

# Southeast Asian Division

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#### *Participants and Sequence Numbers of Abstracts*

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<p><b>S-1</b> Abutment Tooth Vitality and Longevity of Fixed Partial Dentures. P-O.J. GLANTZ (Oral Health Science Centre, Malmo, Sweden).</p> <p>The use of root filled teeth as abutments for fixed partial dentures (FPD) is a long accepted practice and successful component of modern prosthodontics. Little knowledge has, however, been available about the relative prognostic value of root filled abutment teeth as compared to vital ones. A series of surveys and clinical experiments was therefore performed to compare the relationship between abutment tooth vitality and the longevity of FPDs. The survey was performed during a 7 year period on a group of 316 patients selected at random from the files of the Swedish Dental Insurance System. All studied patients were treated with FPDs (mean extension = 8 units) by general practitioners prior to selection. The results show that fractures of distal abutment teeth only occurred in root filled such teeth and that the frequency of all types of technical failures (incl. loss of FPD-retention and FPD-fractures) was higher for patients with root filled distal abutment teeth and varying with the number of FPD-cantilever extension pontics. The biomechanical quality of root filled and vital abutment teeth was studied in a series of clinical bending experiments on three healthy subjects. The results of this study show root filled teeth to have a biomechanical (pain and/or discomfort) threshold level that is more than twice as high as that of neighbouring or contralateral vital abutment teeth. <u>The results of these studies therefore show in FPDs root filled distal abutment teeth exhibit more frequent mechanical failures than vital ones.</u></p>	<p><b>S-2</b> Emerging diseases and oral health care. C SCULLY* (Eastman Dental Institute for Oral Health Care Sciences, University of London, UK)</p> <p>The human has a remarkable array of defences against microorganisms. Similarly, microorganisms can be remarkably adept at colouring suitable niches evading host defences and outwitting attempts at their destruction, not least by the appearance of antimicrobial resistance, new strains or even new organisms. Immune defects, population shifts and changing lifestyle and environment contribute to the emergence of new diseases, several of which can affect oral health or health care, and have implications for all specialities.</p> <p>Infection with human immunodeficiency viruses (HIV) is making a major impact and oral infections with new viral and fungal organisms and other agents are appearing, with new clinical diseases, disorders hitherto found only in specific geographical areas, and with implications for oral health care.</p> <p><u>Dental health care workers now need to extend their education into a much wider field of health care.</u></p>
<p><b>S-3</b> The Potential Role of Growth Factors in the Regeneration of the Periodontium and Alveolar Ridge. T. HOWARD HOWELL (Harvard School of Dental Medicine, 188 Longwood Ave, Boston, MA, USA).</p> <p>Resorption of alveolar bone occurs as a result of periodontal disease and as a normal remodeling of bone following tooth loss. Throughout the years, a variety of substances and technologies have been used with moderate success to regenerate the soft and hard tissues of the periodontium following bone resorption. Recently, advances in the understanding and use of biological response modifiers, such as growth factors, gives us a new opportunity to modulate and enhance the healing of the periodontal wound and has taken us to a new frontier in periodontal regenerative therapy. This presentation will review some of the preclinical and clinical studies that have confirmed the regenerative potential of selected growth factors. Specific data from several unique human clinical trials recently completed at the Periodontal Research Center at Harvard using growth factors such as Platelet Derived Growth Factor (PDGF), Insulin Like Growth Factor (IGF), and Bone Morphogenetic Protein-2 (BMP-2) will be presented.</p>	<p><b>S-4</b> Future Oral Health Status: Experiences from Japan. M. MORIMOTO (Research Institute of Oral Health Science, Nihon University, Matsudo, Chiba, Japan).</p> <p>Modern dentistry in Japan has started at the early stage after the Meiji Restoration by missionaries in foreigners, settlement in Yokohama and the Dentist Law has legislated in 1906. I wish to explain the subjects showing my title the contemporary history of Japanese dentistry about fifty years since 1950, as I can state that the recent Japanese dentistry has been developed after the World War II. Japanese characteristic of dental laws are consisting the Dentist Law, Dental Hygienist Law and Dental Technician Law. Further, all of Japanese are insured by any kind of social insurance scheme. Japanese dental care delivery has developed in parallel with increasing of quality and quantity. Under the such circumstances, Japanese dental care has been fulfilled and oral health status improved also. On these context I wish to explain punctually.</p>
<p><b>S-5</b> Studies of the Pharmacologic Effects of Fluoride in Children and Adults in the United States and China. G. STOOKEY, R. JACKSON, Y. LI, S. NIU, C. LIANG, A. DUNIPACE, B. KATZ (Indiana U School of Dentistry, USA, Academy of Preventive Medicine, China)</p> <p>The purpose of this series of six clinical studies was to investigate the pharmacologic effects of fluoride in children and adults exposed to excessive concentrations of fluoride in the presence and absence of conditions which were considered to have the potential for exacerbating any adverse effects of fluoride if, in fact, they exist. These conditions included lifetime ingestion of fluoride in the drinking water at four times the optimal level, osteoporosis being treated with large doses of fluoride, diabetes, decreased renal function, and malnutrition (i.e., suboptimal intake of calcium and protein). Parameters investigated included dental and skeletal fluorosis, blood enzymes routinely used to determine organ function and patient wellness, genotoxicity as evidenced by sister chromatid exchange in blood lymphocytes, and concentrations of fluoride in blood and urine. Total fluoride intake was also determined in patients in both studies conducted in China. The results of these studies indicated that there was no adverse effect of fluoride on organ function or patient wellness regardless of the level or duration of exposure or the presence of medically-compromising conditions. Similarly, there was no evidence of a genotoxic effect of fluoride in any of the studies. The only adverse effects of excessive fluoride intake observed in any of these studies was dental fluorosis (when ingested during infancy) and skeletal fluorosis in the studies in China, particularly in the presence of sub-optimal nutrition</p>	<p><b>O-1</b> Orofacial Pain and Discomfort among Malaysian Army Personnel. NMZ WAN HUSSAIN, IA RAZAK*, TN MOHD DOM. (Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia)</p> <p>The aims of this study were to look into the prevalence and impact of orofacial pain and discomfort among 202 randomly selected Malaysian Army Personnel (MAP). The data were collected through a self-administered questionnaire and an oral examination. About 60% of the subjects had experienced orofacial pain and discomfort within the four weeks prior to the survey. The point prevalence for pain was 38.1% and 46.3% for discomfort. Out of the subjects who had pain, 18% were granted leave and 40% had disturbed sleep due to pain. Despite this only one-quarter of them consulted a doctor or dentist and only about half of them sought treatment promptly. Among the reasons given for the delay were the lack of urgency, no time due to work commitment and the unavailability of a dentist in the camp. Among those with discomfort, only about 28.2% had consulted a doctor or dentist. The majority did not seek professional help because they thought that the condition was not too serious and they also took self-medication aimed at relieving discomfort. The dentition status of the MAP personnel was better than their corresponding civilian population. However all subjects showed evidence of periodontal disease. Subjects with more decayed teeth are more likely to report of dental pain. <u>It is recommended that the MAP be made aware of the importance of oral health and its possible consequences to the military organisation. There is also a need to introduce the Active Dental Support (ADS) programme for these personnel. However this programme should incorporate a preventive and health promotion component.</u></p>
<p><b>O-2</b> Impact of Orofacial Pain and Discomfort in 16-17 yrs-old children in Johor, Malaysia. J. DOREYAT and N. JAAFAR* (Min. of Health Malaysia &amp; Dept of Community Dentistry, University of Malaya, K. Lumpur).</p> <p>The study aims to investigate the use of subjective measures using orofacial pain and discomfort and its perceived impact as an evaluative tool to complement normative indices. The sample consist of 420 Malay children, from 2 urban and 2 rural schools, aged 16-17 years, who had received treatment from the School Dental Service throughout their school years. Subjective data (orofacial pain) were collected through a self-administered questionnaire, while normative data (DMF, CPITN, pain diagnosis) were collected through a clinical examination. The mean caries level was low (DMFT 3.4) with almost no unmet treatment needs (DT 0.20, MT 0.27) while FT was 2.99. The majority had a healthy periodontium (61% CPITN=0). However despite the commendable normative outcome, 34% of subjects had pain in the past 4 weeks. The prevalence of orofacial pain and/or discomfort in the past 4 weeks was about 65%. The point prevalence was 53%. Orofacial pain was the second most common pain condition after headache (41%). The most common pain was sensitivity to hot/cold foods/drinks (16%), ulcers (15%) and toothache (5%). However the majority (96%) felt it was not severe and hence did not do anything about it (79%). The most common discomfort was food impaction (44%). Psychosocial impacts (eg. depression, interrupted sleep, worry) affected between 3-21% of the total sample. One in 20 said that their concentration in studies were affected. <u>It is concluded that orofacial pain/discomfort has a significant psychosocial impact on the sample, despite the fact that almost all subjects have been certified as "dentally fit" from the normative point of view.</u></p>	<p><b>O-3</b> Prevalence of signs of temporomandibular disorders in non-TMD subjects. P. VANICHANON*, C. SATRASOOK, and P. KUESAKUL (Faculty of Dentistry, Chulalongkorn University, Bangkok, THAILAND)</p> <p>The objectives of this study are to determine the prevalence of clinical signs associated with temporomandibular disorders (TMD) in non-TMD subjects and to compare the prevalence of those signs in groups of subjects with respect to age and sex. A sample of 193 non-TMD Thai subjects from non-academic staff of the Faculty of Dentistry were clinically examined. Subjects included 138 females and 55 males ranging from 20 to 60 years of age. About three-fourths of the subjects (74.1%) had at least one sign of TMD. The most common signs were masticatory and/or jaw muscle tenderness (48.1%), deviation on mouth opening (38.3%) and temporomandibular joint sounds (32.6%). Frequencies of masticatory muscle tenderness ranged from 2.1% for the posterior temporalis to 35.2% for the lateral pterygoid area, most were only a mild tenderness. Males significantly demonstrated larger unassisted maximum opening (51.0 ± 5.0 mm.) than did females (48.8 ± 5.5 mm., p&lt;0.05). No statistically significant differences were shown between males and females for frequencies of the observed signs (Chi-square test, p&gt;0.05) except females had higher frequencies for lateral pterygoid and submandibular region tenderness. In addition, no significant differences were found for the prevalence of signs between age groups (20-40 years and 41-60 years). <u>The results suggest that the prevalence of signs associated with TMD appear to be common in non-TMD Thai samples. However, when individual signs are evaluated separately, the prevalence is relatively low with a mild degree of severity. Most of the observed signs are found equally in males and females and in age groups. These findings are in concordance with other foreign studies.</u> (Supported by Dental Research Fund, Faculty of Dentistry, Chulalongkorn University)</p>

