1265 Bactericidal Activity of High Oxidation Potential Water for Impression. Y. YOKOYAMA*, K. YASUMOTO, H. NOMASA, K. TAJIMA, H. KAKIGAWA, C. UCHIYAMA and Y.KOZONO (Kyushu Dental College, Kitakyushu, Japan).

High oxidation potential water has come into use in dental practice because of its marked bactericidal activity. However, appropriate methods of bactericidal treatment for impressions have not yet been proposed, and their effects on the properties of impressions remain unknown. This study examined several bactericidal treatments of alginate impressions with this water. Impression of a plastic model on which about $1.0x10^6$ staphylococcus aureus 209 P accumulated was taken with an alginate impression material (AROMA FINE DF II NORMAL SET; GC Corp.). Subsequently the impressions were immersed in the high oxidation potential water (SUPER WATER mini; Hirata Corp.) at 23±2 ℃ for 1, 5 or 10 min. The bactericidal effects were evaluated by survival rate through agar media. After treatment the impressions were contacted to agar culturing media, and the media were placed in an incubator at 37 ℃ for 20 hr. The number of colonies uptaken from the model to the impression was 39.9±3.8 %. No decrease in the colonies was found when the impression was immersed in distilled water. The impression in the high oxidation potential water, on the other hand, could significantly decrease the number of colonies to less than 0.1%. It was proved that the only 1 minute immersion in high oxidation potential water was an effective bactericidal treatment for alginate impression.

1266 Corrosion Resistance of Magnetic Stainless Steel for Magnetic Attachment O.OKUNO*, Y.TAKADA, Y.KINOUCHI, H.MIZUTANI, M.AI and H.YAMADA (Tohoku Univ., Tokushima Univ., Tokyo Med.Dent.Univ. & Hitachi Metals, Japan)

To increase attractive force and protect the magnet from oral fluids, small encapsulated magnetic attachment with magnetic stainless steel cup yoke has been developed. The purpose of the present work was to discuss corrosion behavior of the magnetic stainless steel and to determined galvanic effect resulting from coupling dental precious alloys in oral environment. The magnetic stainless steel was new developed type 430 stainless steel. The corrosion resistance was investigated through immersion test, natural electrode potential and potential/current density curve measurement in 0.9%NaCl or 1%lactic acid at 37 ℃ for 7 days. The elution of Fe ion from the magnetic stainless steel was 0.9 ±0.1 $\mu g/cm^2$ in 0.9%NaCl at 37℃ for 7 days. It was almost equal to that from type 316L stainless steel. According their anodic polarization, a pitting corrosion potential of the magnetic stainless steel was 0.31 V(vs NHE), which was almost the same value as that of type 316L stainless steel. Though the natural electrode potentials of the magnetic stainless steel were lower than type 316L stainless steel, it might be stable because the potentials lie in the passive state. These results suggested that corrosion resistance of the magnetic steel be equivalent to that of type 316L stainless steel.

1267 Dynamic Viscoelastometry of Temporary Soft Lining Materials. H.MURATA*, T.HAMADA and T.ARIMA (Dept. of Prosthet. Dent., Hiroshima Univ., Japan).

The viscoelastic properties of temporary soft liners characterize the ability of the materials to recondition abused tissue underlying ill-fitting dentures and to take functional impressions. The purpose of this study was to establish a testing method using the dynamic viscoelastometer of non-resonance forced vibration method. Soft liners tested were GC Soft-Conditioner (GC), Hydro-Cast (HC), Hi-Soft (HS) and Visco-gel (VG). Three tests were carried out for each material, 2 h after mixing. The shear storage modulus (G'), shear loss modulus (G") and loss tangent (tan δ) were determined over the frequency range of 0.01, 0.1, 1, 10 and 100 Hz at different temperatures (25 - 70 ℃). The curves of G', G" and tan δ versus frequencies at different temperatures for each material were superimposed to a single master curve (37℃) by the time-temperature superposition principle. ANOVA and Tukey's method were used to analyze the data. The order of tan δ at 0.1Hz was : HS(1.91±0.43), HC (0.61±0.08), VG(0.50±0.02) and GC(0.34±0.00). HS was found to have a significantly higher tan δ (P<0.01) than the other materials. No significant differences were found among the tan δ of HC, VG and GC. That of tan δ at 100Hz was : GC(0.67±0.04), HS(0.51±0.04), VG(0.49±0.01) and HC(0.36±0.02). Differences between the materials were significant (P<0.01), except for HS and VG. The results suggest that the non-resonance forced vibration method is suited to determination of dynamic viscoelastic properties of temporary soft lining materials.

