33 A SEM Study of Four One-Bottle Bonding Systems.

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Several one-bottle bonding systems are available. The aim of this Scanning Electron Microscope (SEM) study was to evaluate the fracture sites of four one-bottle bonding systems subsequent to the determination of their shear bond strength (SBS) to flat, ground, buccal, human dentine surfaces. The SBS study involved: Scotchbond 1 (SB, 3M), Prime & Bond 2.1 (PB, Dentsply), Optibond Solo (SO, Kerr) and Syntac Single Component (SY, Vivadent).

After the SBS study, 5 fractured specimens and matching stubs of each system were prepared and examined in a JEOL JSM-5800LV SEM, using magnifications up to 15,000 times. The SEM examination demonstrated (1) several cohesive dentine fractures with all systems except Syntac, (2) resin penetration in all specimens and (3) spectacular resin tags in both tubules and in several lateral tubular branches.

All bonding systems evaluated in this study demonstrated resin penetration. The particular SEM used in this study served well for examination of fracture sites.

34 Shear Bond Strength of a Glass-ionomer Bonding System.

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The purpose of this *in vitro* study was to determine the shear bond strength (SBS) of composite resin to buccal human enamel and dentine, using Fuji Bond LC as a bonding system.
Forty, recently extracted, human, molar teeth were embedded in metal rings, using selfcuring acrylic resin. The projecting buccal surfaces were ground wet on 600 grit SiC paper in order to expose either enamel (n=20) or superficial dentine (n=20). The surfaces were treated according to manufacturers instructions, and cylinders of composite resin (Z100) were bonded to the treated surfaces using a silicone rubber split mould. All specimens were stored for 24 hours under water at 37°C. Bonds were stressed to failure using a shear load in an Zwick materials testing machine, operating at a crosshead speed of 0,5mm/min. Data were statistically analysed (Student t-test). Selected fracture sites were also examined in a scanning electron microscope (SEM).

The mean SBS (MPa) were: enamel= 22 ± 6,2 and dentine= 11,2 ± 2,9. SEM examination demonstrated mixed adhesive and cohesive fractures. There was a statistical significant difference between the enamel and dentine bond strengths ($p<0,05$).

It can be concluded that this bonding system displayed an adequately high bond strength to both enamel and dentine, although the latter was significantly weaker.

35 Oro-facial Injuries and Mouthguard Usage during the 1995 Rugby World Cup

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A previous study by Chapman and Nasser (1993) revealed the prevalence of oro-facial injuries as well as attitudes regarding mouthguards, by the players of 4 teams who participated in the 1991 Rugby World Cup. The purpose of this study was to repeat the process on 4 teams participating in the 1995 Rugby World Cup.

This study was performed on the players of the following four teams: Australia (A), Ireland (I), Ivory Coast (IC) and Romania (R). Completed questionnaires revealed data regarding their age, team, playing position, frequency of games played, injuries and mouthguard type. The average age of players varied from 26,25 years (A) to 27,83 (IC), and the age at which they started playing rugby from 10,7 years (A) to 18,5 years (IC). Mouthguard usage varied from 92,3% (A) to 100% (I). Most players of A, I and R used the custom-made type, but in the IC team 52,9% used a mouth-adapted type. Injuries varied from chipped teeth (13,5 %) to concussion (4,2 %).

It can be concluded that most players wore mouthguards (mostly custom-made) and believed in its protective value. Injuries were not common in players wearing mouthguards. Players from Ivory Coast and Romania started playing rugby at an older age. There were only small differences between the data obtained from the various teams.

36 Fluoride Release of Four Fluoride Releasing Fissure Sealants.

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A fissure sealant which releases fluoride may provide additional caries protection. This report shows data from an ongoing study of the fluoride release of four fluoride releasing sealants. The following materials were tested ie: Fuji II LC (F), Delton (D), Helioseal F (H) and Ultraseal XT Plus (U). U,H,D and F were drawn up into new plastic syringes, light cured for 60 seconds using The Max™ light curing unit, and for another 60 seconds in a lightbox of a Transluxᵀᴹ unit. Each filled syringe was cut with a diamond saw into sections and each specimen then weighed and measured. Twenty five specimens of each material were placed in 1ml distilled water in individual polyethylene bottles, maintained at 37°C, and the 24 hourly F content of the water potentiometrically measured for 4 days and thereafter weekly until day 28. The fluoride release was expressed as $\mu gF/ml$. The data were statistically analysed (Student's t-test). The fluoride release ($\mu gF/ml$) of the different products at day 1,4 and 28 respectively were as follows: Fuji II LC= 38.768, 8.679 and 8.975; Delton Plus= 17.299, 3.806 and 2.331; Helioseal F= 6.310, 1.763 and 1.107 and Ultraseal XT Plus= 2.367, 1.284 and 0.921.
It can be concluded that all materials had a rapid initial fluoride release which decreased steadily over the following month. Release rates depended on the type of material, with Fuji II LC (the resin modified product) releasing the most fluoride for the duration of the study.

37 *In vitro* Biofilm Formation by the Oral Strain of *Lactobacillus paracasei*.