<p><b>O-4</b> Comparison of Exercise, Habit Reversal, and Placebo for Myofascial Pain. A. LADPLI*, J.R. FRICTON and J.L. WAGNER (Chulalongkorn University, Bangkok, Thailand and University of Minnesota, USA).</p> <p>Thirty-five patients with a primary diagnosis of masticatory myofascial pain (MFP) participated in a study using a short-term (4-6 weeks) randomized placebo-controlled clinical trial to determine the efficacy of stretching exercise or habit reversal in treating masticatory MFP. Patients were randomly assigned to either stretching exercise (E), habit reversal (H) or placebo medication control (M) group. Outcome measures included Symptom Severity Index (SSI) to measure subjective pain, Muscle Index (MI) to measure the number of muscle tenderness, pressure pain threshold (PPT) and range of motion measurement. The final data were obtained from 10 patients in group E, 9 patients in group H and 9 patients in group M. The results of the between-group comparison by ANOVA failed to reject the null hypotheses that there were no group differences relative to mean change from baseline for the outcome measures (<math>p &gt; 0.01</math>). Paired student's <i>t</i>-tests were used to compare treatment effects within each group. Patients in group E reported pain reduction and demonstrated decreased muscle tenderness. Mean changes for SSI, MI and PPT for this group were statistically significant (<math>p = 0.003</math>, <math>p = 0.0001</math>, <math>p = 0.002</math>, respectively). Mean range of motion was slightly increased, but not significantly. Patients in group H also had tendency toward improvement but not statistically significant. Patients in group M showed statistically significant reduction in the MI (<math>p = 0.003</math>). Overall, the stretching exercise showed greater consistency for improvement than habit reversal or placebo in reducing pain and muscle tenderness in masticatory MFP patients. However, since masticatory MFP is multifactorial, one treatment alone may not be enough to significantly improve signs and symptoms.</p>	<p><b>O-5</b> The validity of using mandibular movement velocity as a diagnostic parameter for Temporomandibular Disorders. (C.Z.WU*, C.M.LIU, S.L.CHOU. Taipei Medical College School of Dentistry, Taipei, Taiwan, ROC)</p> <p>EMG, bite force analysis and opening amplitude of the mandible have been studied fairly extensively for their sensitivity and specificity as a diagnostic parameter for TMD, but none is of valuable aid for the differential diagnosis of TMD. The aims of this study are to test the sensitivity and specificity of using mandibular movement velocity as a diagnostic parameter for the TMD. Thirty-three non-TMD subjects (24 males and 9 females, ages ranged from 21 to 26 years old) and twenty TMD subjects (16 males and 4 females with comparable age distribution) joined the study. Myotronics Kinesigraph K-6 system was applied for the measurement of jaw motion velocity. Each subject was instructed to open and close the mouth as fast and wide as possible, ten continuous open-close strokes were recorded before and immediate after splint insertion and the data were processed for the following categories: (1) the maximal opening velocity (MOV), (2) the average opening velocity (AOV), (3) the maximal closing velocity (MCV), (4) the average closing velocity (ACV) and (5) the maximal terminal velocity (MTV) 1mm before tooth contact. Mean velocity difference between pre-splint insertion and post-splint insertion in non-TMD and TMD group was used for the calculation of the sensitivity and the specificity. Analysis of data indicated the sensitivity and the specificity among the five categories were 0.65 vs. 0.45 in MOV, 0.59 vs. 0.39 in AOV, 0.80 vs. 0.30 in MCV, 0.80 vs. 0.30 in ACV and 0.65 vs. 0.48 in MTV respectively. In conclusion, the sensitivity of the maximal closing velocity and the average closing velocity is high enough to be used as a diagnostic parameter for evaluation of the TMD. This study is supported in part by NSC-85-2331-B-038-033.</p>
<p><b>O-6</b> Traumatized Anterior Teeth and Psychosocial Impact: The Malaysian Students' Experience. K.C. LEE, R. ABDUL-KADIR*, and T.N. MD-DOM (Min of Health and University of Malaya, Kuala Lumpur, MALAYSIA).</p> <p>Traumatic dental injuries which are quite common in many countries, have received rather scant attention in Malaysia as evident from the lack of local studies on this condition. Limited information collected from earlier studies point to a high proportion of untreated traumatic injuries among younger schoolchildren. A cross-sectional study was carried out to determine the prevalence of traumatic injuries in permanent anterior teeth in a sample of 2132 16-year-old students in the state of Malacca. In addition, the amount of treatment needs of untreated trauma as well as its impact on quality of life of affected individuals, was assessed through a questionnaire. Findings revealed that the prevalence of traumatised anterior teeth was low at 6.1%. Males had significantly higher prevalence than females at 3.9:2.2. The majority had one tooth injured and the most commonly involved tooth was the maxillary central incisors. Untreated traumatised teeth comprised 74.4% of all traumatised teeth in 80.2% of all trauma cases. Of the untreated teeth, 58.8% were found to require treatment. In addition, 57% of subjects with untreated traumatised teeth perceived a need for treatment with aesthetics as the most commonly reported reason. The level of reported impact among those with untreated trauma was low to moderate with psychological and social dysfunction reported more frequently than functional limitation or pain and discomfort. Generally, subjects who reported impacts also perceived a need for treatment more often than those who did not perceive.</p>	<p><b>O-7</b> The Involvement of Pterygomandibular Space in Lateral Pharyngeal Space Infection. P.KUMPLANONT (Hatyai Regional Hosp., Hatyai, Songkhla 90110, Thailand).</p> <p>Lateral pharyngeal space (LPS) infection is one of the most life threatening maxillofacial infections. Its extraoral swelling may be mistaken in diagnosis and treatment. This study was conducted in 20 patients with LPS infection secondary to odontogenic origin. Other fascial space infections, particularly pterygomandibular space (PMS) and submandibular space (SMS), were assessed. In addition, the location and spreading regions were confirmed by intraoral examination. We found 6 out of 20 patients had only LPS infection whereas 14 patients showed LPS infection associated with PMS (13 cases) and SMS (1 case). Fisher's Exact test showed statistical correlation between infections of LPS and PMS (<math>P &lt; 0.001</math>). The results indicate that PMS is the most common fascial space involved in the infection of LPS and should be detected early to prevent spreading to LPS.</p>
<p><b>O-8</b> Metastatic Neoplasms in Jaw Bones in An Oriental Population J.F. YEO (Department of Oral and Maxillofacial Surgery, National University of Singapore, SINGAPORE)</p> <p>In order to collate demographic and clinical information on metastatic neoplasms in jaw bones as seen by dentists in Singapore, a retrospective survey was done in Histopathology Laboratory, Department of Oral and Maxillofacial Surgery, NUS on biopsy reports over a period of 40 years, i.e. from 1954 to 1993. Fifteen cases of metastatic neoplasms were reported. Patients' age ranged from 13 months to 65 years old giving a mean age of 38.5 years <math>\pm</math> 25.5 years. Most cases fell into the 1st decade (26.7%), 4th decade (20%) and 7th decade (33.3%). 60% were females. The racial distribution were: Chinese (64%), Malays (20.4%), Indians (7.8%) and others (7.8%). The duration of symptoms ranged from 3 weeks to 1 year. Two thirds of cases occurred in the mandible. Associated teeth in most cases were loose. Pain and ulcerations were reported in two cases respectively. No neck nodes were reported. The histologic diagnoses included: undifferentiated carcinoma, large cell anaplastic carcinoma, small round cell tumour, neuroblastoma, choriocarcinoma, nephroblastoma, neurogenic sarcoma and follicular carcinoma. The primary tumour sites were breast, brain, nasopharynx, lung, thyroid gland, kidney and uterus. It is important that dentists be aware of such seemingly uncommon metastatic neoplasms when managing patients with osteolytic lesion in the jaw bones.</p>	<p><b>O-9</b> The Relationship between Smoking and Periodontal Disease. P. Silarujisun, S. Moonsarapee and N. Hongprasong* (Dept. of Periodontology, Fac. of Dentistry, Chulalongkorn Univ., Bangkok, Thailand).</p> <p>Previous research data indicated that smoking is one of the significant risk factors in the development and progression of periodontal disease. So this study wanted to know the relationship between cigarette consumption and severity of periodontal disease, and to compare the severity of the disease among current smokers, former smokers and non-smokers. One hundred and fifty periodontal patients from the Periodontal Department, Faculty of Dentistry, Chulalongkorn University who had at least 20 teeth with 4 molars, were asked to complete questionnaire about smoking habits. Smoking consumption was classified to be light (less than 10 cigarettes/day) and heavy (more than 10 cigarettes/day) including the history of smoking for the former smokers. Periodontal data was collected from their periodontal chart records. The severity of the disease was classified by the depth of periodontal pocket: slight (4-5 mm.), moderate (6-7 mm.) and severe (more than 7 mm.). The data was statistically analysed using <math>\chi^2</math> test (<math>P &lt; 0.05</math>) by computerised program SPSS. It is found that smoking and also the level of cigarette consumption are significantly related to the severity of the disease. Non-smokers have less severity of the disease than current smokers and former smokers while no difference in severity of the disease between current smokers and former smokers. In the conclusion, periodontal patients who are current smokers or former smokers will have more susceptible to periodontal disease than non-smokers. And the level of cigarette consumption is also related to the severity of the disease. This study was supported by Dental Research Fund, Faculty of Dentistry, Chulalongkorn University.</p>
<p><b>O-10</b> Subgingival Periodontopathogens of Smokers and Non-smokers in an Asian Population. L.P.LIM*, F.B.K. TAY &amp; M. GUNARATNAM (Faculty of Dentistry, National University of Singapore)</p> <p>Smoking and subgingival infection with specific periodontopathogens have been identified as factors which increase the risk for periodontitis. The aim of this study was to examine the association between cigarette smoking and subgingival infection with periodontopathogens and if smokers are more likely to be infected with certain periodontopathogens than non-smokers in an Asian population. Microbiological analyses was performed in 97 male adult Periodontitis patients (35 non-smokers and 62 smokers). Subgingival plaque samples were collected from the deepest palatal pocket (probing depths <math>&gt; 5</math>mm) of each subject using sterile paper points. The samples placed in VMGA III transport media were sent to the Oral Microbiology Testing Laboratory at University of Southern California for microbiological analyses by culture. The periodontopathogens assayed were: <i>Actinobacillus actinomycetemcomitans</i>, <i>Fusobacterium nucleatum</i>, <i>Porphyromonas gingivalis</i>, <i>Prevotella intermedia</i>, <i>Bacteroides forsythus</i>, <i>Camphylobacter rectus</i>, <i>Capnocytophaga</i> and <i>Peptostreptococcus micros</i>. A higher proportion of smokers than non-smokers harboured most of these organisms except for <i>A. actinomycetemcomitans</i>. The differences were significant for <i>P. intermedia</i> and <i>P. micros</i> (Chi-square <math>P &lt; 0.05</math>). The studies concurred with recent findings that smokers are more likely to be infected with periodontopathogens than non-smokers although some differences in the preponderance of certain organisms were found. This study was supported by Research Grant RP3930351, National University of Singapore</p>	<p><b>O-11</b> Detection of <i>Porphyromonas gingivalis</i>, <i>Bacteroides forsythus</i> in An Asian Population. F.B.K. TAY*, L.P. LIM &amp; M. GUNARATNAM Faculty of Dentistry, National University of Singapore</p> <p><i>Porphyromonas gingivalis</i> and <i>Bacteroides forsythus</i> have been implicated in destructive periodontal disease. Various microbiological techniques of detecting these organisms have been used. This include analyses by culture, DNA probes and more recently PCR (Polymerase chain reaction). The purpose of this study is to identify the presence of <i>P. gingivalis</i> and <i>B. forsythus</i> using these different methods of microbiological analyses in an Asian population presenting with periodontitis. Subgingival plaque samples were taken from 94 male patients presenting with pocket depths of at least 5mm were sampled from selected sites. The samples for culture were placed in VMGA transport media and the samples for analyses by DNA probes and PCR were placed in vials. The samples were sent to the Oral Microbiology Laboratory, University of Southern California for analyses. <i>P. gingivalis</i> was found to be present in 33% of the samples using culture, 63.8% by DNA probe and 77.7% by PCR. <i>B. forsythus</i> was found in 25.5% of the samples using the culture, 58.5% by DNA probe and 72.3% by PCR. Cross tabulation of the techniques indicate a significant difference in the results obtained from Culture method from PCR for both the organisms (<math>P &lt; 0.05</math>). The results suggest that PCR is the more sensitive method in detecting the presence of these putative organisms. The study was supported by Research Grant from the National University of Singapore</p>

**O-12** Salivary immunoglobulin A levels in "rapid" and "slow" plaque formers. K.Y. ZEE\* and L.P. SAMARANAYAKE (Faculty of Dentistry, The University of Hong Kong).

Salivary immunoglobulin A (s-IgA) is known to play a role in aggregation of oral bacteria, and hence, may affect the rate of plaque formation. Therefore, the aim of this study was to investigate s-IgA levels in "rapid" and "slow" plaque formers. Forty-nine healthy volunteers were screened for their plaque formation rate. All the subjects received oral hygiene instructions and prophylaxis once a week for 3 weeks in order to upgrade their gingival health. Thereafter, a 3-day no oral hygiene period started in order to assess the plaque formation rate using the plaque index (PI). PI on the buccal surfaces of all the canines, premolars and 1st molars were recorded and 5 subjects with the highest mean PI and 5 with the lowest mean PI were selected as "rapid" and "slow" plaque formers, respectively. Unstimulated whole saliva was collected into a ice-chilled beaker from each of these 10 subjects. The saliva samples were then centrifuged at 10,000g for 10 min. and the supernatants were stored at -70°C until analysis. Reference curves for s-IgA were established by testing serial dilutions of human IgA with known concentrations. The levels of s-IgA in the saliva of all the subjects were assessed by using a conventional ELISA technique. Differences between the 2 groups were compared by using Student t test. Results showed a statistically significant ( $p < 0.05$ ) difference in the mean s-IgA concentration between the "rapid" ( $9\mu\text{g/ml} \pm 1.9$ ) and "slow" ( $17\mu\text{g/ml} \pm 6.3$ ) plaque formers. This suggests that s-IgA may contribute to the differences in the rate of plaque formation in these two groups of subjects.

**O-13** Antigenic proteins in the outer membrane of *Porphyromonas gingivalis*. B. Yapong<sup>1</sup>, S. Koorntongkaw<sup>2</sup> and M. Ongsakul<sup>3</sup> (Fac. of Dentistry, Fac. of Science, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand.)

Many methods have been used to identify *Porphyromonas gingivalis* (*P. gingivalis*) in subgingival plaque samples including culture techniques, immunological assays and DNA probe. However, immunological assays still appear to have potential in the microbiological diagnosis of periodontal diseases. The purpose of our study was to investigate *P. gingivalis* outer membrane antigens using electrophoresis and Western blotting. *P. gingivalis* ATCC 33277 was ultrasonically disrupted in a solubilizing solution containing 10mM HEPES, pH7.4, 0.05 mM PMSF and 0.3 % SLS. The supernatant fraction was collected. The pellet was then dissolved in the solubilizing solution. The outer membrane was isolated by centrifugation at 100,000xg for 2 h. Polyclonal antibodies against *P. gingivalis* were raised in rabbits using the supernatant or outer membrane fraction. Characterization and antigenicity of the extracted proteins were studied by SDS-PAGE and Western blot analysis. Five major proteins of outer membrane ranging from 44 to 78 kDa were recognized by sera raised against the supernatant. The 44 kDa protein exhibited obvious reaction in both supernatant and outer membrane fractions. The specificity of antibodies was confirmed by positive results in indirect immunofluorescence against *P. gingivalis*. These results suggest that the outer membrane of *P. gingivalis* contains antigenic proteins. The 44-kDa surface protein seems to be a potent antigen.

**O-14** Effect of Dexamethasone on Periodontal Healing of Replanted Dog Teeth. V.SAE-LIM\*, Z. METZGER, M.TROPE (University of North Carolina at Chapel Hill, USA).

Previous studies have shown ViaSpan to be an excellent medium for the extended storage of avulsed teeth. Also, it has been shown that replantation of teeth into a 48-hour-old socket resulted in a particularly high degree of inflammatory root resorption. It was hypothesized that this resorption was related to macrophage activation within the tooth socket at this 48-hour time period, resulting in a plethora of cytokines and other products implicated in bone/root resorption. Steroids have been shown to inhibit macrophage activation and its consequences. The purpose of the present investigation was to evaluate histologically, the effect of dexamethasone in the prevention of root resorption in stored and replanted dogs' teeth. Twenty nine roots of 3 beagle dogs were endodontically treated to prevent subsequent inflammatory root resorption of pulpal origin. The teeth were extracted and randomly assigned to 3 groups for 48 hours storage. Group 1. Teeth (n=13) were stored in vials containing ViaSpan only. Group 2. Teeth (n=10) were stored in vials containing ViaSpan and dexamethasone (topical treatment, concentration 16 ug/ml). Group 3. Teeth (n=6) were stored in vials containing ViaSpan only, but dexamethasone was administered intramuscularly (systemic treatment, 0.5mg/kg bw) 2 days prior to, on the day of and the following 2 alternate days after extraction/replantation. After 12 weeks, the dogs were sacrificed, the teeth histologically prepared and evaluated according to Andreasen. The mean percentage complete healing in the Group 2 (85%) was significantly higher than that in Group 1 (69%) and Group 3 (67%). Accordingly, the mean percentage inflammatory and replacement resorption of Group 2 (13%, 3%) were lower than that in Group 1 (22%, 7%) and Group 3 (28%, 5%). There was an indication that topical use of dexamethasone resulted in an increase of complete healing and less resorption complications.

**O-15** Dental and periodontal health status in Thai vegetarians.

A. JANKITTIVONG\* and T. PREMSIRINRUND (Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand)

It has been found that the diet of vegetarian is beneficial to oral health, as reflected by a high number of teeth present, improved caries status, and increased the resistance of periodontal tissues. The aim of this study was to compare the dental and periodontal health status in vegetarians with their non-vegetarian controls. Subjects were 130 Thai lactovegetarians who maintained at least 5 years in vegetarian diet and 130 volunteer non-vegetarian controls. All subjects were interviewed about their dietary habit. Of the lactovegetarians, 76.9% had 5-14 years of vegetarianism and the majority (73.8%) ate only one meal a day. The dental and periodontal health status were assessed by oral examination. DMFT and gingival index were registered. The vegetarians and controls did not differ in their caries prevalence (58.5% vs 60.8%;  $p > 0.05$ ). The number of remaining teeth, DMFT and gingival index in the vegetarians and controls were not different ( $p > 0.05$ ). Although the prevalence of periodontal diseases were numerically high in both group, the vegetarians showed significantly lower periodontal disease prevalence than the controls (81.5% vs 95.4%;  $p = 0.008$ ). There were no differences in DMFT and gingival index among the lactovegetarians regarding to their duration of vegetarian diet. This study did not demonstrate better dental health in vegetarians in comparison with their controls but it did show less prevalence of periodontal disease in the vegetarians. This study was supported by the Dental Association of Thailand.

**O-16** Effect of Self-Administered Daily Irrigation on Gingivitis in Orthodontic Patients. V.KERDVONGBUNDT (Mahidol University, Bangkok, Thailand)

To determine the effect on periodontal health of daily self-administered water irrigation device (Water Pik). Thirty subjects of fully banded orthodontic patients were selected and assigned to two stages. They had moderate chronic generalized gingivitis, free from any abnormal systemic metabolic condition and did not use any antibiotics, steroids or nonsteroidal anti-inflammatory agents. Stage one was done during the first month, and subjects were given their regular oral hygiene techniques (own toothbrushing technique). Stage two was done during the second month, subjects were given instructions for using the Water Pik along with their own toothbrushing techniques. Irrigating was employed two and one-half minutes, twice daily after breakfast and after supper. Irrigation was used in accordance with the manufacturer's instruction with the highest available pressure, full reservoir of water, and kept the device tip close to the teeth, but not touching them. No other forms of oral hygiene were allowed. All subjects were not to have their teeth scaled or dental prophylaxis done during the 8 - week period of the study. Scoring was done at baseline, 4 - and 8 - weeks, with measurements taken of the amount of debris, calculus, plaque and the amount of inflammation present in papillary, marginal, and attached gingiva. Bleeding index and injured to soft tissue, hard tissue and restoration were registered. Plaque scores were low after using oral irrigator. The clinical data showed more improvement in periodontal health after the 4 weeks for the water irrigation group ( $P < 0.01$ ). Gingivitis on some interproximal decreased. Damage to restoration was not found. It would appear that irrigation alone is marginally effective in controlling plaque and gingivitis in untreated inflamed gingivae. The use of a water irrigating device will prevent the increase of gingivitis and, to some extent, decrease the gingivitis, as well as enhancing the removal of plaque in patients undergoing orthodontic therapy.

**O-17** Compressive Strength of a Glass Ionomer Cement with Antibacterial Agents. M.G. Botelho (Prince Philip Dental Hospital, Hong Kong)

Recent studies have investigated the antimicrobial effect of incorporating antibacterial agents into dental materials. The addition of antibacterial agents into GIC's may be useful in restoring cavities where carious tissue may be inadvertently or deliberately left in situ. However, the addition of antibacterial agents may have detrimental effects on the physical properties of the restorative material. The aim of this pilot study was to investigate the effects on the 24 hour compressive strengths of antibacterial agents incorporated into the powder of Fuji IX. Two antibacterial agents; chlorhexidine hydrochloride (CXH), and cetrinide (CET) were added at 0% (control), 1%, 3% and 6% concentration by weight of set cement into the powder of GIC. Materials were mixed according to manufacturers' instructions and 90 cylindrical specimens 6mm X 3mm diameter were mixed in a 3:0:1 powder to liquid ratio at 80-90% humidity and stored for 24 hours in deionized water. The specimens were subjected to a compressive force to failure in an Instron machine (model1185) at a crosshead speed 1mm/min and the force in MPa's calculated. ANOVA test showed highly significant reductions in compressive strength ( $P = 0.0001$ ) with the addition of both CET and CXA to Fuji IX. Dunnett's test showed significant ( $P = 0.01$ ) differences between the antibacterial test groups and the control. Compressive strength at 24 hours: Fuji IX 226MPa SD±17.6, CET 1% = 204MPa SD± 19.3, 3% = 127MPa SD±15.2, 6% = 89MPa SD±13.9, CXH 1% = 194MPa SD± 18.5, 3% = 165MPa SD± 30, 6% = 160MPa SD± 13.7.