1268 Flexural and Impact Strengths of Four Polymeric Denture Base Materials. K MCLAUGHLIN[1]* and R L CLARKE[2] (Departments of Child Dental Health[1] and Biomaterials[2], The London Hospital Medical College, London, UK).

This study compared the flexural and impact strengths of four polymeric denture base materials; Trevalon Heat Cure (THC), Optilon 399 High Impact (OHI), Acron MC Microwave (AMC) and Forestacryl 'S' Self Cure (FSC). Ten rectangular and ten cylindrical samples were cured for each material by standard techniques with the exception of (AMC) which was cured in a fibre reinforced plastic flask using a domestic microwave oven. All samples were water conditioned for a period of six months prior to testing, being initally machined to the following dimensions: Flexural tests; depth 2mm x breadth 8mm with an effective span of 30mm. Notched Impact tests; diameter 8mm x length 44mm with a notch depth of 4.7mm. Flexural tests were conducted using a universal tensile testing machine with a crosshead speed of 5mm/min. Charpy impact tests were conducted using a Hounsfield Impact tester with a tup weight of 0.028 kg (1/16lb). Statistical analysis using Newman-Keuls ranked comparison tests showed heat cured materials with significantly higher mean flexural strengths (P<0.5) in comparison with (FSC). The mean flexural strengths (MPa ± SD) of the polymers tested decreased in the order of (OHI) 95.6 ± 8.1 > (AMC) 91.5 ± 7.5 > (THC) 90.3 ± 8.3 > (FSC) 75.1 ± 5.7. Notched impact tests showed mean impact energies (Joules) of materials decreased in the order of (AMC) 0.029 > (THC) and (FSC) 0.027 > (OHI) 0.026.

Optilon 399 showed the highest mean flexural strength of the materials tested whilst displaying the lowest mean impact strength. Acron MC Microwave showed favourable flexural and impact strengths.

1269 Acrylic Resin Reinforced with High Performance Polyethylene Fiber. Y.Y. CHENG*, T.W. CHOW, N.H. LADIZESKY+ and I.M. WARD+. (Faculty of Dentistry, University of Hong Kong, Hong Kong. +IRC in Polymer Science and Technology, University of Leeds, Leeds, UK.)

Highly drawn polyethylene fibers have been used as woven fabrics, continuous threads or chopped fibers to reinforced acrylic denture base resin. Laboratory testing of rectangular bars of the various fiber/resin systems confirmed that the reinforced material possesses superior properties of clinical importance. The typical results of the unreinforced and reinforced resin with continuous parallel fibers are as follows (SD in brackets); Stiffness GPa: 3.2 (0.2) & 19.9 (1.2), Impact strength kJm^{-2}: 10(1) & 125 (18), Water sorption $x10^{-3}gcm^{-3}$: 2.66 (0.03) & 1.12 (0.06), Curing shrinkage %: 0.33 (0.02) & 0.02 (0.01), Dimensional changes during water immersion %: 0.45 (0.01) & 0.02 (0.01). Improved stiffness (less deformation during function), large increase in impact strength (higher durability of dentures), and reduced processing shrinkage (more accurate initial fit) are complemented with decreased water sorption and associated dimensional changes (longer lasting fit). In addition, the resultant material is notch insensitive in impact (unaffected by anatomical fraenal notches) and remains in one piece even after severe and repeated tests (reduced likelihood of swallowing a broken during an accident). Reinforced maxillary and mandibular dentures have been successfully produced with standard dental compression moulding techniques. High fiber loading of over 30 volume % has been readily achieved with all three forms of reinforcement. The resultant appliances are aesthetically pleasing and clinical trials, now in their sixth year, are encouraging. The research concentrated on the reinforcement of denture base resin, but should also be relevant to the chemically similar surgical (or bone) cements. This study was supported by University of Hong Kong, Grant No. 335/255/0004.

1270 Factors Influencing Gelation Time of Tissue Conditioners. H. IWANAGA*, H. MURATA, N. SHIGETO and T. HAMADA (Dept. of Prosthet. Dent., Hiroshima Univ., Japan)

To investigate the effects of the composisition and structure on the gelation of tissue conditioners, gelation time was measured with an oscillating rheometer. As polymer powders, four poly ethyl methacrylates were used. As liquid, six plasticizers were used. They were benzyl salicilate, benzyl benzoate, butyl benzyl phthalate, butyl phthalyl butyl glycolate, butyl phthalate and butyl sebacate. Using an oscillating rheometer, the time required for a 75 % reduction in the width of the rheometer trace was used for gelation time in the evaluation method. Linear multiple regression analysis was carried out. Gelation time of a tissue conditioner was selected for the dependent variable, and the molecular weight, molar volume, solubility parameter and viscosity of the plasticizer were selected for independent variables. The best multiple regression equation was the one with independent variables of molar volume, solubility parameter and viscosity($P<0.01$). On the basis of the values of the standardized regression coefficients, the molar volume was most influential. It was suggested that gelation time was explained by linear multiple regression equations with independent variable of molar volume, solubility parameter and viscosity of plasticizer. In particular, the most influential factor was suggested to be molar volume. This study was supported by a Grant in Aid(No. 02557076, 03454449) for scientific research from the Ministry of Education, Science and Culture, Japan.

