## 108 Two fibronectin-binding protein genes detected in viridans streptococci bacteraemia isolates.

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Oral streptococcal species are increasingly isolated from cases of bacteraemia, in particular in cancer patients, and are also implicated in infectious endocarditis. A mechanism whereby these normally commensal bacteria might disseminate from an orally colonised site may be via adherence to extracellular matrix (ECM) proteins, such as fibronectin (fn), exposed during chemotherapy treatment. The CshA polypeptide of *Streptococcus gordonii* is the only identified fn-binding protein of a viridans streptococcal species (McNab *et al.*, [1999] J Bacteriol, 181:3087-3095). We have detected homologues of *cshA* and a *Streptococcus pyogenes* fn-binding protein gene, *FBP54*, in laboratory strains of the viridans streptococcal species, *Streptococcus sanguis*, *Streptococcus oralis* and *Streptococcus mitis*. In order to investigate whether such proteins are involved in pathogenesis, it first needs to be shown that the *cshA* and *FNBP54* gene homologues are consistently present in clinical isolates. Thirty three blood isolates from cancer patients undergoing chemotherapy were obtained and were identified to the species level by use of standard biochemical and physiological tests and typed by ribotyping. The majority (>80%) of the isolates were identified as either *S. mitis* or *S. oralis*. Using the Polymerase Chain Reaction (PCR) technique and Southern blotting with *S. gordonii* probes, *FNBP54* and *cshA* gene homologues were identified in all *S. oralis* and *S. mitis* clinical isolates. The genes were also detected in untyped isolates. In conclusion, we have confirmed the presence of homolgues of two genes encoding putative fibronectin-binding proteins in viridans streptococcal bacteraemia isolates. This work was supported by the University of Otago.

## 109 Ultra-micro indentation characterisation of mouthguard materials.

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Mouthguards play an important role in preventing dental trauma. However, the literature on mechanical properties of mouthguard materials is limited. The present study was designed to evaluate elastic-plastic properties of the materials. Three bands of mouthguard materials (clear and coloured) were selected. An ultra micro-indentation system (UMIS-2000, CSIRO) to determine near surface properties of materials with nanometer resolution. Each measurement consisted of at least 10 indentations. The measurement procedure was programmed such that the specimens were first indented to maximum force of either 40 or 50 mN. All the indentations were equally spaced (250 m). Each measurement was conducted with a spherical stainless steel indenter ($R$ = 500 μm). Typical contact pressures were ~ 1 MPa. The elastic modulus value ($E$) at maximum depth and the energy loss ratio during loading and unloading is given by Wi/Wt where Wt is the area under the loading force displacement and Wi is the area between the loading and unloading curves. The higher the ratio, the greater energy absorption capacity of the system. The $E$ values (mean ± SD) in GPa and Wi/Wt in % are summarised in the Table below. All materials gave significantly different $E$ values between clear and coloured specimens ($p<0.001$, $t$-test)

| | EC | FC | SH | EB | FB | SB |
|---|---|---|---|---|---|---|
| E (MPa) | 15.93 ± 0.09[a] | 19.45 ± 0.07[m] | 15.10 ± 0.11[s] | 17.33 ± 0.14[b] | 17.72 ± 0.13[n] | 17.17 ± 0.42[r] |
| Wi/Wt(%) | 11.48 ± 0.16 | 12.08 ± 0.15 | 11.33 ± 0.07 | 12.46 ± 0.17 | 11.83 ± 0.17 | 11.26 ± 0.08 |

Present UMIS system was reliable and consistent for quantify the elastic modulus and energy loss during indentation process of mouthguard materials.

## 110 Application of the focused ion beam in dental research.

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Focused Ion Beam (FIB) technology has been available for over ten years but until recently its usage has been confined to the semiconductor industry. It was developed originally as an important tool in that industry for defect analysis and circuit modification and, more recently, for preparation of samples for viewing under the transmission electron microscope. Its ion and electron imaging modes complement the scanning electron microscope and it is possible to prepare samples from a wide range of materials and to allow detailed study of many types of adhesive interface. FIB allows selection of the area of interest and precise milling with minimal sample deformation. The aim of this paper is to introduce FIB into dental research and to demonstrate its application in examining the dental restorative material interface. The example offered involves the characterisation of the interface between the composite resin used to repair a section of porcelain fractured from a crown or a bridge. It is suggested that this instrument offers opportunities to expand research in dental materials to areas not possible before. This work was gratefully supported by ESPE Australia P/L.