From this pilot study, it can be concluded that the addition of antibacterial agents to Fuji IX should be performed cautiously to avoid adverse effects on the physical properties. Grant CRCG 373-252-0009

**O-18** Influence of lactic acid on surface microhardness of resin-modified glass ionomer restorative materials. M. NOOR and C.G. TOH\* (Department of Conservative Dentistry, Faculty of Dentistry, University of Malaya, Kuala Lumpur, MALAYSIA)

Resin-modified glass ionomer restorative materials are becoming increasingly popular as restorative materials because of their improved handling property but little is known about their surface properties such as surface microhardness. The objective of this study was to evaluate the surface microhardness of 4 commercially available resin-modified glass ionomer restorative materials (Fuji II LC (improved)<sup>1</sup>, Photac-Fil<sup>2</sup>, Vitremer<sup>3</sup> and Dyract<sup>4</sup>), a conventional glass ionomer restorative material (Fuji IX GP<sup>5</sup>) and a composite material (TPH<sup>6</sup>) when stored in 0.01 mol/L lactic acid-sodium acetate buffer solution (pH 4.1) for 1, 7, and 28 days as compared to the surface microhardness immediately after cure. Twenty samples of each material were fabricated for each period of storage with 10 of the samples being coated with a bonding agent (ProBond<sup>7</sup>). Each group of 10 specimens were kept in dark plastic containers and stored in an incubator set at 37°C ± 2°C. Measurements were taken at 23°C ± 1°C by using a Shidmadzu Microhardness Tester HMV-2000 with a Vickers diamond and 100 gm load for 15 seconds. The surface of each specimen was ground with a 1000 grid carboride paper before 3 indentations were made. Data were analyzed by using ANOVA and Newman-Keuls Multiple Range Test. Representative SEM micrographs of each group of materials studied were made. All materials with and without bonding agent exhibited a significant progressive decrease in surface microhardness with storage in lactic acid ( $p < 0.05$ ). SEM observations of samples after storage in lactic acid for 7 and 28 days showed surface roughness and multiple cracks on the surfaces of all conventional and resin-modified glass ionomer materials except Dyract irrespective as to whether bonding agent was applied prior to storage. There were no cracks and the surfaces remained smooth for Dyract and TPH samples. It was concluded that exposure to an acid environment will cause adverse changes to the surfaces of resin-modified glass ionomer restorative materials. A preliminary coat of bonding agent will not protect the material against such changes.

**O-19** Thermocycling as a means of inducing mechanical fatigue in dental composites. NH Abu Kasim\* and JF McCabe. Dental Faculty, University of Malaya, Malaysia and Dental School, University of Newcastle upon Tyne, UK.

The effect of thermocycling on the fatigue behaviour of 5 commercially available dental composites; P50(P)<sup>1</sup>, Silux Plus(S)<sup>2</sup>, Heliomolar(H)<sup>3</sup>, Clearfil Photo Posterior-light activated(CLA)<sup>4</sup> and Clearfil Posterior-chemically activated(CC)<sup>5</sup> was investigated. One hundred and ten rectangular bar specimens were prepared for each material and divided into 11 groups of 10 each. Ten groups 1-6 were subjected to 0, 250, 500, 750, 1000 and 10000 thermal cycles respectively. Each thermal cycle consisted of 1 minute immersion time of 50 seconds per change. The control groups 7-11 were stored in distilled water at 37°C for the equivalent time to complete 250, 500, 750, 1000 and 10000 thermal cycles respectively. All specimens were subjected to a 3 point bend test and loaded at a crosshead speed of 1mm/min on an Instron Testing Machine. The flexural strength of all materials decreases with the number of cycles and length of water storage except for CC where the flexural strength increases during the earlier stages of thermocycling and water storage. The lowest flexural strength was observed in groups 6 and 11 ( $P < 0.05$ ), however the thermally cycled and water storage groups were not different from each other for all materials tested. The decrease in flexural strength of all materials in the water storage groups (7-11) when compared to the 24 hour group (1) is related to weakening of resin-filler interface by hydrolysis. While the decrease of the thermally cycled groups can be attributed to debonding of matrix-filler due to variation in coefficient of thermal expansion. It can be concluded that thermal changes does not reduce the flexural strength of composites. 1,2 - 3M,USA; 3 - Vivadent, Liechtenstein; 4,5 - Kuraray, Japan

<sup>1</sup> GC Corp, Japan; <sup>2</sup> ESPE, Germany; <sup>3</sup> 3M, USA; <sup>4</sup> DeTrey Dentaply, Germany; <sup>5</sup> Caulk Dentaply, USA.

**O-20** Ultrastructure of Resin-Dentin Interface in Scotchbond Multi-Purpose in Wet and Dry Bonding. S.H.Y.WEI\*, A.J.GWINNETT\*, F.R.TAY (Faculty of Dentistry, University of Hong Kong, 'SUNNY at Stony Brook, New York)

Keeping the demineralized dentin collagen matrix hydrated is crucial for optimal primer infiltration in acetone-based, water-free adhesives that involve acid-conditioning of dentin. This study compared the interfacial ultrastructure when Scotchbond Multi-Purpose (SMP), a water-based adhesive was used under different dry and wet conditions. 20 dentin discs were prepared from recently extracted third molars. Specimens were randomly divided into three groups (n=6), based upon the status of remaining moisture following dentin conditioning with 10% maleic acid for 15 seconds: Group I: surface air-dried for 3 seconds; Group II: dentin surface gently blot-dried to remove excess moisture (wet bonding); Group III: additional 10µL of distilled water added to dentin surface following blot-drying (overwet condition). Following acid-conditioning, SMP primer was applied. Dentin discs from each group were then bonded together to form disc-pairs using SMP bonding resin. They were demineralized in EDTA, embedded in epoxy resin and processed for TEM examination. Comparisons were made with the remaining disc-pair, which was bonded with a generic primer containing 35% HEMA in water in the absence of Vitrebond polyalkenoic acid copolymer. It was concluded from the ultrastructural observations that: a) a water-based adhesive such as SMP is able to rewet the briefly desiccated collagen matrix and that the use of a wet bonding technique is not critical; b) failure to remove excess water could result in dilution or uneven distribution of the water-soluble primer components within the zone of demineralized dentin; c) phase separation of the partially water-soluble polyalkenoic acid copolymer occurred along the resin-dentine interface and within the dentinal tubules as electron-dense globules containing electron-lucent domains. (Supported by the CRCG grant, the University of Hong Kong)

**O-21** Shearing Strength of Several New Dental Adhesives. W.M.A. IBRAHIM (Faculty of Dentistry, University of Malaya, 50603 Kuala Lumpur, Malaysia.)

This study compared the shearing strength of three new dentine adhesives at one hour, 24 hours and nine months. DenTASTIC, FUJIBOND and OptiBond were the materials used for this study. Extracted human molar teeth that had been cut into two pieces were used in preparation of dentine specimens. For each type of adhesive, dentine surface was treated according to manufacturer instruction. The specimens were tested for shearing strength at crosshead speed of 0.5 mm per minute by using an Instron machine. The mean and coefficient of deviation for each test were recorded. The result showed that the shear strength of all materials; after nine months stored in an oven at a temperature of 37° C and 100 percent humidity; was significantly difference compared to its early shear strength. The mean shear strength of FUJIBOND, for example, decreases from its early strength of 10.3 Mpa to 2.1 Mpa after nine months. Reduction of shear strength for DenTASTIC and OptiBond were only two- to three-fold i.e from 9.4 Mpa to 4.9 Mpa and from 17.4 Mpa to 5.6 Mpa respectively. Shear bonding strength to dentine varies by the type of adhesive materials and decreases with time. An early strength of DenTASTIC and FUJIBOND could be categorised to fall in a middle range strength when compared with other early strength of other products. While OptiBond could be consider to fall a high range strength.

**O-22** Comparison of Various Metal-Ceramic Bond Strength. V. TIYAPRAVAT\*, O. PITTAYAWUTVINIT, S. PRAKOBJIT, K. VIBULSAVATDIWAT, and N. JUNTAVEE (Khon-Kaen University, Faculty of Dentistry, Khon-Kaen, Thailand)

Success of metal ceramic restoration is based upon the nature of bonding between metal alloys and dental porcelain. This study compares shear bond strength of three dental porcelain which are: Unibond (Shofu), Carat (Dentsply), and Spectrum (Dentsply) to three metal ceramic alloys which are: Argedent88 (Argen), Argeloy (Argen) and Techstar (Leach & Dillon). Each alloy was casted into metal disc of 10 mm in diameter by using centrifugal casting technique. Ten metal discs for each group of various dental porcelain combination. Porcelain was applied to the center portion of disc surface using silicone forming mold, sintered processing and forming porcelain cylinder of 5.0 mm in diameter and 3.0 mm thick. These were test shear bond strength on universal testing machine at 2mm/min crosshead speed. Shear strength values (MPa) obtained were statistically analysis using ANOVA and Tukey multiple comparison that reveal statistically significant difference between experimental groups (at p=0.05). SEM examination appeared to fail at interface with some porcelain remaining adherence on the metal surface.

Porcelain & Metal	Argedent	Argeloy	Techstar
Unibond	29.63±13.73	27.93±10.03	19.02±7.65
Carat	26.22±12.06	17.67±3.38	24.13±17.86
Spectrum	26.46±12.44	16.89±3.25	17.67±9.35

The investigation suggests the combination of different dental alloy to various dental porcelain demonstrated a significant effect on metal ceramic bond strength.

**O-23** Mechanical Properties of Ag-Pd-Au-Cu Alloys for Ultra-low Fusing Porcelain. H. OGURA\*, A. NAKAI, S. GOTO, Y. MIYAGAWA (The Nippon Dental University, School of Dentistry at Niigata, Dept. of Dental Materials Science, Niigata, Japan)

Commercially available alloys for ultra-low fusing porcelains consist of mainly gold and show relatively low strength. Another alloy system consisting mainly of Ag, Pd, Au and Cu (Ag-Pd-Au-Cu alloy) was previously investigated in order not only to reduce the material cost but also to improve the mechanical properties. Although the efficacy of this alloy system was reported at the 29<sup>th</sup> meeting of the Japanese Society for Dental Materials and Devices in April, 1997, the mechanical properties of these alloys were not evaluated in detail. The purpose of the present study was to evaluate the mechanical properties of these alloys. Nine different Ag-Pd-Au-Cu alloys containing either 5% Sn or 5% Ga were prepared using high-induction melting in argon atmosphere. The composition of Ag-Pd-Au-Cu alloys were 20-50%Ag, 20-40%Pd, 20%Au and 10-20%Cu. The specimens for tensile test and hardness test were prepared and subjected to the tests following the ISO 9693:1991 for dental ceramic fused to metal restorative material. From the tensile test, their ultimate tensile strength, 0.2% off set proof stress, elongation and elastic modulus were determined and their Vickers hardness was determined from the hardness test. The data were statistically analyzed using ANOVA. The results showed that: 1) the evaluated mechanical properties significantly changed with the increases of Pd and Cu, 2) Some of the prepared alloys showed about 700MPa proof stress which is competitive to that of conventional Pd-Cu alloys, and 3) the mechanical properties of the Ag-Pd-Au-Cu alloys were significantly influenced by the addition of Sn and Ga.

**O-24** Study of A Pd-Ag-Sb System alloy for Metal-Ceramics. Pramote Limkool and Toshio Sunji (Faculty of Dentistry, Chiang-Mai University, Chang-Mai, Thailand, Biomaterial Science Unit, Sydney University, Australia).

Metal ceramic restorations are widely used in dental practice, because strong and accurate metal casting can be combined with aesthetic and abrasion-resistant ceramics. The present study is aimed at developing silver based alloy containing Antimony and other elements for metal ceramics. Composition 54.2 Pd-36.2Ag-7Sb-2.9In-1.0Sn-1.0Ga (alloy No.10) was finally selected as the best for practical applications. Liquidus and solidus temperatures of this alloy were 1,250° C and 1,087° C under fired conditions, the Vickers hardness number, tensile strength, and elongation were 270,847 Mpa and 3.4% respectively. In the temperature range from 20° C to 800° C the thermal expansion rate was 0.87% and thermal expansion coefficient was 15.0X10<sup>-6</sup>° C. The results obtained for tests of shear bond strength of alloy No. 10 was higher than 58 Mpa on the average, which was as strong as KIK (86.5Au-8.0Pd-4.0Pt-0.6Ag-0.9 other elements alloy for metal ceramics) and better than any other PdAg or PdCu alloys due to easy casting better bonding strength. Alloy No. 10 have excellent compatibility with commercial porcelains (Vita, Ducera and AAA Noritake porcelains). The mechanical manipulation properties of this alloy were satisfactory for clinical applications.

**O-25** Acute Toxicity of Polyesters in Animal Research W. SISWOMIHARDJO (Gadjah Mada Univ., Yogyakarta, Indonesia).

Acrylic resin is one of the most popular materials in dentistry, and it has been the only polymeric denture base materials for many years. Acrylic resin does not fulfill the requirements of an ideal denture base material. Residual monomer (methyl methacrylate) in acrylic resin causes irritation of the oral mucous (Tsuchiya et al, *J Prost Dent* 71:618-630, 1994) and according to Lefebvre et al (*J Biomater Sci Polym Ed* 7:965-976,1996) components used in dental resins may alter various cell metabolic processes. Siswomihardjo (preliminary study, 1996) stated that polyesters, a polymeric material for statues can be manipulated to denture base, while gas chromatography examinations showed there was no residual monomer or other components released from polyesters. Data proved there was no toxicity of polyesters in human cultured lymphocytes (Siswomihardjo et al, *IADR/SEA:48*, 1996). This research examined the acute toxicity of polyesters in rats. There were three treatment groups and one control. The dose variations were 67.5 mg, 135 mg and 270 mg respectively. Examination was done 24 hours after treatment and no rats were found dead. There was no different histological findings in the digestive organs among the four groups. It can be concluded that polyesters was not absorbed, so that no toxicity was found in rats.

**O-26** Low Intensity Laser-Modulation Of Prostaglandin-E2 Production In Mechanically Stimulated Myoblasts. S. SATTAYUT\*, P.F. BRADLEY and F.J. HUGHES (Saint Bart's and Royal London School of Medicine and Dentistry, London E1 2AD, UK)

Previous studies have suggested the efficacy of Low Intensity Laser Therapy (LILT) for the management of musculoskeletal pain, but its mode of action is not clear. The aim of this study was to investigate the effect of LILT on prostaglandin E2 (PGE2) production by myoblast cultures undergoing stretching by mechanical deformation. Cells from the mouse skeletal muscle cell line C2C12 were plated in flexible base petri plates and cultured in Dulbecco's-MEM medium with 10% Fetal Bovine Serum (FBS) until ≈ 70-80% confluent. Cultures were then maintained in medium with 1% FBS for a further 7 days to allow myoblast differentiation to occur. For experiments, cultures were mechanically deformed every 5 seconds for a 35-second period followed by a 15-minute rest period; this activity was repeated 20 times in 5 hours. In addition test cultures were irradiated with an 820 nm GaAlAs laser at energy density ≈ 0.536 - 0.603 J/cm<sup>2</sup> and power density ≈ 0.008 - 0.009 W/cm<sup>2</sup> after each stretching episode. PGE2 release into the culture medium was subsequently measured by commercially available EnzymelmmunoAssay Kit (Amersham plc). Mechanical deformation increased PGE2 production by 243% (Range=186-344 and SD=103) after a 5-hour treatment period. However in the test group additionally subjected to LILT therapy PGE2 production was increased by 501% (Range=329-650, SD=174). The results indicate that stretching of myoblasts by intermittent mechanical deformation stimulates PGE2 synthesis in differentiated (C2 C12) skeletal muscle cells and low energy density of GaAlAs laser may further stimulate PGE2 production. Further tests are being undertaken to determine the effects of a higher energy density regimen.

**O-27** Responses of Pulpal Macrophage-associated Antigen-expressing Cells to Tooth Replantation. S. RUNGVECHVUTTVITVITAYA\*, T. OKIJI, K. AOKI, K. OHYA\*, and H. SUDA\* (Dept. of <sup>1</sup>Endodontics and <sup>2</sup>Dental Pharmacology, Tokyo Med. & Dent. Univ., Japan).