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Lactobacilli species in the oral cavity are known as secondary invaders of caries lesions. Their role in the production of acid and the onset of caries are not defined as it was believed that they are not able to colonize tooth surfaces. In this study the *in vitro* development of a biofilm on tooth surfaces (enamel and root) that was exposed to four different carbohydrates (glucose, fructose, lactose, sucrose) in a pure culture of *Lactobacillus paracasei* was followed. Results evidently showed that *Lactobacillus paracasei* colonized the tooth and root surfaces and attached firmly to the surfaces to form a biofilm. Slight differences were observed for the different carbohydrates, with the biofilm formed in the presence of glucose and fructose being more profound than for the other two carbohydrates. The onset of biofilm formation was observed from 4 hours after inoculation with *L. paracasei* and after 24 hours a monolayer of organisms was observed on all the surfaces. Little difference was observed between the 24 and 48 hour samples which indicated that the time span of 24 hours was sufficient for *L. paracasei* to form a profound biofilm on tooth surfaces. Lots of organisms were retained in the tissue filaments on the root, but the firm attachment on enamel surfaces by pseudopodia-like structures confirmed the active adhesion of *L. paracasei* on teeth *in vitro*.

38 Salivary IgA Against Mutans Streptococci in 5-year-old South Africans.

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Immunoglobulin A (IgA) is found predominantly in mucosal secretions such as saliva and restricts bacterial adhesion to mucosal surfaces. The purpose of this study was to determine if IgA activity against mutans streptococci (MS), differed among caries and ethnic groups and its potential as a caries risk marker. Salivary IgA to MS was measured in 28 5-year-old South Africans. Unstimulated saliva was obtained from 7 black, 7 coloured, 7 Indian and 7 white children. dmfs were determined according to WHO criteria. Caries groups were none (dmfs=0), mild (dmfs=1-5) and moderate to severe (dmfs>5). Total IgA was measured by radial immunodiffusion. Antigen extracts from MS reference strains and isolates from plaque, were separated by 7,5% sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) and salivary IgA activity was detected by Western blotting. Silver staining of the MS extracts separated on SDS-PAGE showed typical protein profiles for biotypes I and IV. IgA activity against MS antigens was detected as 1 to 7 distinct bands in 5 black, 6 coloured, 7 Indian and 5 white children. Caries-free children had IgA against ms reference strains but not to ms isolates. The Kruskal-Wallis test showed a significant difference in the IgA profile with respect to ethnic group (P=0,0124), but not to caries group. It may be concluded that genetic factors are important in the ontogenesis of an immune response to MS antigens. This preliminary study showed that antibody activity against reference ms strains and plaque or saliva isolates may be useful in caries prediction.

39 Minimum Inhibitory Concentration (MIC) of Combined Antibacterial Agents Against Cariogenic Organisms.

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The minimum inhibitory concentration (MIC) of antibacterial mouthwash agents were tested in paired combinations against cariogenic bacteria to determine if synergy, antagonism or indifference existed between the antimicrobial agents. The antibacterial agents were tested individually and in the following combination pairs; chlorhexidine diacetate (CA) & cetylpyridinium chloride(CC), CA & benzalkonium chloride (BC), CX & cetrimide (CT), BC & CT, BC & CC and CT and CC. These were tested against a total of nineteen bacteria isolated from the oral cavity; Streptococci (6), Lactobacilli (6) and Actinomyces (7). Serial dilutions of antibacterial agents from 32µg/ml to 0.0625 µg/ml were prepared in 96 well microtitre plates in paired combinations in a 1:1 ratio. An inoculum of the test organism equivalent to 10^5 colony forming units per millilitre was dispensed into each test well. The plate was then incubated anaerobically for the Actinomyces and Lactobacilli and aerobically for Streptococci for 48 hours at 35°C. After this time, the lowest concentration at which no visible growth occurred was recorded to be the MIC. Each organism was tested on three separate occasions. The MIC range for the individual antibacterial agents was 8.0 to 0.125 µg/ml and for the combined agents was 4.0 to 0.25 µg/ml for the organisms tested. The fractional inhibitory concentration (FIC) of the two individual agents was calculated from the individual and paired antibacterial MIC, the two FIC's were then combined to give a summation of FIC index. This index determined that no combination of antimicrobials showed synergy or antagonism at a 1:1 ratio. Combined antibacterial agents do not appear to show synergy or antagonism on oral bacteria as judged by *in vitro* MIC testing.

40 Viridans susceptibility to erythromycin and roxithromycin after ß-lactam exposure *in vivo*.

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Erythromycin is an accepted alternative to penicillin as an agent of prophylaxis in patients susceptible to the development of infective endocarditis (IE) who have recent prior exposure to penicillin.

To simulate antibiotic prophylaxis use in this study, specimens of dental plaque were cultured overnight in Todd-Hewitt broth containing 0.125 and 1.0 mg/l penicillin G. Susceptibility of the viridans streptococcal broth isolates to erythromycin, roxithromycin, amoxycillin and penicillin V was determined using the standard NCCLS microtitre broth dilution technique. A total of 140 isolates were tested - 74 from 50 volunteers with prior penicillin exposure (E-group) and 66 from 54 without (UE-group). Predictable increases in resistance amongst E-group isolates to the ß-lactam antibiotics was observed. Unexpected, however, was a notable increase in MIC 50 and MBC 50 values and upper MIC and MBC range limits amongst E-group isolates to both erythromycin and roxithromycin. MIC 50 (and MBC 50) values in the UE-group rose from ≤0.007 (≤0.007) and 0.015 (0.03) mg/l antibiotic to 0.015 (0.03) and 0.06 (0.12) mg/l in the E-group, respectively; while respective MIC (MBC) range upper limits rose from 0.25 (1) and 4 (4) mg/l to >64 mg/l antibiotic for the two agents. ß-Lactam exposure in the E-group, therefore, appeared also to select for macrolide resistance - resistance behaviour which may possibly be plasmid linked. This resistance phenomenon may be of clinical significance in patients susceptible to the development of IE who require erythromycin (macrolide) as antibiotic prophylaxis after recent prior exposure to ß-lactam antibiotics.

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