## 111 Perceptions of dental attractiveness in UK and Malaysia.

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There may be variations in what is considered to be a pleasing dental appearance between dentists, non-dentists and different ethnic groups. ***Objectives***: To determine if there were differences in perceptions of dental attractiveness between subjects of various groups and in two different countries. ***Method***: Ten standardised photographs of full arches of mainly non-restored teeth, generally well-aligned and in occlusion, with the lips retracted, were shown to 275 dental and patient subjects in Manchester, UK (MAN, $n$=150) and Kuala Lumpur, Malaysia (KL, $n$=125). Mann-Whitney-U statistical tests evaluated the mean rankings comparing MAN and KL, and between dental and non-dental groups in each of MAN and KL. Kruskal Wallis tests were used to determine if the mean rankings were influenced by the ethnic group of the subject. ***Results***: Overall, a different photo was selected as the most attractive in each of MAN and KL by 40% and 29% of subjects respectively, for reasons of tooth shade, form, alignment and healthy gingivae. Another photo was selected as the least attractive in both locations of MAN and KL by 32% and 42% respectively of subjects (for stated reasons of deep overbite (MAN-81%/KL-54%) and poor crown shape/length (KL-36%). For three photos there was a significant difference in mean rankings by dentists and patients at each of MAN and KL, and also overall (from p=0.00 to p=0.022). *Conclusions*: Although there was a generally similar perception of dental attractiveness across the groups, there were some significant differences found in rankings between MAN and KL, between dentists and non-dentists, and between different ethnic cultural groups.

## 112 Oral health of remote-dwelling W.A. Aborigines.

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*Objective and Background* The CDS provides an annual visiting dental service to some remote Aboriginal communities in Western Australia (WA). To ascertain needs, oral health status of Aborigines in 18 communities in the Kimberley and Pilbara regions was surveyed in 1997 and 1999. *Methods* Clinical examinations, conducted by dentists, included all available schoolchildren, and adults who wished to have a dental check-up. Exams (WHO criteria) were conducted in health centres using standardised lighting and portable dental equipment. The findings, recorded on a special form, were transferred to computer for analysis and are compared with the results of the 1998 WA Child Dental Health Survey and for adults, the National Oral Health Survey (1987/8). *Results* There were 83 5–7, 96 11–13 and 74 25–54 yr-olds (data on other age groups not reported here). Among 5–7 yr olds, dmft was 2.6 (1.4 in WA 6-yr-olds) and among 11–13 yr-olds, DMFT was 1.7 (0.8 in WA 12 yr-olds). Mean DMFT in adults was 5.1 whereas in Australian adults mean DMFT was 18.1. The examined Aboriginal adults had on average 26.6 teeth present (Australian adults 21.1 teeth). *Conclusions* Aboriginal children have poorer oral health than the state average but Aboriginal adults' caries status is better than the national average. These findings are consistent with a hypothesis that caries risk factors are greater for today's young Aboriginals than was the case when today's adults were children; this is a cohort effect.

## 113 Effect of disinfectant on dimensional accuracy of alginate impression material.

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Maintaining dimensional accuracy of dental impression materials during disinfection is important. The present study was aimed to investigate the effect of various disinfectant solutions on the dimensional accuracy of an alginate impression material. Two grooves separated by a distance of 50,000 m were carved on a plastic reference plate from which alginate impressions (Palgat Plus, ESPE) were taken. The distance apart of the same groove was measured on the resultant impression following or exposure to the various disinfectant solutions. The measurements in air, immediately following the taking of an impression were taken as the reference dimension, were compared with the measured lengths of the various disinfectant solutions. Measurements in air at 6 and 60 minutes were also taken and were found to be 49,795 and 48,967 m respectively that using a precision travelling microscope. Experiment was repeated 5 times with 2 measurements for each specimen. Statistical significance ($t$-test) was set at $p<0.05$.