Immunohistochemistry and confocal laser scanning microscopy (CLSM) were applied to study kinetics of pulpal macrophages and class II MHC-expressing cells in replanted immature rat molars. Upper right first molars of 5-week-old male Wistar rats were elevated and replanted. At 8 h to 84 days postoperatively, specimens were obtained and subjected to immunoperoxidase or immunofluorescence staining using monoclonal antibodies OX6 (anti-rat class II MHC molecules), ED1 (anti-rat macrophages and dendritic cells) and ED2 (anti-rat resident macrophages). Between 3 and 7 days when pulpal degenerative changes were prominent, an accumulation of ED1+ cells with strong intra-cytoplasmic immunoreactivity and OX6+ cells was found predominantly along the pulp-dentine border corresponding to the enamel-free cuspal area. CLSM revealed that some of the OX6+ cells with dendritic morphology projected their dendrites into the dentinal tubules. A migration of ED1+ED2-/OX6- cells was also frequently observed in contact with a cell-rich regenerating tissue at the apical region of the root pulp. Between 14 and 84 days, most pulps progressively formed reparative dentine, indicating successful pulp tissue regeneration. In these pulps, the OX6+ and ED1+ cells did not show an accumulation but exhibited an almost normal distribution. However, in the other pulps that displayed an invasion of a bone-like tissue, the cell accumulation was still evident. These findings may indicate that, following tooth replantation, class II MHC-expressing macrophages and dendritic cells are of critical importance in the pulpal immunodefence against dentinal tubule-derived infectious stimuli. The magnitude of the response of these cells may be influenced by the change of dentine permeability due to tooth pulp degeneration and the reparative dentine or bone-like tissue formation. Exudative macrophages might have some roles in promoting pulp tissue healing.

<p><b>O-28</b> Frequent Detection and Localisation of Human Herpesvirus-7 in Salivary Glands. SP KHOO*, MYADAV, SNAMBIAR (University of Malaya, Malaysia).</p> <p>Human herpesvirus-7 has been shown to be present in erythema subitum, an infection in childhood. Its presence in salivary glands has also been recently described. The aim of this study was to describe the nature of cells associated with HHV-7 replication in the salivary glands. Tissue samples from 20 paraffin embedded labial minor salivary glands were used. Immunohistochemistry, in situ hybridisation, polymerase chain reaction amplification of HHV-7 DNA and Southern hybridisation were carried out on all samples. Of the 20 samples, 78.6% showed the presence of HHV-7 antigen in the salivary gland tissues especially in the columnar ductal cells. In these cells, 61.4% showed positivity in the cytoplasm only whilst 38.6% in both nucleus and cytoplasm. The high frequency of detection of HHV-7 in the nucleus was confirmed by in situ hybridisation, PCR and Southern hybridisation. All controls were negative. <u>In conclusion we have shown that HHV-7 is prevalent in certain sites in minor salivary glands and the results suggest that the lip salivary gland is a site for replication of HHV-7, potential source of infective HHV-7.</u></p>	<p><b>O-29</b> Osteomorphogenetic study of HA-implanted defects using SEM and a modified EDTA-KOH method. CY SU*, ZC LIN, CS CHANG (Institute of Dental Science, National Yang-Ming University, Taipei, Taiwan)</p> <p>The purpose of this study was to use SEM and a modified EDTA-KOH method to observe the stepwise osteomorphogenesis around implanted HA with special reference to the structural features of bone cells and their spatial relationship to HA. Twelve adult mongrel dogs weighing 10-15 Kg were used as experimental animals. Dense HA particles were implanted into a cavity (7mm x 15mm) created in a dog's right side tibia. A cavity the same size at the corresponding site in the left tibia was used as control. Animals were divided into three groups (four in each) representing harvest periods of two weeks, 1 month, and 3 months. Perfused with Ringer's solution and fixed with glutaraldehyde, specimens were then decalcified with 10% EDTA for three days, treated with 10 N KOH at 60°C for 8 minutes to digest collagen fibers. Thus, the bone matrix near the exposed surface was completely removed but the cellular components retained their structural integrity. In the 2-weeks HA-implanted cavity the interparticular space was found to be fully filled with newly formed bone together with palisading osteoblasts. At 1 month implantation almost all interparticular space was invaded by bone combining with connective tissue. In the 3-month HA-implanted group the interparticular space was filled with steons. Well-developed vascularization could be found directly juxtaposed to HA particles. Osteoclasts characterized by ruffled borders were found in some specimens, indicating a bone remodeling process. <u>It is anticipated that this study will provide a greater insight into the biological response of HA to bone cells as well as the value of a modified EDTA-KOH method in examining the stereomorphology of osteogenesis.</u></p>
<p><b>O-30</b> The Terminal Hinge Axis (THA) Determination in Thai Dental Students by SAM 2 AxioGraph. L. SARINNAPHAKORN (Department of Prosthodontics, Faculty of Dentistry, Khon Kaen University, Khon Kaen, Thailand);</p> <p>The terminal hinge axis (THA) is a clinically important anatomic and geometric position of the mandible. The location of the true hinge axis as fixed posterior cranial reference points on both sides of the face permits the repeated transfer of the dentocaxial relations from the patient to an articulator, and back to the patient, without altering the spatial relations. The aim of this study was to use SAM 2 axiograph to locate the terminal hinge axis position in Thai dental students. The subjects were 20 Thai dental students at Khon Kaen University, age range from 19-25 years (mean = 21.8 years). They had no signs and symptoms of Temporomandibular disorders (TMDs) and were not under orthodontic treatment. The THA was located by using SAM 2 axiograph (SAM Praxisionstechnik, Munich, Germany) according to Slavicek's method (1988). Through a series of adjustment on the axiograph side arm, a position will be located where the tips of the styli do not translate on an arc but remain fixed in that position during small opening and closing movements of the mandible. After marking the hinge axis position on the skin, it was measured as X and Y values using tragus-canthus line as reference. X is measured from the most posterior point of the tragus to the perpendicular intersect from THA point to the reference line. Y is measured from the THA point perpendicular to the reference line. The findings show that X is 11.89±3.05 mm (mean±SD) and Y position, above the reference line, is 3.84±3.06 mm (mean±SD). <u>This preliminary study suggests that the THA position is easily determined by SAM 2 axiograph and more subjects would be necessary for the study and the value would be of great benefit for the future research in this area.</u> This study was supported by Khon Kaen University Research Grant 1997.</p>	<p><b>O-31</b> Cost-Effectiveness Analysis of Using Atraumatic Restoration Treatment (ART) Technique Compared to Conventional Amalgam Treatment. W. PUTTHASRI*, W. FITPHAT, P. PHANTUMVANIT, Y. SONGPAISAN (Khon Kaen Univ., Thammasat Univ. &amp; Mahidol Univ., Thailand)</p> <p>Atraumatic Restorative Treatment (ART) technique is an alternative measure for treating caries. The procedure is based on manually cleaning the dental cavities with hand instruments and restoring them with Glass Ionomer. This study purposed to determine the cost-effectiveness of using ART technique compared to conventional amalgam restorations. The field trial was carried out in rural villages in Northeastern Thailand. In one village, 241 ART restorations were provided to 144 persons. In the second village, 138 persons were treated with 205 amalgam restorations. The results showed that the total cost (equipment, materials and wages) of performing one-surface ART restoration was 54.8 Baht compared to 70.1 Baht of amalgam restoration. The success rate of ART restorations were 93%, 83% and 71% at 12, 24, 36 month evaluations while those of amalgam restorations were 98%, 94% and 85% respectively. As a consequence, total cost-effectiveness ratio of ART restorations at 12, 24, 36 month evaluations were 0.58, 0.66 and 0.77 compared to 0.71, 0.74 and 0.82 of amalgam restorations. <u>It was concluded that ART is not only the less expensive but also the more cost-effective way for treating one-surface caries lesions than the conventional Amalgam technique.</u> ART should be considered as a new choice of tooth restorative technique, especially in remote areas where economic point of view is concerned.</p>
<p><b>O-32</b> Factors determining Hong Kong adults' satisfaction with dental care. MCM. WONG and E. SCHWARZ* (The University of Hong Kong).</p> <p>Measuring patient satisfaction with dental care is crucial for the service providers to understand and predict patient behavior, and to evaluate the dental services provided. Data on dental satisfaction among Hong Kong citizens appeared to be lacking. The present study was undertaken with the primary aim to assess the dental satisfaction amongst Hong Kong adults. The study population was adults aged 30-50 who had visited a dentist within 3 years. A telephone interview was conducted using a modification of the internationally accepted Dental Satisfaction Questionnaire developed by Davis and Ware (1981). The questionnaire comprised 20 statements on different aspects of dental satisfaction measured on a Likert scale where 1 referred to very dissatisfied and 5 referred to very satisfied. A total of 1,357 calls were made of which 405 were eligible; 388 questionnaires were completed (95.8%). Using factor analysis, eight subscales were constructed: access, availability, continuity, cost, expectation, general satisfaction, pain and quality (Cronbach alpha: 0.39-0.84, test-retest reliability: 0.46-0.85). Scaled means for subscale scores ranged from 2.27 (general satisfaction) to 3.59 (quality). The relationship between the scaled means of different subscale scores and the background information of the respondents were analyzed using ANOVA. The results indicated that <u>males in general had higher satisfaction on the pain and expectation subscales; regular dental visitors had higher satisfaction on the cost, pain and continuity subscales; respondents with higher income were more satisfied with the aspects of pain management, cost, and the accessibility of dental services.</u></p>	<p><b>O-33</b> Patient Satisfaction with Dental Services at Hospitals in Bangkok. C. HOSANGUAN* K. KIERTIBURANAKUL and B. PROMASA (Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand).</p> <p>The purpose of this study was to evaluate satisfaction with dental services among patients attending public and private hospitals in Bangkok. A stratified sample of 9 hospitals was selected and 60 questionnaires were sent to each to be administered by attending dental patients during a one-month period. Patient satisfaction was measured by a 32-item scale consisting of 4 subdimensions: quality of care, economic, facility, and dentist-patient relationship. A total of 195 adult patients completed the questionnaires. It was found that dental patients in public and private hospitals were significantly different with regards to education, occupation, income, and payment methods of dental services. Total satisfaction scores between patients attending public (69.0 ± 15.5 SD) and private hospitals (68.4 ± 14.6 SD) were not significantly different (p = 0.77). Only economic subdimension of satisfaction showed significant difference (p = 0.038) between patient groups. Factors found to be significantly correlated with total satisfaction included age of patients and travel time. <u>It is concluded that economic issues in dental care play an important role in patient satisfaction.</u> This study was supported by Dental Research Fund, Faculty of Dentistry, Chulalongkorn University.</p>
<p><b>O-34</b> Patients' satisfaction with dental services provided by an university in Hong Kong. Chu CH, Lo ECM* (University Health Service and Faculty of Dentistry, University of Hong Kong)</p> <p>This study was a consumer evaluation of the dental care services provided by a university dental clinic in Hong Kong. The objectives were: 1) to study the consumers' satisfaction with the dental services; 2) to identify reasons for not using the dental services; and 3) to compare the opinions of the students with those of the university staff and their spouses. A total of 140 students and 180 staff and their spouses were randomly selected for this study. The response rates were 100% for students and 77% for staff and spouses. Results showed that both groups of respondents were satisfied with the quality of dental services provided by the university dental clinic. However, they were not satisfied with the long waiting time for an appointment. Students who had not attended the university dental clinic commonly stated that they were busy and had no time for a dental visit. On the other hand, many staff and their spouses did not seek care from the university dental clinic because they thought that the fees were high. Although the overall Dental Satisfaction Index (DSI) scores for the students (65.3) and staff (65.9) were similar, there were differences in the aspects of the services which the two groups were satisfied or dissatisfied with. <u>Thus if the university dental clinic wants to implement changes so as to improve consumer satisfaction and utilization, a careful analysis of the specific opinions of its various consumer groups is required.</u></p>	<p><b>O-35</b> ORAL HEALTH STATUS OF THE ELDERLY AGE GROUP IN SRI LANKA 1995. SIRENAMI ABAYARATHA* (Ministry of Health, Sri Lanka)</p> <p>The second National Oral Health Survey for Sri Lanka was done in 1995. This survey studied the elderly group aged 65 to 74 years for the first time at National level. The life expectancy at birth for Sri Lanka is 70 years for males and 74 years for females. In the survey sample 1894 subjects were examined and of this 47.62% were males and 52.38% were females. WHO criteria was used for the examinations. The mean number of permanent teeth present were 11.54. Analysing further 11.46% of this group had 11-15 missing teeth, 11.09% had 16-19 missing teeth, 25.67% had 20-27 missing teeth and 23.82% had 28 missing teeth. Of the sample analysed 37% were edentulous and only 5.8% were wearing full upper and lower dentures while 36.4% needed full upper and lower dentures. Considering the habits practised in the country such as betel chewing and use of charcoal for cleaning teeth 4.4% had abrasion and 20.7% showed attrition of their teeth. The CPITN scores revealed 38.86% to be having deep pockets and 46.35% shallow pockets. The DMF of this age group was 22.48. <u>The results of this survey will form an useful baseline for future evaluations in this age group.</u></p>



**O-36** Integrating perceived oral impacts into dental treatment need estimation. S ADULYANON\*, A SHEIHAM (Faculty of Dentistry, Khoo Kaen University, Thailand; Department of Epidemiology & Public Health, University College London, UK)

To improve on the traditional clinical approaches of dental treatment need estimation, a new theoretical model of treatment needs composed of 'Normative' and perceived oral impacts from people is proposed. The aim of the present study was to develop an appropriate 'Impact-Related Treatment Need' (IRTN), and compare them with professionally assessed normative need. An oral health survey was carried out in Ban Phang district, Khon Kaen, Thailand. 501 people aged 35-44 years in 16 villages, selected by cluster random sampling process, were interviewed about oral impacts on daily performances and then were had clinical examinations. A concise indicator 'Oral Impacts on Daily Performances' (OIDP) was developed, based on measuring impacts on eight physical, psychological and social aspects of daily activities. The indicator scores were tested for psychometric properties on the study sample. The combination of specific OIDP scores and normative needs generated the IRTN for various dental treatments. As expected, the percentage of people with need was decreased from normative need, when IRTN was applied. The differences were large in needs for prostheses, orthodontics and periodontal treatment (ranging from 21.7% to 40.2% of normative need); moderate for restorations (64%); and low for pulp care and extractions (81.7%-91.7%). A similar pattern of need reduction was obtained when increasing cut-off points of OIDP scores. The advantages of the socio-dental needs approach in dental care planning were demonstrated and discussed. It was concluded that integrating the perceived impacts of lay people into normative treatment need, could provide alternative improved dental treatment need estimations.

**O-37** The dentition of the Aborigines of Sri Lanka MALKANTHI S CHANDRASEKERA Faculty of Medicine, University of Peradeniya, Sri Lanka

Veddhas the aborigines of Sri Lanka are hunter gatherers living in close proximity to the jungles. The present study was carried out in the Veddhas living in two areas in Sri Lanka. The study sample consisted of 268 adult Veddhas (131 males and 137 females) ranging in age from 15 to 90 years.

Oral cavities were examined using a dental mirror and probe under natural daylight and decayed, missing and filled teeth (DMFT), total number of teeth, tooth attrition, tooth dimensions, oral habits and oral mucosal lesions were recorded.

Analysis of results showed lower DMFT value (0.46 to 3.41) at all age groups when compared with the contemporary Sinhalese (2.00 to 13.00). These differences were significant ( $p < 0.05-0.01$ ). Tooth decay was very low in the older Veddhas but gradually increased in the younger age groups. Almost all missing teeth were due to periodontal conditions. There were no filled teeth in the adult Veddhas. Most of the adult Veddhas had the full complement of teeth (28 to 32) and marked attrition was present. Oral mucosal lesions were minimal although there was a higher incidence of betel chewing. Most of the biological similarities found in the prehistoric fossil specimens in Sri Lanka occurred in highest frequency among the Veddhas. These dental observations in the Veddhas may be due to their different life styles and food habits.

**O-38** Psychiatric Morbidity in Final Year Dental and Medical Students AHM ONG\* and TI WONG (University of Malaya, Kuala Lumpur, Malaysia)

This study was to compare the caseness of psychiatric morbidity using the 28-item General Health Questionnaire (GHQ-28) in the final year students of the Dental and Medical Faculties, University of Malaya.

Method: Two versions, English and Malay of the GHQ-28 were administered to 55 dental (mean age 23.1 years) and 56 medical students (mean age 24.3 years). The dental students comprised of Malay (63.6%), Chinese (29.1%), Indian (5.5%) and other races (1.8%) while the medical students were Malay (64.3%), Chinese (33.9%) and Indian (1.8%). The ratio of female:male was 1.9:1 for dental and 1.7:1 for medical students. The GHQ was answered in either English or Malay and a cut-off score of 5 or higher was regarded as caseness of morbidity.

Results: More than 50% in both groups answered in the English version. The mean GHQ was 6.3 and 2.7 for dental and medical students respectively. High scores were noted in 60% (mean high GHQ 9.2) of dental but only 25% (mean high GHQ 8) of medical students. Although more women (dental 67%, medical 57.1%) than men had high scores in their psychiatric morbidity, no significant difference was noted between the sexes.

The data shows that a larger proportion of the final year dental students has psychiatric morbidity when compared to the final year medical students. This difference is statistically significant ( $P < 0.001$ ).