1271 Adherence of Oral Microorganisms to Guided Tissue Membranes. W. DISTLER*, S. MARWITZ and A. PETSCHELT (University of Erlangen, Dental School, FRG).

The first aim of this study was to compare qualitatively the bacterial adhesion to guided tissue regeneration (GTR) materials, namely mixed acetate/nitrate-cellulosester-membranes (MILLIPORE™), polytetrafluoroethylene-membranes (GORETEX™), polyglactin 910 (VICRYL™) and human dura mater. Secondly, we developed a method for quantitative measuring the adhesion of bacteria by radioactive labelling. *Streptococcus oralis (S. o.), Actinomyces naeslundii (A. n.), Capnocytophaga gingivalis (C. g.)* and *Actinobacillus actinomycetemcomitans (A. a.)* were selected for quantifying adhesion.

For qualitative inspection pieces of the membranes were placed in tubes containing broth cultures of the bacteria. After 24 - 48 h anaerobically growth the membranes were inspected by eye and SEM-microscopy. All bacteria adhered heavily to human dura mater, moderate to good to MILLIPORE™ and VICRYL™, and, with some exceptions, poor to hydrophobic GORETEX™.

Labelling the bacteria with 14-C-acetate and measuring bacteria adhering to equal membrane-pieces in tubes with increasing numbers of cells resulted in LANGMUIR-adsorption isotherms. At least three series of experiments per bacterium were done and mean values calculated.

Cell numbers between $0.21*10^8$ and $2.06*10^8$ per cm^2 were found. The differences between MILLIPORE™ and VICRYL™ compared to GORETEX™ were statistically significant ($p<0.001$; t-test). Ranked for adhering cells on MILLIPORE™, highest numbers were found for *S. o.*, followed by *C. g.*, *A. a.* and *A. n.*. For VICRYL™ this sequence changed to *A. a.*, *S. o.*, *C. g.* and *A. n.*. A further set of experiments with saliva-coated GTR-membranes needs to be done. Lower colonized hydrophobic materials like GORETEX™ may be favourable for GTR by reducing the amount of possible inflammation reactions in cases of exposed membranes.

1272 Formation of Macropores in Calcium Phosphate Cement Implants. S. TAKAGI* and L.C. CHOW (ADAHF PRC, NIST, Gaithersburg, MD, USA).

A calcium phosphate cement (CPC) was shown to harden at ambient temperatures and form hydroxyapatite as the only product. Animal study results indicated that CPC resorbed slowly and was replaced by new bone. For some clinical applications, it would be desirable to have macropores built into the CPC implant in order to obtain a more rapid resorption and concomitant osseointegration of the implant. The present study investigated the feasibility of a new method for producing macropores in CPC. Reagent grade Na_2HPO_4, $NaHCO_3$, and sugar crystals were sieved to obtain particles size in the range of 125 to 250 μm. Mixtures of CPC powder (an equimolar mixture of $Ca_4(PO_4)_2O$ and $CaHPO_4$) and up to 50 wt% of one of the above crystals were prepared. Cement specimens were prepared by mixing 4 parts of the above mixtures to 1 part of cement liquid (1 mol/L Na_2HPO_4). After hardening, the specimens were placed in water to dissolve the crystals. The porosity and diametral tensile strength (DTS) of the samples were then measured. Results (mean ± s.d.; n = 5):

Group	microporosity (vol%)	macroporosity (vol %)	DTS (MPa)
100% CPC	36.0 ± 0.5	0	10.1 ± 0.7
75% CPC + 25% Na_2HPO_4	22.2 ± 1.6	38.3 ± 4.4	1.5 ± 0.5
50% CPC + 50% Na_2HPO_4	17.9 ± 1.0	50.3 ± 2.7	0.37 ± 0.03
75% CPC + 25% $NaHCO_3$	26.3 ± 0.6	27.0 ± 1.6	2.4 ± 0.2
75% CPC + 25% sugar	29.2 ± 0.6	19.0 ± 1.7	3.7 ± 0.3

SEM examinations revealed well-formed macropores in the shapes of the entrapped crystals. Summary: Macropores can readily be formed in CPC implants with the use of water soluble crystals. Mechanical strength decreased with increasing porosity. Supported in part by NIH grant DE05030.