interesting to extend this study to a larger group of patients of mixed sex, age, and from known socio-economic backgrounds, where the dietary intake/oral environment may well vary dramatically.

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## 'Effect of fluoride exposure on cariostatic potential of orthodontic bonding agents: an *in vitro* evaluation' by A. Corry, D. T. Millett, S. L. Creanor, R. H. Foye and W. H. Gilmour

Is the cariostatic potential of a resin-bonded glass-ionomer cement enhanced by the use of fluoride toothpaste? To find out the authors conducted this laboratory-based study. Brackets were bonded to extracted teeth with a resin-based adhesive or a resin-modified glass-ionomer cement. They were cycled daily between a demineralizing solution and a remineralizing solution. Half of each group were also treated with fluoride solution to simulate toothbrushing each day. Fluoride release was measured regularly and decalcification subsequently assessed visually.

As expected, all the glass-ionomer samples released fluoride, and continued to do so for 10 days or so. If fluoride treatment was used, the fluoride release began to increase again after 15 days. A similar, but smaller rise was found in the resin-based adhesive group. Fluoride

treatment greatly reduced the visible decalcification in both groups.

In a clinical context this indicates that the release of fluoride from a glass-ionomer cement is short-lived in the absence of tooth brushing, but regular use of fluoride toothpaste may top up the fluoride. Unfortunately, it is difficult to assess the clinical significance of this finding owing to the dearth of reliable clinical studies on adhesives, as a recent systematic review showed.[1] Nevertheless, it seems that the advantage of glass-ionomer cements, if any, could prove to be greater for those who brush regularly. Conversely, less benefit may accrue when compliance is poor, ironically the time when the need is greatest.

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## Reference

1 Mandall NA. *et al*. Orthodontic adhesives: a systematic review. *J Orthod* 2002; **29:** 205–10.

## 'The clinical comparison of two chemically-cured adhesives' by P. G. Miles and R. J. Weyant

Indirect bonding has traditionally divided orthodontists over the years into two camps. Some who are strong advocates of the technique and others who find it unworkable in a busy clinical situation. My own personal experiences of indirect bonding have not been without their problems. I have often found that when the locating splint was removed several of the brackets were also removed! The technique has also previously been limited to using light cure adhesive with consequent difficulty in correct positioning of the curing light, particularly in the posterior area of the mouth. This paper describes how the indirect bonding technique has evolved over recent years, and describes in detail the clinical and laboratory technique used in this prospective clinical trial. The aim of the paper was to evaluate the suitability of two chemically-cured composite bonding resins (Sondie Rapid Set and Maximum Cure). Forty consecutively treated patients were included in the study after having to meet various specific inclusion criteria. They were then assigned to alternating groups in a split mouth study design. Only one patient was lost from each group over the period of observation, which was 6 months. The sondie rapid set group showed a 9.9% failure rate compared with only 1.4% for the maximum cure group. The authors conclude that both adhesives are suitable for indirect bonding, but that the maximum cure group appeared to perform better with respect to bond failure.

This paper shows that the indirect bonding technique can work very well, although the authors state that the clinician placing the brackets had been using an indirect technique routinely for about 8 years. This paper will certainly show the sceptics that with respect to bond strength and clinical performance, indirectly compares favourable with direct bonding. Whether they would be happy to invest the time required to ascend the learning curve and convert their practices to indirect bonding is, of course another matter.

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