**O-39** The Eruption of Primary Teeth in Small Gestation Age Children R.R. OEWEN\* and W. SYARIEF, P. IDJURADINATA (Pedodontic Dept and Pediatric Dept Padjadjaran University, Bandung-INDONESIA)

The objective of this study was to obtain the time of primary tooth eruption and its relationship to the height in Small Gestation Age (SGA) children. SGA is a baby under percentile 10 in Lubchenco's Curve. Normal children are used as control group. The subject of this study was healthy children, aged 4 to 30 months which fulfilled the criteria. They were divided into two groups, SGA children and normal children. Thirty nine SGA children and 240 normal children were come out from using the sampling technique from Consecutive Admissions at Department of Pediatric, Medical Faculty Padjadjaran University - Dr. Hasan Sadikin General Hospital. The time of tooth eruption of primary dentition and their relationship with height are shown by the number of erupted teeth. The result of statistical analysis showed Regression coefficient in normal children ( $b_1 = 0.95$ ) was higher than SGA children ( $b_2 = 0.53$ ), and Z score = 6.79 ( $p < 0.001$ ). It means that the time of tooth eruption in SGA children is delayed compared to normal children. Pearson's correlation coefficient in normal children ( $r^2 = 0.463$ ) and in SGA children ( $r^2 = 0.472$ ). It means that body height could be as one predictor of tooth eruption.

**O-40** Craniofacial Anthropometry of Sri Lankan Children DEEPTHI NANAYAKKARA\* AND MALKANTHI CHANDRASEKERA, Faculty of Medicine, University of Peradeniya, Sri Lanka

The data available on craniofacial anthropometry of Sri Lankans are very scanty. These measurements are an important consideration to the clinician and the anthropologist. A total of 8409 children, 3954 males and 4450 females in the age range of 6-18 years belonging to the three major ethnic groups in Sri Lanka, the Sinhalese, Sri Lankan Tamils & Sri Lankan Moors were examined with the aim of establishing the normal values for a series of craniofacial measurements. Seven craniofacial measurements using standard anthropometric instruments were obtained. Norms were established for 1-year age categories from 6-18 years, for males and females in the three ethnic groups. The craniofacial dimensions of the males were greater than those of females. The Sinhalese males and females had higher values for head circumference, head breadth and bicondylar breadth than the Tamils and Moors and these were statistically significant ( $p < 0.01-p < 0.001$ ). In general the craniofacial measurements of the Sinhalese were greater than those of Sri Lankan Tamils & Sri Lankan Moors.

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**O-41** Prevalence of and risk factors for dental fear among Hong Kong children. DSH. FUNG\* and E. SCHWARZ (The University of Hong Kong).

Recent studies have shown that dental fear may lead to avoidance of dentistry, and hence a deterioration in dental health. A large proportion of such fear is acquired during childhood. The factors behind fear of dentistry are largely unknown in Hong Kong due to a lack of relevant local studies. Therefore, a study of the prevalence of and risk factors for dental fear among Hong Kong children was completed in July, 1996. 25 primary schools were randomly selected from 612 local schools in 7 school dental care service clinic districts throughout Hong Kong. All primary 6 students in the selected schools participated in a questionnaire survey conducted in the classrooms under supervision. The final sample consisted of 3596 students with 47.4% boys and 51.9% girls, with 84.5% of them being 11 or 12 years old. The results showed that mean dental fear score (15-item Children's Fear Survey Schedule-Dental Subscale (CFSS-DS, min. = 15 to max. = 75)) for the subjects was  $29.39 \pm 9.15$  with 15.5% of the respondents having high dental fear (score  $>$  mean + 1 SD). Among the 15 items listed in the CFAS-DS, the most feared item was "dentist drilling", followed by "injection". The students who had avoided dental treatment had significantly higher level of dental fear ( $p < 0.001$ ). Multiple regression analysis indicated that the children's general fear level, their past unpleasant experiences in the dental clinic and mention of dental fear by their parents, siblings and friends had significant effects on their level of dental fear (Adjusted  $R^2 = 46\%$ ).

**O-42** Estimation of Daily Fluoride Intake, based upon Water Consumption, of Infants Residing in Chiang Rai Municipality. Obsuwan K. and Chittaisong C.\* (Faculty of Dentistry, CMU, Chiang Mai, Thailand).

The purpose of this study was to estimate the daily fluoride intake from water consumption of infants residing in Chiang Rai Municipality. The samples of 120 infants under 1 year old were stratified randomly selected. Each body weight and each water consumption were recorded quantitatively. The fluoride concentrations were determined by the fluoride ion specific electrode (96-09, Orion Inc.) with the expandable ionanalyzer (EA 940, Orion Inc.). The results revealed that the average water consumptions were ranged from  $412.43 \pm 414.85$  ml. per day among infants from birth to 3 months of age to  $898.76 \pm 414.75$  ml. per day among those from 10-12 months. The fluoride concentrations of drinking water in this study were ranged from  $0.048$  to  $0.54$  ppm (mean =  $0.166 \pm 0.069$  ppm). The highest daily fluoride intake per kilogram of body weight per day of  $0.022$  mg. was found among infants aged 7-9 months. The results showed that water consumption contributed insufficient daily fluoride intake to infants living in Chiang Rai Municipality. This study suggested that, in order to prevent dental caries in Chiang Rai Municipality, fluoride supplementation of 0.25 mg. per day should be recommended by dental professions.

**O-43** Food consumption, OHI and DMF Profile of Mental Retardation population. Prijatmoko D\*, Hernawati S, Erliani S., Laksaminingsih R. (Department of Oral Biology, Dental Faculty, The University of Jember).

Results on which mental retardation (MR) population had significantly higher DMF score without any differences on nutritional status compared to that of normal, age matched control have been published previously. To determine whether nutrient consumption is different between the two populations is a great interest as it may explain in some extent the high DMF score among the MR population. 36 MR subjects and 36 control participated in the previously study were recruited again. Oral Hygiene Index (OHI) score was assessed using the Green and Vermilion method and a 24 h recall method was conducted to determine food intake. The findings shows that carbohydrate, protein and fat consumption were significantly higher but the calcium intake was significantly lower in MR population as tested using the Student t test. It is concluded that food consumption may play a significant role in the development of caries among MR population through changes in oral hygiene. However, further study aims to assess the food intake behaviour among the MR population is required to answer this question.

Variable	MR (n=36)	Control (n=36)	P value
DMF Score	4.64	2.07	< 0.02
OHI Score	1.48	0.59	< 0.05
Carbohydrate (g/day)	320.67	226.08	< 0.01
Protein (g/day)	67.05	48.23	< 0.05
Fat (g/day)	63.08	49.64	< 0.05
Ca (mg/day)	276.62	448.89	< 0.01

**O-44** Dental Health of Down's Syndrome Children in Malaysia. H. AWANG, S. MUSA\* and A. H. SALCEDO (University of Malaya, Kuala Lumpur, Malaysia).

The purpose of the study is to determine the oral health status of Down's Syndrome children in Malaysia. 92 Down's Syndrome children aged 2 to 6 years old attending an early intervention programme centre in Kuala Lumpur were examined. They were examined sitting on a chair, using disposable mirrors and under daylight. Diagnosis of caries and gingivitis were based on visual criteria. Almost 80% of the children had an unsatisfactory oral hygiene. The mean dmft was 3.13 and untreated dental caries was 53%. About 10% of the children examined had rampant caries. Half of the group had gingivitis. Majority of the children had Class I occlusion. The study also found that 18% of the children had experienced trauma of the anterior teeth. 50% of them had a medical problem; the most common problem was congenital heart disease which was present in 26% of the children. 38 children (41%) required fillings and 11 children (12%) required extraction. Out of 49 children who needed dental treatment, 10 of them were deemed to require urgent treatment. This study found that the dental health of this group was considerably poor and further investigations are necessary for the planning of an effective dental care programme, with emphasis on primary prevention, for this group of 'special' children.

**O-45** One Year Clinical Evaluation of Five Tooth Coloured Restorative Materials. C.C.LIM\*, J.NEO, C.L. CHEW (Dept. of Restorative Dentistry, National University of Singapore).

The objective of this in-vivo study was to investigate the clinical performance of five tooth coloured restorative materials, namely, Probond/TPH (PT), Fuji II LC (F), PSA/Dynact (PD), All Bond 2/Aestheti (A/A) and Uni-bond/Aestheti (UA) used for the restoration of non-carious tooth cervical lesions at baseline, 6 months and 1 year. A total of 202 restorations were placed in 35 patients, aged 29-63 according to the manufacturers' instructions over a period of 8 months and assessed by two independent examiners utilizing the USPHS criteria. Intra-oral photos of each restoration were also taken at pre-operative, baseline (Bline), 6 months and 1 year. Recall rate at baseline, 6 month and 1 year remained at 97.1%. The percentage of results which scored "A" is tabulated as follows:

Materials	Retention		Color Match		Crosssurface margin discoloration		Anatomic form		Marginal adaptation		% Sensitivity Absent		
	Bline	1 yr	Bline	1 yr	Bline	1 yr	Bline	1 yr	Bline	1 yr	Pre-op	Bline	1 yr
PT	100	82.1	66.7	28.2	100	66.7	97.4	74.4	94.9	23.1	35.9	75.5	69.2
F	100	93.2	45.2	33.3	100	81.0	100	92.9	97.6	59.5	31.0	83.3	83.3
PD	100	92.9	66.7	40.5	100	78.6	100	90.5	95.2	45.2	23.8	71.4	69.1
A/A	100	78.1	46.3	14.6	100	61.0	100	75.6	97.6	31.7	29.3	68.3	63.4
UA	100	97.9	39.5	13.2	100	52.6	97.4	33.3	94.7	36.8	29.0	76.3	47.4

The results show that at one year, the materials which scored the most number of "A"s, in decreasing order are: Fuji II LC, PSA/Dynact, Probond/TPH, All Bond 2/Aestheti and Uni-bond/Aestheti. We conclude that the clinical performance of (1) Fuji II LC and PSA/Dynact were excellent (2) Probond/TPH and All Bond 2/Aestheti were satisfactory and (3) Uni-bond/Aestheti was poor at one year.

**O-46** Fluoride Release of Selected Tooth Colored Restorative Materials. A. LUKSIRILERT, J. SATANG, A. JUNTAVEE\* and N. JUNTAVEE (Khon-Kaen University, Faculty of Dentistry, Khon-Kaen, Thailand)

The purpose of this study was to determine the release of fluoride from four commercial tooth colored restorative materials. The materials tested were: Gr. 1)Z-100 (3M); Gr. 2) Vitremer (3M); Gr. 3) Dyract (Dentaply); and Gr. 4) Compoglass (Vivadent). Ten circular disc specimens of 10 mm in diameter and 2 mm thick were prepared from each material in metal molds according to manufacturer's instruction. They were light activated for fully setting and then immersed in plastic vials containing 32 ml of artificial saliva. The specimens were kept at 37°C during storage period. The specimens were transferred to fresh vials of artificial saliva everyday for 30 days. The fluoride in the artificial saliva of each day was stabilized with TISAB and measured with fluoride electrode probe (Orion model SA 720). The fluoride were measured every 24 hours for 30 days. The accumulative contents of fluoride released (ppm) from each material for 30 days period are : Gr. 1) 2.20 ppm; Gr. 2) 103.25 ppm; Gr. 3) 17.63 ppm; and Gr. 4) 14.09 ppm. All materials showed a decrease in fluoride release with time. ANOVA and Tukey HSD multiple comparisons test revealed statistically significant difference in accumulative content of fluoride release and rate of fluoride release (at P=0.05). Vitremer (3M) demonstrated a significantly higher fluoride release than the other restorative materials tested. The quantity of fluoride release reduced significantly with time.

**O-47** Direct Comparison of <sup>45</sup>Ca and three dye tracers. M. A. G. Gonzalez and M.L. Swartz (University of Malaya, Kuala Lumpur and Indiana University, Indianapolis, IN).

The difference in the results of microleakage studies has been attributed to variation in individual tooth, cavity preparation, and restoration. It is also assumed that different tracers will detect the same degree of leakage. In order to diminish these variations, microleakage was determined on the same tooth by means of <sup>45</sup>Ca and one of three dye tracers for direct comparison. Class V amalgam were inserted in forty-five extracted human teeth, then stored in water for two weeks at 37°C. Within this period, they were subjected to 2500 thermal cycles at a 40°C temperature differential. Microleakage was tested at the end of the storage period. The specimens were first immersed in <sup>45</sup>Ca and then divided into three groups of 15 specimens. These were randomly assigned and tested in one of three dyes: (A) 0.5% basic fuchsin dye, (B) 2.0% fluorescent dye, and (C) 1.5% reactive orange 14. One-way analysis of variance was used for statistical analysis. The consistency of results from <sup>45</sup>Ca was analyzed using the Newman-Keuls test (p<0.05). The t-dit mean and standard deviation were obtained. <sup>45</sup>Ca and reactive orange 14 indicated the same degree of leakage at both the occlusal and gingival margin. <sup>45</sup>Ca and 2.0% fluorescent dye indicated the same degree of leakage only at the gingival margin. <sup>45</sup>Ca did not give consistent results at the gingival margin. The results indicate that results of microleakage studies using different tracers should not be compared. Testing with <sup>45</sup>Ca on different sets of teeth may not give consistent results even under the same experimental methodology.

**O-48** Sealing Ability of Super EBA Versus Amalgam as Root-end Filling Materials. S. Kitpongpan \* and V. Sattarajwongse. (Dept. of Operative Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand 10330).

An in vitro dye leakage study was conducted to test the root-end sealing ability of amalgam with varnish and Super EBA by using ultrasonic retroprep in different depth levels of root-end cavity preparation. Eighty roots of single-rooted teeth were cut off their crowns. Canals were cleaned, shaped and obturated with gutta-percha and root canal sealer. All roots were randomly placed into four groups. One control group was divided into positive and negative control. Three experimental groups, twenty roots for each group, received root-end resection and root-end preparation at 3 mm, 2.5 mm and 2 mm depth, consequently. In each experimental group 10 roots were filled with amalgam with varnish and the others were filled with Super EBA. After immersion in Indian ink for 7 days, the roots were cleared and evaluated for leakage by measuring the depth of penetrating dye with a stereo-microscope. The two ways analysis of variance showed that no significant difference between 3 levels of the depth of root-end preparation (p>0.05) and all depths of Super EBA produced significantly better seal than amalgam (p<0.001). This study was supported by Tantaraks Research Foundation, Chulalongkorn University, Bangkok, Thailand.

**O-49** Anatomical Study of Distance and Dimension in Human Skull of Thai Population Compares to Reference Dimensions of an Articulator. (H2-Hanau Articulator) V. CHINDAVANG\*, B. LEKRUENGGIN, S. MULLIKANAWIN. (Department of Prosthodontics Faculty of dentistry, Chulalongkorn University, Thailand)

Values of distance and dimensional anatomical landmarks relate to distance and reference dimension of an articulator were evaluated. Sixty skulls were studied by vernier caliper measuring distance between various anatomical landmarks. Distance from nasion to the midline between tips of upper incisors is 7.88 cm. Distance from infraorbital notch to left and right buccal cusp tips of upper second premolars are 5.60 and 5.50 cm. While the reference distance of the articulator is 4.67 cm. Distance from left and right glenoid fossae to the midline between tips of upper incisors are 10.63 and 10.60 cm, while the reference distance of the articulator is 11.00 cm. Distance between left and right mid-condyle to the midline between tips of lower central incisors are 10.66 and 10.85 cm., while the reference distance of the articulator is 10.70 cm. These values are helpful for determination of mean value on designing an articulator that may suitable for Thai population. This study was supported by Chulalongkorn Dental Research Fund.

**O-50** Mucosal Topography of Edentulous Palate using Pulse-Echo Probe Measurement Keng S B and Tan K B ( Faculty of Dentistry, National University of Singapore )

A study on the thickness of the palatal mucosa of a group of completely edentulous subjects was conducted using the Krupp SDP Probe with ultrasonic shock-wave transducer. The instrument running at 5 MHz has a measuring range of 0.5 to 8.0 mm at sound velocity of 1,518 m/s, with a resolution of 0.1mm. By timing the received ultrasonic pulse echo from the jawbone, the thickness of the membrane was determined and displayed. The initial sample consists of 41 fully edentulous Chinese adults ( 64 ± 9.5 years ) with period of edentulism at 20 ± 11.9 years. Six points (3 on each side of the midline; PPS 1 to PPS 6) on the posterior palatal vibrating line (fovea palatini) region across the palate together with 7 midpoints of the sides of the slope of incisor midline, canine, premolar and molar regions of right and left sides were measured. The results of the measurements across the posterior palatal zone were 3.87 ± 0.66; 2.92 ± 0.56; 1.98 ± 0.51; 2.88 ± 0.49; 3.83 ± 0.57 mm ( PPS 1 to PPS 6 ). The measurements at the midpoints were for the incisor region (1.93 ± 0.55); canine region (right 2.81 ± 0.72; left 2.72 ± 0.66 ); premolar region (right 3.05 ± 0.84; left 3.06 ± 0.73 ); molar region (right 3.63 ± 1.10; left 3.75 ± 0.96 ) mm. Statistically significant differences were observed between the thickness of the posterior palatal mucosal seal area from midline towards the ridge, PPS 1 and PPS 2 and PPS 3 (p<0.0001). The results show a thickening of the mucosa away from the midline towards the ridge. In complete dentures the post dam seal is often made by damming this region of the denture base. By using the sound echo probe, it may allow the clinician a quick assessment of the area to assist in planning the design of the post dam. Previous studies on palatal mucosa slope by Kydd and Daly (1971) on corresponding positions of dentate palates in a caucasian population gave readings of 2.2 to 4.0 mm compared to the present study of 1.93 to 3.75 mm. The differences may be a racial variation. The study confirms that the mucosal thickness in the post dam region varies in thickness from the midline towards the ridge. The study was supported by NUS research grant RP-950319.