| Air | | Water | Milton | Novasonics |
|---|---|---|---|---|
| 50,094 ± 2* | 6 minutes | 50,091 ± 37* | 50,100 ± 42* | 50,082 ± 14* |
| - | 60 minutes | 50,054 ± 22** | 50,005 ± 66** | 50,058 ± 34** |

There is no significant difference between various solutions in 6 and 60 minutes time intervals. Of all the disinfectant solutions examined, 6 minutes disinfection with Novasonics had demonstrated minimum dimensional change (12 m). While exposure to Milton solution for 60 minutes had shown the greatest dimensional change (89 m). A minimum distorted impression would be maintained after 6 minutes disinfection. *This study was supported by the Novapharm Research (Australia) Pty Ltd.

## 114 Dimensional stability of alginate impression material when powder:water ratio is varied.

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The clinical practice of altering the consistency of alginate impression material by varying the powder:water ratio to meet different circumstances has proved very useful. The dimensional stability of the various consistencies however needed to be investigated because no manufacturer actually recommends the practice and a study was set up to test seven specimens each of a light, medium and heavy consistency, stored dry and wet. Water:powder ratios were derived from clinical experience of suitable consistencies and then standardized for all specimens as was the mixing by electronic mixer. Specimens were prepared in a cylindrical mold (12mm diameter x 20 mm) and after a set setting time transferred to a transducer-containing measuring device, recording dimensional changes via a data logger. Each specimen was tested over 40 min, both dry and wet, the wet specimens surrounded by wet cotton wool. All specimens contracted (indicated by means) and the average readings for 7 specimens were: dry; heavy, – 2.23% (±0.484), medium, – 2.42% (± 0.675), light, – 3.17% (± 0.504); wet; heavy, – 0.32% (± 0.113), medium, – 0.22% (± 0.268), light, - 1.08% (± 0.141). Statistically compared all dry specimens differed significantly from wet ($p = 0.0001$, $p = 0.000$, $p = 0.0000$) but medium compared with heavy wet and dry were not significantly different ($p = 0.37$ and 0.56). Shrinkage was found in all six categories of specimens in time. Alginate stored dry contracted much more than wet but heavy and medium consistencies displayed similar shrinkage for both wet and dry and both shrank much less than the light. It is postulated that clinically significant shrinkage could occur after 2.8 min, and that the recommended traditional 10 min. storage period may be excessive. However, as light bodied alginate is used only in narrow dimensions the quite high shrinkage is not in fact important.

## 115 Human buccal epithelium and vaginal epithelium: a comparative study.

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Vaginal mucosa, in contrast to buccal mucosa, is more readily available. If the former could be substituted for the latter, it would expedite research involving the buccal mucosa. Both are lined by non-keratinized epithelium, the distribution of their keratin filaments is comparable and their permeability to chemical substances is similar. To further strengthen the concept that vaginal epithelium could replace buccal epithelium in certain studies, comparisons are necessary with regard to the thickness, patterns of keratinization, the presence or absence of intercellular lipid lamellae and the lipid composition of the epithelia. Because these characteristics all play a role in the permeability of substances through the epithelial layer, they were examined and compared. Thirty-three specimens of vaginal mucosa from postmenopausal women and 36 of buccal mucosa were investigated. To compare thickness, the cell layers in sections of each mucosal specimen in the 3 thickest and 3 thinnest regions were counted. Surface keratinization was evaluated on sections stained with the Picro-Mallory method. To demonstrate lipid lamellae 2 vaginal and 2 buccal mucosa specimens were examined electron microscopically after normal and post fixation in $RuO_4$. Following solvent extraction of 11 vaginal and 14 buccal epithelia, quantitative lipid analyses were performed using thin-layer chromatography. No statistically significant differences were found between the maximum and minimum number of epithelial cell layers. The pattern of surface keratinization, distribution and appearance of the lipid lamellae were similar. Except for the cholesterol esters, triglycerides and glycosylceramides, which differed between the two epithelia their lipid composition was comparable. Based on the structural similarity, comparative lipid composition and our earlier findings we conclude that vaginal epithelium can be used as a substitute for buccal epithelium in certain *in vitro* and possibly for *in vivo* studies. This study was funded by the MRC of South Africa and the Harry and Doris Crossley Foundation.