**O-51** LASER MICRO-LABELING ON COBALT-CHROMIUM DENTURES B. C. LING\*, P. NAMBIAR, K. S. LOW\* (Faculty of Dentistry and Institute of Postgraduate Studies and Research\*, University of Malaya), C. K. LEE (Fotontec Sdn. Bhd., Kuala Lumpur, Malaysia).

Denture identification is an important tool in forensic odontology. Most existing techniques involved the use of inclusion labels in the acrylic portions of dentures. These labels and acrylic may be destroyed by fire. In order to develop a system that is more resistant to fire, we aimed at using laser to create labeling on cobalt-chromium metal components of dentures. The laser used in this project is a copper vapor laser (CVL) developed by Fotontec Sdn. Bhd. The copper vapor laser is a metal vapor laser which operates at a temperature range of 1300 to 1600°C emitting visible wavelength of 510.6nm and 578.2nm. It is driven by high voltage discharge through a copper powder filled ceramic tube. The CVL was operated at kHz with a peak power of 10kwatt and pulse width of 20ns. The laser optics focused the CVL beam into a spot size of less than 10 micrometer. A two axis scanner delivers this focused laser beam onto the material surface. The character to be engraved was edited and entered using a personal computer. The computer also controls the movement of the scanner and the firing of the CVL. With this set up good focussibility of the laser beam to achieve a spot size of a few microns as well as deliver enough power to vaporize the interested area was achieved, making the engraving and drilling of very small holes on metal objects possible. Labeling of personal information on cobalt-chromium denture is made possible using modern high power metal vapor laser technology.

<p><b>P-1</b> Smoking and Periodontitis among Adults in Bangkok. S. SAKOOLNAMARKA*, S. WINSOOTTHISIN, Y. SONGPAISAN., D SUJIRARAT (Mahidol University, Bangkok Metropolitan Admin., Thailand).</p> <p>There are many risks factors leading to periodontitis. Smoking, especially cigarette smoking has been questioned to be one of them. It is interesting to investigate whether smoking habit among Thai population attributed to the occurrence of periodontitis. A cross-sectional study was carried out at a health centre in Bangkok. 190 males and females aged 35-55 years old, both males and females, were assessed their periodontitis status (i.e. pocket depth and attachment loss) using Community Periodontal Index (CPI), and using Plaque Index (PII) and Simplified Calculus Index (CIS) for plaque and calculus deposits. Their smoking habits were also interviewed simultaneously. The results showed that the likelihood of having periodontitis among smokers was 1.8 times more than non-smokers (CI = 1.01-3.47, <math>p &lt; 0.05</math>). Among smokers, those having smoked for more than 10 years were 4 times more likely to have periodontitis than those having smoked less than 10 years (CI = 1.57-10.22, <math>p &lt; 0.01</math>). Regarding to the number of cigarette smoke per day, those subjects smoke &gt;10 cigarettes per day was 3.82 times more likely to have periodontitis than those smoke <math>\leq 10</math> cigarette per day (CI = 1.53-9.56, <math>p &lt; 0.01</math>). Significant difference of plaques and calculus deposits between smokers and non-smokers were not found in this study. <u>Thus it is concluded that cigarette smoking is likely to play a significant role in higher prevalence of periodontitis in Thai adults population as studies in other populations have shown.</u></p>	<p><b>P-2</b> Establishment of <i>Porphyromonas gingivalis</i> reactive T-cell lines from periodontitis patients. S. PRACHANEV*, S. TEERAWATNAPONG and R. MAHANONDA (Chulalongkorn University, Thailand).</p> <p>The objective of the study was to establish <i>Porphyromonas gingivalis</i> reactive T-cell lines (TCLs) from peripheral blood of severe periodontitis patients. These TCLs were obtained by stimulation of peripheral blood mononuclear cells from two subjects with heat-killed whole cell <i>P. gingivalis</i>, FDC381. The antigen specific cells were then maintained subsequently through the cycle of 1 week rest in enriched medium and rIL-2 and 1 week stimulation with phytohaemagglutinin. Irradiated autologous Epstein-Barr Virus transformed B-lymphoblastoid cell lines were used as antigen presenting cells in culture. The two TCLs reactive to <i>P. gingivalis</i> were established in culture up to 6-8 weeks and were demonstrated to increase responsiveness to <i>P. gingivalis</i>. Phenotypic analysis of the TCLs revealed heterogeneity of cell types as well as different proportions of CD4+ and CD8+ cells between the two cell lines. One TCL showed approximately 65% CD4+ and 35% CD8+, while the other TCL showed 15% CD4+ and 75% CD8+ cells. These results demonstrate that <u>it is possible to establish long-term T-cell lines reactive to <i>P. gingivalis</i> and it seems that this organism did not tend to select specific cell phenotype.</u> (Supported by Thailand Research Fund)</p>
<p><b>P-3</b> Periodontal Status of Referred Periodontal Patients in a Dental School TAIYEB ALI TB, RAZAK IA (Faculty of Dentistry, University of Malaysia, Malaysia).</p> <p>The aim of this study was to determine the periodontal and oral hygiene status of patients referred to a dental school for periodontal treatment and to report their toothbrushing habits. A total of 207 consecutive patients diagnosed with periodontitis were interviewed and examined clinically and radiographically. Assessments of plaque levels, bleeding on probing (BOP) scores, probing pocket depths (PPD) and bone loss (from radiographs) were made. The ages ranged from 20 to 76 years with a mean age of <math>45 \pm 12.8</math> years old. The male to female ratio was almost 1.5:1. Malays comprised 40% of the subjects, with the Chinese being 34% and the Indians 26%. patients presented with high plaque and BOP scores. A high frequency of toothbrushing was reported i.e. 86.5% of subjects brushed twice or more times per day. <u>However the high plaque and BOP scores did not concur with this finding.</u> This may reflect on the ineffectiveness of their brushing. Periodontal pockets were detected in 69% of the teeth in these patients. On the average, shallow pockets were detected in 7 teeth, moderate pockets in 6 teeth and deep pockets in 3 teeth per patient. From radiographs, alveolar bone loss was detected on the average on 52% of the teeth in this study group. On the average, early bone loss was detected on 7 teeth; moderate loss on 4 teeth; advanced loss on 1 tooth per patient. Early onset periodontitis accounted for about 5% of the total cases seen and 21% of subjects suffered from advanced adult periodontitis. <u>Hence about a-quarter of the patients referred already had marked periodontal destruction.</u></p>	<p><b>P-4</b> Black pigmented Bacteroides as parametric on Chronic Adult Periodontitis flap operation. Sunarto H, Djala, A., Muthalib A, and Auzartari EI (Faculty of Dentistry Univ. of Indonesia)</p> <p>It has been reported that a number of flap operations cases by using standard procedures in Chronic Adult Periodontitis were failed. The objectives of this study were to evaluate standard procedures of flap operation which is associated with elimination of Black pigmented Bacteroides. Samples were taken by scrubbing periodontal pocket tissues culture from 18 patients which are clinically diagnosed as Chronic Adult Periodontitis. These samples were taken three times; before and after operations as well as after irrigating with H<sub>2</sub>O<sub>2</sub> 3% and pooled in Brain Heart Infusion Media + Vitamin K + hemin which has been prepared initially under anaerobic conditions. Samples were incubated for 24 hours, 35°C under anaerobic conditions. Black colony outside handloop Mix zone which has dark red color under long-wave U.V. light and red shape Gram negative, were tested biochemically. The results showed that before flap operation Black pigmented Bacteroides were 94% (17/18), after flap operation 30% (7/18) and after irrigation 89% (8/18). Therefore it could be calculated that flap operation could eliminate 60% of the bacteroides, where as a combination of flap operation and irrigation eliminated 47% of Black pigmented Bacteroides. <u>These findings suggest that the standard procedures of flap operation could not eliminate the Black pigmented Bacteroides perfectly.</u></p>
<p><b>P-5</b> Radiological study of 58 cases of fibro-osseous lesions. W.CHOLITGUL* and P.DHEERAVARANGKURA ( Faculty of Dentistry, Chulalongkorn University and Srinakarintaravirote University, Thailand)</p> <p>The purpose of this study was to report the radiological findings of patients with fibro-osseous lesions at Chulalongkorn University during 1971-1997. The clinical findings and microscopic features were collected and confirmed retrospectively. Fibrous dysplasia was dominant among these lesions found in 52 cases, ossifying fibroma and florid osseous dysplasia each found in only 3 cases. Radiological findings, fibrous dysplasia revealed various types of bone trabeculae patterns as cyst like, diffuse sclerotic and ground glass appearances that located mainly in the mandible. Ground glass appearance was the majority type of fibrous dysplasia. Ossifying fibroma revealed diffuse sclerotic type with encapsulated border in the maxilla. All 3 cases of florid osseous dysplasia were related with chronic infections and revealed generalized extensive changes of bone trabeculae as dense bone sclerotic forms. <u>Hence we conclude that fibro-osseous lesions revealed various radiographic bone trabeculae changes from cyst like to radiopaque lesions depending on the pathogenesis stage. Radiological findings in conjunction with clinical and microscopic findings were required for the specific diagnosis of these lesions.</u></p>	<p><b>P-6</b> Soft Tissue Analysis in Thai Adult Females with Pleasing Faces T. WONGSRIMONGKOL*, A. BERESS, J. M. CARUSO, W. L. SCHLENKER, R. KIMBROUGH and M. T. JEIROUDI. (Loma Linda University, Loma Linda, Calif, USA).</p> <p>This study was to establish cephalometric soft tissue norms for 26 Thai females with pleasing faces, ranging in age from 17 to 21 years. After reviewing cephalograms of 60 female students enrolled at Khon Kaen University 26 were selected by the author as having pleasing faces. A panel of four persons judged the females to determine the level of facial attractiveness. Lateral soft tissue mean values were established based on methods of analysis previously published. The results were compared to female Caucasian norms of soft tissue analysis published as a thesis by Anne Beress, Loma Linda University. A paired t-test (<math>P &lt; 0.05</math>) was used to analyze the data. Mean and standard deviation were established to compare the Thai and the Caucasian values. The comparison showed significant differences in various soft tissue parameters, most significantly in the lip area. The findings of this study indicate the usefulness of the establishment of soft tissue norms for Thai populations, since the differences between the Caucasian and the Thai ethnic groups show that Caucasian norms cannot be applied to Thai samples without modification. A comparison of the Thai samples was also done with soft tissue norms published for other Asian groups. Many similarities were found when comparing the Thai measurements with the normal values of other Asian samples. <u>Therefore it may be practical to combine the various Asian samples into one Asian soft-tissue norm. This soft tissue analysis norm should be used on Thai patients seeking orthodontic or orthognathic surgery treatments.</u></p>
<p><b>P-7</b> Psychological Aspects in Oral Lichen Planus Patients. S. TANAKUN* (Department of Oral Medicine, Faculty of Dentistry, Mahidol University, Bangkok, Thailand).</p> <p>Lichen planus is a chronic mucosal disorder that has been reportedly associated with psychological factors. The aim of this study was to assess psychological profile in a group of 30 Thai oral lichen planus patients using validated psychometric tests. 27 female and 3 male patients (mean age 46.00 years, range 30-64 years) with a clinical and histologic diagnosis of oral lichen planus completed 2 questionnaires, General Health Questionnaire-30 item version (GHQ-30) and Hospital Anxiety and Depression Scale (HADS)-Thai version. 30 patients with healthy oral mucosa, similar age and sex distributions (comprising 27 females and 3 males, mean age 42.52 years, range 30-61 years), completed the same 2 questionnaires as a control group. By GHQ-30, Thai-version 7 (23.33%) of oral lichen planus patients had psychiatric disorders compared to 4 (13.33%) of a control group. By HADS, Thai-version 1 (3.33%) of oral lichen planus patients had anxiety, none had depression compared to 2 (6.67%) subjects of a control group had in each subscale. Chi-square analysis revealed that the patients with and without oral lesion of lichen planus did not differ with regard to psychiatric disorders either anxiety or depression (<math>p &lt; 0.05</math>). <u>The results of this study suggest that there were no statistically significant associations between oral lichen planus patients and psychiatric disorders, either anxiety or depression.</u> This study was supported by research grant of Faculty of Dentistry, Mahidol University.</p>	<p><b>P-8</b> Chewing Efficiency in Elderly Patients with only Premolars or Molars. P. SALIMEE*, A. AKEANANKUL, K. MITRAKUL, P. TECHAKUMPUCH, and S. ANNUSSORN-NITISARA ( Chulalongkorn University, Thailand)</p> <p>The patient who lose their posterior teeth should wear dental prosthesis to improve their chewing efficiency. However, in some elderly patients, wearing the dental prosthesis might be troublesome because of various factors such as discomforts, unable to receive the treatment, etc.. The purpose of this study is to evaluate the degree of necessity in wearing dental prosthesis by investigating the chewing efficiency of the patients who have two different types of posterior edentulous. 20 subjects with normal full dentition (control group), 17 patients with remaining only premolars and 7 patients with remaining only molars participated in this study. All subjects were asked to chew 3 fishballs, (diameter 2.6 cm), each one for 10, 20 and 40 strokes on the selected side. The chewed fishball was spit and rinsed off the mouth with water then passed through sieve No. 5 (mesh 0.157") followed by sieve No.100 (mesh 0.0059"). The fishball on both sieves were weighted and calculated for the chewing efficiency. The chewing efficiency in the control group for 10, 20, and 40 strokes were 16.03%, 26.23% and 42.05%, the group with remaining premolars were 14.41%, 19.92% and 31.56%, and the group with remaining molars were 14.58%, 20.05% and 30.23% respectively. Using independent t-test, <u>the chewing efficiency of the patients who have only premolars is not significantly different from the patients who have only molars (<math>p &lt; 0.05</math>).</u> Supported by Dental research Fund, Faculty of Dentistry, Chulalongkorn University</p>

<p><b>P-9</b> Factors Associated with Early Dental Crowding in Japanese Children Y. Ono*, A. Jayawardena, B. Linsuwanont, L. de Melo, M. Saito, M. Asano, H. Iijima, K. Fumayama, Y. Takagi (Tokyo Medical and Dental University, Tokyo, Japan)</p> <p>Dental crowding is a primary concern of parents as well as dental professionals. The purpose of this study is to identify and evaluate the relative contributions of specific factors associated with incisor crowding in the early developing dentition. Records from 23 subjects in the files of Tokyo Medical and Dental University, Department of Pediatric Dentistry, were analyzed at nine years of age. Two groups of subjects were identified (normal and crowded groups) based on the degree of lower incisor crowding. Lateral headfilms were traced, digitized and measured, and dental casts were measured using a digital caliper. A total of 86 measurements (72 cephalometric and 14 cast variables) were selected for statistical analysis. Student's t test and discriminant analysis were performed. The results revealed that the statistically significant factors (<math>p &lt; 0.05</math>) associated with early incisor crowding, in order of importance as determined by discriminant analysis, were 1) Cranial base dimension; 2) Mesiodistal width of the permanent central incisors; and 3) Craniofacial morphology represented by gonial angle.</p>	<p><b>P-10</b> The Use of the Sugar Clock to Change Dietary Behavior. T. Vachirarajopisan*, M. Wantanasiri, and P. Kowawisarat (Dept. of Community Dentistry, Fac. of Dentistry, Chulalongkorn Univ., Thailand).</p> <p>The purpose of this study was to evaluate and to compare between two dental health education programs for limiting the frequency of fermentable carbohydrate intakes. We studied in 11-12 year-old children who lived in urban community. In experimental group, we used the sugar clock as a media to teach them how to eat fermentable carbohydrate with a minimum harm to their teeth. In control group, we taught them not to eat fermentable carbohydrate by using standard media. Both of groups recorded everything they ate in the sugar clock as a daily record for 5 days (including holidays). They recorded before teaching. After teaching immediately and 1, 3 and 6 months later. The data was statistically analysed using paired t-test (<math>p &lt; 0.05</math>). The result showed a significant decrease of frequency of fermentable carbohydrate intakes in both groups. They decrease from 3.8 times/5 days to 2.4 times/5 days for the 6 months later in control group and decrease from 5.2 times/5 days to 2.6 times/5 days in experimental group. <u>It was concluded that the use of the sugar clock as a daily record can decrease the number of times of daily intakes of fermentable carbohydrate.</u> This study was supported by Tantarakwajai Foundation, Faculty of Dentistry, Chulalongkorn University.</p>
<p><b>P-11</b> Stain removing efficacy of some commonly consumed beverages. D. SWAMINATHAN<sup>1</sup>, J. MORAN<sup>2</sup> and M. ADDY<sup>1</sup> ( <sup>1</sup>Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia; <sup>2</sup>Bristol Dental School, Bristol, UK).</p> <p>Previous <i>in vitro</i> studies examined stain inhibition and removal by cosmetic dentifrices (Swaminathan et al. J. Dent Res 74, Abs 1323, 1995), detergents (Swaminathan et al. J. Dent Res 75, Abs 563, 1996). The aim of this <i>in vitro</i> study was to evaluate the chemical stain removing efficacy of some commonly consumed beverages namely acidic soft drinks and white wine as these beverages have been implicated in the erosion of dentition which is possibly related to their pH. The products used in this study were lemonade, white wine, coke, tab clear, orange juice and specimens treated with only distilled water acted as control. Pre-staining of the specimens was achieved using the perspex-chlorhexidine-tea staining model and the procedure was repeated until optical density (OD) which was determined on a uv/vis spectrophotometer reached between 2 - 2.5 on the perspex blocks. The baseline OD of these previously stained blocks was determined and perspex blocks in triplicate were allocated for each product so that the mean OD was similar for each of the treatment. The blocks were then soaked in beverage/water for certain intervals and the OD was determined at the lambda maximum for tea of 395 nm. pH of the products used in the study was then determined. Results as determined by OD indicated that stain was removed at almost similar rate by these beverages. However specimens treated with only water also produced some reduction in stain. Generally exposure of the specimens to beverages removed stain by approximately 40% when compared to water control. Thus OD of prestained specimens reduced from approximately 2.3 to 1.0 with beverages and from 2.3 to 1.88 for the water control after a total treatment of about 13 hours using different soaking periods. Cosmetic dentifrices like Eucriyl reduced stain from 2.3 to 0.23 after treatment period of 13 hours and detergents like SLS from 2.3 to 0.00 after only 6 hours of treatment. Although it was assumed that acidic beverages which erode hard tooth tissues could also remove surface stains from the specimens, the results of this study did not substantiate this assumption. <u>It was thus concluded that stain removal by acidic beverages may not be of any clinical relevance.</u></p>	<p><b>P-12</b> BACTERICIDAL AND FUNGICIDAL EFFECTIVENESS OF VARIOUS SURFACE CLEANING SOLUTIONS. S. SRISINTORN, R. TEANPAISAN (Faculty of Dentistry, Prince of Songkla University, Thailand).</p> <p>The objective of this experimental study was to determine the comparative bactericidal and fungicidal effectiveness of a number of surface cleaning solutions. Ten solutions were applied to surface cultures of <i>Escherichia coli</i>, <i>Staphylococcus aureus</i>, <i>Bacillus subtilis</i> and <i>Candida albicans</i> at each of 2 levels (8 or 15 ml), treatment time was 1 minute and the numbers of organisms remaining after treatment assessed by counts of the numbers of colonies developing in cultures obtained from swabs of the treated surfaces. Cultures from swabs of surfaces receiving no treatment served as controls.</p> <p>Six (Biocide, Virkon 1%, hypochlorite 1000 ppm, Pore-Cresol 0.5%, Pore-Dex solution and Pore-Dex spray) of the ten solutions appeared to have been totally effective, in that no organisms could be cultured after treatment. Four treatments (approx. 1% phenol, 70% ethanol and 0.5% Virkon) failed to exhibit total effectiveness against at least some of the organisms.</p> <p><u>This experiment suggested that (Biocide, Virkon 1%, hypochlorite 1000 ppm, Pore-Cresol 0.5%, Pore-Dex solution and Pore-Dex spray) needed only 1 minute treatment time to reduce number of organisms to the level that it was unable to culture from swabs of the treated surface.</u></p>
<p><b>P-13</b> Penetration of the Pulp Chamber by Carbamide Peroxide Bleaching Agent. W. Thitinthapan*, P. Satamanont and N. Vongsavan ( Mahidol University, Faculty of Dentistry, Bangkok 10400, Thailand ).</p> <p>Vital tooth bleaching has become a popular procedure for correction of tooth discoloration. Most home bleaching products contain 10% carbamide peroxide. The purpose of this <i>in vitro</i> study was to measure the quantity of hydrogen peroxide that reaches the pulp chamber by 3 carbamide peroxide products: Opalescence, Sparkle and Rembrandt. Seventy roots of extracted premolars were amputated approximately 3 mm apical to the cemento-enamel junction and the pulp tissues were removed. They were divided into three experimental groups (3x20) and a control group of ten teeth. An acetate buffer solution was placed in the pulp chamber then the crown was exposed to the bleaching agent at 37°C for 25 min. The buffer solution was removed and reacted with leuco crystal violet and horse radish peroxidase. The absorbance of the solution was measured by a spectrophotometer and determined the quantity of hydrogen peroxide by comparing to a calibration curve. The amounts in micrograms of hydrogen peroxide in the group of Opalescence, Sparkle and Rembrandt were 3.605 ± 1.405, 1.282 ± 0.762 and 0.359 ± 0.251 respectively. The data were analysed by ANOVA and showed significant difference among the groups (<math>p &lt; 0.05</math>). <u>It was concluded that the penetration of commercial bleaching products was very different even they were labelled as having the same 10% carbamide peroxide.</u> This study was supported by a grant from Mahidol University.</p>	<p><b>P-14</b> Expression of Secreted Aspartyl Proteinases (Saps) of <i>Candida</i> in Human Whole Saliva L.P. SAMARANAYAKE* and T. WU (Faculty of Dentistry, The University of Hong Kong)</p> <p>It is known that the Saps produced by <i>Candida</i> species amplify their virulence. Although the Sap activity of <i>C. albicans</i> in human saliva has been studied in quantitative terms (Samaranayake et al. <i>Oral Microbiol Immunol</i> 9: 236-40, 1994), no qualitative data are available. Hence the expression of Saps of 3 oral isolates each of <i>C. albicans</i>, <i>C. parapsilosis</i> and <i>C. tropicalis</i> was investigated in batch cultures of human, whole saliva supplemented with glucose. The saliva samples were collected from a healthy donor, spun and the supernatant supplemented with glucose (200 mM). The yeasts grown for 18 h on Sabourauds agar were washed and inoculated to yield salivary suspensions of <math>1.0 \times 10^9</math>/ml. Appropriate controls, and the test suspension were incubated for 72 h at 37°C. Aliquots were removed periodically to estimate the pH, cell numbers (haemocytometer counting), protein profile (BCA protein assay; <i>Anal Biochem</i> 1985; 150:76-85), secreted aspartyl proteinase activity and their antigenic characteristics (polyacrylamide gel electrophoresis, ELISA and Western blotting). Antibodies used for ELISA and Western blots were raised in rabbits, and were generous gifts. All three <i>Candida</i> species demonstrated marked growth, Sap expression and salivary proteolysis with significant inter-species variations. In general, <i>C. albicans</i> displayed a greater growth, acidogenic potential, and Sap expression in saliva than the other species. <i>C. parapsilosis</i> and <i>C. tropicalis</i> isolates resembled each other in the studied parameters. Neither candidal growth nor proteolysis was observed in glucose-free control saliva samples. <u>As the oral cavity provides low pH niches periodically supplemented with dietary carbohydrates the secreted aspartyl proteinases of <i>Candida</i> species may play a role in the pathogenesis of oral candidiasis.</u></p> <p>( Funded by the Committee for Research and Conference Grants of the University of Hong Kong)</p>
<p><b>P-15</b> Effect of Soft Laser on Bacterial Killing of Neutrophils B. THAWEBOON*, S. THAWEBOON and W. BUJAEED. (Department of Microbiology, Faculty of Dentistry, Mahidol University, Bangkok)</p> <p>Previous studies have shown an increase in phagocytic activity of human neutrophils following low reactive-level laser therapy (LLLT), however the data about the effect of this laser on bacterial killing was unclear. To investigate whether LLLT would enhance bacterial killing of neutrophils, we measured the effect of Ga-Al-As diode laser on neutrophils bactericidal activity <i>in vitro</i>. The test was done in 20 replicate assays using blood from 5 healthy adult volunteers. Neutrophils were isolated from venous blood and adjusted to the concentration of <math>4.2 \times 10^6</math> cells/ml. Bactericidal assay following the therapeutic dose of this laser (830 nm, 15mW, 60 sec) was performed by incubating 1 ml volume with opsonized <i>Staphylococcus aureus</i> (ATCC 25923) and neutrophils at 1:1 ratio then determining the number of viable bacteria with time after laser irradiation. The results showed that the mean percent killing at 30, 60, 90 and 120 min of laser irradiated groups were 10.36±6.27, 60.24±10.25, 82.48±8.32, 89.56±9.81 and of control groups were 8.25±6.38, 56.00±10.45, 78.00±9.56, 86.00±10.22 respectively. The differences at any time points between these two groups were not significant (<math>p &gt; 0.05</math>) as tested by t-test. These data indicate that the Ga-Al-As diode laser has no effect on bacterial killing of neutrophils.</p> <p>This study was supported by the National Research Council Grant 1994.</p>	<p><b>P-16</b> Development of an Electronic Platform for TMD Research and On-line Clinical Diagnosis. K.B. TAN, A.U.J. YAP, V. HO, J. JAFFAR, and R. YAP (National University of Singapore, Singapore)</p> <p>Temporomandibular disorders (TMD) are a group of clinical disorders involving the temporomandibular joints and associated structures. As the precise etiology of TMD is still unclear, it remains the center of much debate and controversy. This controversy has been fuelled in part by the lack of uniformity in research protocols and designs. To address this problem, Dworkin et al. (<i>J Craniomandibular Disorders: Facial Oral Pain</i>, 1992; 6:307-365) proposed a set of research diagnostic criteria (RDC). This TMD-RDC allows standardization and replication of research into the most common forms of muscle and joint-related TMD. This paper reports on the development of an electronic platform based on the TMD-RDC. The History Questionnaire and the Clinical Examination have been implemented as electronic forms which allows direct data input by the patients and clinicians, thus bypassing the manual data entry stage. Development issues included: 1) Customisation of TMD-RDC for Asian population; 2) Optimisation of the human-computer interface design (screen presentation of information, navigation control, progress tracking) and 3) Internal logic. The Patient Summary of Findings is immediately generated by the prototype program from the electronic History Questionnaire and the Clinical Examination Forms. The TMD-RDC diagnostic rules to derive the Axis I and Axis II Diagnoses were hard-coded in a custom C++ program. These diagnoses are immediately available to the examining clinician, enabling on-line clinical diagnoses. Data can also be exported to SAS or SPSS for statistical analysis. The electronic platform has been designed for deployment on both desktop and portable notebook personal computers. The latter hardware platform allows deployment and administration of the TMD-RDC in the field or in clinical situations where personal computers would not otherwise be available. A pilot study on 34 patient records was used to validate the system and full correlation between the conventional manual method and the electronic program was obtained. <u>It is concluded that the NUS TMD-RDC electronic platform holds great potential as a tool for both clinical and epidemiological TMD research due to its simplicity of administration, flexible deployment and on-line clinical diagnosis.</u></p>

**P-17** Testing Method of Extra-Oral Photography for Reproducibility  
T. Ngerywijit\*, K. Godfrey, N. Srisak and Y. Tawornpitak (Khon Kaen University, Khon Kaen, Thailand).

Clinical photography is one of the important records required in orthodontic. To compare pre and post-treatment condition, especially in orthognathic surgery, these photographs must be accurate. Otherwise one cannot compare the result of treatment to the original condition. The purpose of this study is to test accuracy and reproducibility of four methods of photography. Nine subjects as the routine photographers working at the Faculty of Dentistry photographed the frontal view of a head model, which was fixed in the natural head position, using four methods of photography and repeating five times for each method. The four methods which were used in this study were (1) using hands to hold the camera without any instruction given, (2) using a tripod to fix the camera without instruction given, (3) using hands to hold the camera with instruction given and (4) using the tripod fixing the camera with instruction given. The camera-subject distance was fixed for all methods. The instruction given in method (3), similar to which was given to method (4), was based on the AAO Board case examination. The resulting photographs were tested for reproducibility and accuracy by measuring comparisons with the standard photograph as produced by three experienced photographers and confirmed by an experienced orthodontist. Repeated measurement ANOVA ( $P < 0.05$ ) was used to analyze data. The findings of this study indicated that there is significant difference of the resulting photograph between methods and method (4), using the tripod to fix the camera, produced the most accurate photographs. On the contrary, photographs taken by method (1), using hands to hold the camera, produced the least reproducible results. The result of this study confirmed that, to produce accurate and consistent extra-oral photographs, clinicians should use tripod or similar camera positioning and have standard criteria when taking the photographs.

**P-18** FORCE-EXTENSION AND FORCE-DEGRADATION CHARACTERISTICS OF POLYISOPRENE ORTHODONTIC ELASTICS  
P. KANCHANA, K. GODFREY, M. MANOSUPPRASIT\*, and M. BURANARUGSA\* (Dept. Orthod, Fac. Dent. and Dept. Anat., Fac. Med., Khon Kaen University, Thailand).

Several studies have shown that elastic bands have large individual variation of force exertion. To determine whether, nowadays, manufacturers have improved the physical properties of these materials, we tested the standard load-extension index and evaluated the force-degradation characteristics of polyisoprene (latex rubber) elastics. The study was in two parts. In Part 1, 15 randomly selected elastic bands of three sizes (3/16", 1/4", and 5/16") with three force magnitudes (2 oz, 3.5 oz and 6 oz) were tested with an Instron testing machine. Resultant force versus length changes were recorded and plotted as load/deflection curves. Therefore, the standard index can be tested to accurately determine force-extension characteristics and compare with manufacturer specifications. In Part 2, 10 randomly selected elastic bands of the same sizes from the same manufacturer (Part 1) were evaluated. The elastics were stretched on acrylic measuring bases to distances of 20 mm, 28 mm, 32 mm, and 40 mm. Throughout the test period, the acrylic bases were stored in water bath with filtered tap water at 37°C. Force measurements were made at five time intervals: 1 hr, 6 hrs, 24 hrs, 48 hrs, and 72 hrs. Resultant force versus time changes were recorded and plotted as force-degradation curves. It was found that in dry test, Ormco and Dentaunum-elastics compared closely with their force extension index, whereas 3M Unitek and Tomy elastics have greater force magnitude (approximately 30 and 40 per cent more force, respectively). In wet condition, the force was dramatically reduced within 1 hr (approximately 40 per cent) and kept reducing gradually to the end of the 3 days period. However, there was only a small change in mean force value after 1 day. There were statistically significant differences in force decay rates between different extensions, force magnitudes, and manufacturers ( $P < 0.001$ ) as tested by repeated measurement analysis. Nevertheless, this might not be clinically significant since the trends of force degradation were similar. Therefore, the standard index of elastics is still useful to select the elastics only for some manufacturers. There were large individual variations of force magnitude within same batches of elastics. Finally, we suggest change of elastics daily to maintain a relatively continuous force.

**P-19** Corrosion Behavior of High Copper Spherical Amalgam Produced in Thailand.  
D. LEE\*, C. SUCHATLAMPONG, and S. NIVITCHANYONG (Faculty of Dentistry, Mahidol University, Bangkok 10400 and Thai-French Innovation Centre, King Mongkut's Institute of Technology North Bangkok 10800).

Previous studies have shown that the mechanical properties and biocompatibility of high copper amalgam produced in Thailand (Thai amalgam) were above standard level (J Dent Asso Thai 44:150-5, 1994). Since a satisfactory corrosion resistance is one of the primary prerequisites for a dental alloy, the corrosion behavior of the Thai amalgam was investigated using *in vitro* electrochemical techniques. Specimens of Thai amalgam, two high copper spherical amalgams (Tytin and Shofu Spherical D) and one conventional amalgam (New True Dentoalloy) were prepared according to the ISO specification for amalgam alloys and stored in an incubator at 37°C. Electrochemical corrosion tests were performed at 37°C in modified Tami and Zucci artificial saliva exposed to air. Potentiodynamic anodic polarization curves were obtained. The Thai amalgam, Tytin and Shofu Spherical D exhibited similar anodic activity. The curves showed characteristic peak of copper oxidation and did not revealed any breakdown potential. New True Dentoalloy exhibited a current peak of tin oxidation and a breakdown of passivity related to the presence of the  $\gamma_2$  phase, the most corrosion susceptible phase. We conclude that the corrosion resistance of Thai amalgam is within the range of other high copper amalgams; the results also confirmed that there was no  $\gamma_2$  phase contained in the Thai amalgam and other high copper amalgams, resulting in high corrosion resistance. This study was supported by the National Metal and Materials Technology Center.

**P-20** Merits and Demerits of Composite Resin Restorations Inserted Megafillers.  
Y. TANI\* and A. ISHIKAWA (Kyoto University, Kyoto and Nippon Dental University at Tokyo, Tokyo, Japan)

Polymerization shrinkage of Composite resin is considered to be primary cause of marginal gaps. In clinical practice, marginal adaptation of composite resin has been improved by the use of new bonding agents. However, when the contraction force associated with polymerization exceeds the adhesive force of composite resin to the tooth, gaps occur, and cavity sealing of the restoration is impaired. Bowen proposed a new clinical technique by which coarse granules of Beta-Quartz Glass-Ceramic Insert (BQCI) as "Megafiller" are added to the composite resin paste packed in the tooth cavity. From the data obtained by our *in vitro* experiments, BQCI was markedly effective in reducing polymerization shrinkage. Moreover, BQCI was effective in reducing the coefficient of thermal expansion of the composites. These results came up to our expectations for a superior marginal integrity of the composite resin. We started the clinical application of BQCI for the composite resin restorations. Total number of the megafilled composite restorations for Class I cavities was 32 (30 molars and 2 premolars). The longest follow-up term of the case was 4.5 years. We observed some cases of protruding megafillers on the surface of the restoration and some adhesive failures between the megafiller and the surrounding composite resin. In conclusion, it is essential that the characteristics, such as mechanical properties and wear resistance of megafillers and composite resins are as equal as possible. The megafiller must insert completely inside the composite resin to avoid exposing megafiller on the surface.

**P-21** Surface Roughness of Glass Ionomer Cements with Fluoride Release and Uptake.  
W.T.C. LAM\*, H.K. YIP\* and R.J. SMALES\* (Department of Health, Hong Kong Government; Faculty of Dentistry, The University of Hong Kong).

Changes in surface roughness may vary between conventional and resin-modified glass ionomers. The objective of this study was to assess the surface roughness of these cements and its relationship with weight changes during fluoride release and uptake. Five specimens of Dyract, Fuji II LC, Vitremer, Photac-Fil, Ketac-Silver, ChemFil Superior, Fuji IX and Z100 (control) were prepared according to the manufacturers' instructions and placed into 3.0 mm diameter X 2.7 mm thick Teflon moulds. The specimens were placed in well-sealed polypropylene vials with 2 ml of artificial saliva and stored in an incubator at 37°C. The solutions were replaced and the changes in specimen weight monitored at weekly intervals for 12 wk. This protocol was repeated after recharging the specimens with 1.23% APF gel. At the end of the experiment, 1 new and 3 of the immersed specimens for each material were examined with SEM, 1 new and the 2 remaining immersed specimens for each material were assessed with surface profilometry. Average roughness ( $R_a$ ) measurements were taken of both surfaces for each specimen. After an initial increase, all cements lost weight very slowly over 12 wk. However, following APF gel application, there was a significant weight loss for all glass ionomer cements over 2 days ( $P < 0.05$ ). Surface profilometry found that Z100 and Dyract had the smoothest surfaces, and that roughness increased from the resin-modified to the conventional glass ionomer cements. The pattern was particularly obvious following APF gel application. SEM confirmed the marked erosive effect of APF gel on conventional cements, but resin-modified cements were also affected, especially Photac-Fil. Dyract was only slightly affected and Z100 was minimally affected. The dissolution of glass ionomer cements increases their surface roughness, which could increase staining and colonization of plaque micro-organisms. To minimise surface erosion, APF gel should not be used on these cements. Supported by the CRCG 337/252/0005.

**P-22** Flexural Strengths of Repaired PMMA by Five Cyanoacrylate Glues.  
K. SUPUTTAMONGKOL\*, N. JEERAPAEET, C. SUCHATLAMPONG, R. SURARIT, and A. RITTAPAI (Faculty of Dentistry, Mahidol University, Bangkok 10400).

There were some clinical reports about the use of cyanoacrylate glues for repairing broken dentures, but the strength of repaired dentures were not evaluated. The aim of this study was to investigate the flexural strengths of repaired joints using five cyanoacrylate glues. The round joint was used as conventional repaired technique because of its superior flexural strength than other profiles (J Prosthet Dent 23: 464-72, 1970). 36 heat-cured PMMA specimens (Homedent) were prepared and fractured by transverse deflection test according to ISO 1567. The specimens were divided into 6 groups. Five groups were repaired with various brands of cyanoacrylate glues i.e. Kenji, Altec, Loctite, 3M and Histoacryl®, by coating fractured specimens with adhesive and then fixing together in the jig. For the last group, the fractured sites were prepared as round profile and repaired by self-cured PMMA (Homedent) under pressure 30 lb/inch<sup>2</sup>. The repaired specimens were kept in water at 37°C for 7 days before transverse deflection testing. By one way ANOVA, the results indicated that the mean strength of conventional technique (60.0 ± 2.86 MPa) was the highest and significantly different ( $p < 0.05$ ) from the adhesive groups (22.2 ± 2.9 to 40.3 ± 4.7 MPa). Within the adhesive groups, the repaired joint using Loctite showed the highest mean strength and significantly different ( $p < 0.05$ ) from the others. We concluded that the strengths obtained from the repaired joints using cyanoacrylate adhesives were lesser than the conventional technique. So that the suitable method for repairing the fractured PMMA was the conventional technique using round profile.

**P-23** Study on Vibration of Partial Denture Framework.  
T. INOUE\*, H. TANIGUCHI, M. OKI, O. KOMIN, R. SUZUKI, T. OHYAMA and P. PHANKOSOL\* (Tokyo Medical and Dental University, Tokyo, Japan / Chulalongkorn University, Bangkok, Thailand).

The modal analysis on vibration of three different forms of Co-Cr metal framework was performed in order to clarify what form of the major connector for the Class I Kennedy maxillary removable partial denture is the best. The three different forms of major connector that were used in this study were as follows: Horseshoe palatal bar, Central palatal bar and Anteroposterior palatal bar. Forty-six measurement points were established on the framework with Anteroposterior palatal bar, and forty-two were established on the others. The main measurement system was composed of a 512-D Vibration Generator, LV-1300 Laser-Doppler Vibrometer, CF-6400 FFT Analyzer, PC-9821Xn personal computer, and Vibrant-Win modal analysis software. The decay rate was calculated to evaluate effectiveness on vibration of the rests and retainers when stress was put on the retention frame for distal extension base of the framework. The results showed that the framework with Anteroposterior palatal bar had higher decay rate (mean 8.63 ± 0.68) than the others (mean 1.17 ± 0.11, 4.37 ± 0.21). These differences were significant ( $p < 0.05$ ) as tested by ANOVA and Fisher's PLSD. We considered that the framework with Anteroposterior palatal bar would be suitable for Class I removable partial denture from the point of view of vibration.

**P-24** Fracture toughness of acrylic denture bases using notchless triangular prism (NTP) specimens.  
C. WIWATWARRAPAN\*, J.A. HOOD (Faculty of Dentistry, Chulalongkorn Univ., Thailand, Faculty of Dentistry, Otago Univ., NZ).

This study was to determine fracture toughness of acrylic denture base materials by NTP specimens (Ruse, et al. J Biomed Mat Res 31:457-63, 1996). The materials were Lucitone 199 (Dentsply), Luxon-high impact (G.C.), Vertex RS-heat cured (Dentimax), Vertex SC-self cured (Dentimax), and Quick Boil-heat cured (Ivoclar). Sixteen NTP specimens (6x6x12 mm) of each material were prepared by the manufacturers recommended curing method. The specimen holder consisted of two symmetrical half-cylinders ( $\phi = 12$  mm,  $h = 9$  mm) with a loading collar ( $\phi = 18$  mm,  $h = 3$  mm) at one end and a triangular prismatic groove (6x6x6 mm) at the opposite end into which the specimen is placed. Two symmetrically half-disks ( $\phi = 12$  mm,  $h = 3$  mm) restrained the specimen. A sharp blade was used to create a -0.1 mm deep crack initiation point midway along one of the edges of the specimen. The test assembly was secured in the custom designed grip attached to a computerized universal testing machine (Instron model 1193, Instron Limited, High Wycombe, England). The assembly was loaded in tension at crosshead speed of 1.0 mm/min, and the load are recorded. Mean fracture toughness (MPa/m<sup>3/2</sup>) and standard deviation are as follows:

Lucitone 199	Luxon	Vertex RS	Vertex SC	Quick Boil
16.08±1.62	7.77±0.64	2.32±1.16	5.20±1.57	3.56±1.20

Statistic analysis one-way ANOVA and Tukey HSD revealed significant difference ( $p < 0.05$ ) among materials. It was concluded that Lucitone 199 had the highest fracture toughness. This study was supported by Otago University, NZ and Chulalongkorn University, Thailand.

**P-25** Improvements of Denture Base resin Reinforced by Incorporating Various Fibers. SAN-YUE CHEN (School of Dentistry, China Medical College, Taiwan, ROC)

The purpose of this study is to evaluate the effect of denture base resin reinforced by incorporating different fibers. Materials used in this experiment included acrylic resin and polyester fiber, glass fiber, and Kevlar fiber. The fiber were pre-cut into 3 different length, 2, 4, 8mm, and were incorporated with various concentration at 1, 2, or 3%. The Mixture of resin and fibers was cured in 70°C water bath for 13 hrs then 90°C for 1 hr. The cured specimens were prepared and tested for impact and bending strength following the specification of ASTM No. 258 and ISO No. 1587. Specimens used in the impact strength test were reused for Knoop hardness test. This study indicated that the best condition was by incorporating 0.3% 8mm polyester fibers into the resin, which increased the impact strength to 5.5 times (8.886±0.417KJ/m<sup>2</sup>) than the non-fibered group (1.227±0.090KJ/m<sup>2</sup>). There was no difference on bending strength (1058.3±33.5Kg/cm<sup>2</sup>) and Knoop hardness (18.0±0.1KHN) by using a three-way analysis of variance (ANOVA). With the proper amount and length of polyester fibers incorporated into the acrylic resin can improve the mechanical property of conventional denture base.

**P-26** Potassium, Lithium, and Aluminum Ion Exchange of Some Dental Porcelains. K. KITCHAROENSAKKUL, O. KITTIKHUN, P. JANGJUMRAT, S. RATTANAJAROENTARM, and N. JUNTAVEE\* (Khon-Kaen University, Faculty of Dentistry, Khon-Kaen, Thailand)

Previous studies have shown that some conventional feldspathic porcelain can be strengthened using ion exchange treatment with potassium nitrate. The strengthening effect of ion exchange was caused by residual compressive stress in dental porcelain's surface layer resulted from that large size potassium ions substituted for small size sodium ions. The purpose of this study was to determine the effects of strengthening by using potassium ion, Lithium ion, and Aluminum ion exchange on two commercial dental porcelains which are: Unibond (Shofu) and Carat (Dentsply). Porcelain block specimens (2.5 x 28 x 3 mm) were fabricated and glazed according to manufacturer's instruction. They were treated ion exchange with molten potassium nitrate salt, lithium sulfate salt, and aluminum nitrate salt at 450 °C for 24 hours. No treatment were performed on control. Three point flexural strength were investigated by universal testing machine (LLoyd) with crosshead speed 2 mm/min.

Porcelain	Control	K	Li	Al
Unibond	96.16±25.7	117.18±25.8	88.42±11.04	108.13±21.04
Carat	88.27±16.76	119.49±26.03	97.31±28.25	88.64±27.19

ANOVA and Tukey HSD multiple comparisons tests indicated that ion exchange using potassium nitrate was more effective treatment for strengthening than lithium sulfate and aluminum nitrate.

**P-27** The effect of heating polyurethane sheet on bond strength to silicone elastomer P. Phankosol and N. Thomronganukul (Department of Prosthodontic Faculty of Dentistry, Chulalongkorn University, Thailand)

Silicone have been widely use as an extra oral maxillofacial prosthetic material. The Udagama's technics using polyurethane sheet to line underneath the prosthesis, tremendously improve the efficiency of prosthesis. However, polyurethane sheet failed unpredictable after a period of usage. The purpose of this study was to evaluate the effect of heating polyurethane sheet prior to bonding with silicone elastomers. Ninety 2186 silicone specimens were prepared and divided into 6 groups by varied three primers: 1205, 2260, 304 and two heating techniques. The T-peel strength as described in ASTM, D. 1878-72 was used for determination of the bond strength between polyurethane sheet and silicone. Data were recorded and analysed statistically by one-way analysis of variance and Duncan's new multiple range test at significant level 0.05. The result showed that bond strength were significantly greater for polyurethane sheet that applied heat after treated with primers 1205 or 304 than polyurethane sheet that applied heat before treated with primers 1205 or 304, but there was no significantly different of bond strength for polyurethane sheet that treated with primer 2260 in both heating technique. This study was supported by a grant from Dental research project, Faculty of Dentistry, Chulalongkorn University, 1996.

**P-28** The effect of primers and thermocycling on the bond strength of silicone and denture base material. P. PHANKOSOL and K. THONGPUSSA\* (Faculty of dentistry, Chulalongkorn University, Thailand).

Because of the softness and tissue compatibility, silicone has been extensively used for both intraoral and extraoral prostheses. Many kinds of silicone were recommended for using with denture base material especially polydimethylmethacrylate. However, the adhesion of the silicone to the polydimethylmethacrylate fails by time. The purpose of this study was to evaluate the bond strength of 2186 silicone to the polydimethylmethacrylate by varying 3 kinds of primers 1205, 2260 and 304 then compare to Tokuyama soft denture liner as a control. Forty specimens were divided into 4 groups, half of each group were stored at 37 degree celcius and 100% humidity for 72 hours and the other half were stored under 2,000 cycles of thermocycling condition. The tensile bond strength was analysed by using Kruskal Wallis and Mann-Whitney U Test. There was no statistical difference in the bond strength between the two conditions in all materials except the group of 2186 silicone with primer 304. Tokuyama and the silicone 2186 with primer 1205 showed no significant difference of the bond strength and also showed the highest bond strength among all groups in both conditions. All materials failed adhesively but Tokuyama failed cohesively. This study was supported by Chulalongkorn Dental Research Fund.

**P-29** The roles of Fgf/Fgfr2 signalling in the developing mouse skull. S. ISEKI<sup>1</sup>\*, K. ETO<sup>1</sup> and G. M. MORRISS-KAY<sup>2</sup> (Dept. of Developmental Biology, Tokyo Medical and Dental University, Japan; <sup>2</sup>Dept. of Human Anatomy, University of Oxford, U.K.)

Mutations in fibroblast growth factor type 2 receptor (FGFR2) has been found to cause human craniosynostosis (premature fusion of the skull resulting in the loss of sutures). In order to get some insight into the roles of FGF/FGFR2 signalling in differentiation of the skull bones we have investigated the relevant features of the developing skull vault during prenatal stages in the mouse. We found that transcript domains of *osteopontin*, an early indicator of preosteocyte differentiation, indicate the future shape and position of the skull vault bones. *Fgf2* transcripts are localised to the margins of the *osteopontin* domains, with which they are mutually exclusive; cell proliferation rates are highest in the *Fgf2* domains. *Fgf2* protein, which is known to stimulate the osteogenic cell proliferation, localizes in the region of osteogenesis. We implanted FGF2-soaked heparin beads onto the region of the coronal suture of day 15 mouse fetuses subcutaneously by exo utero surgery, and the fetuses were prepared for in situ hybridization 48 hours later. Ectopic transcription of *osteopontin* was induced around the beads, with downregulation of *Fgf2* expression in this area. These results suggest that during normal skull development, Fgf2-induced Fgf2 signalling modulates the transition of cells from the undifferentiated proliferating state to the committed osteoblastic condition. This study was supported by the Human Frontier Science Program.

**P-30c** Correlation Between the Bacterial Culture Result in Root Canal and Postobturation Evaluation. S. SUEBNUKARN\*, S. KOONTONGKAEW and B. YAPONG (Faculty of Dentistry, Prince of Songkla University, Thailand).

In recent years, considerable interest has been generated in the role of root canal anaerobic microorganisms in causing inflammation and pain. However, the technique commonly used in clinical endodontic culturing fails to adequately support growth of anaerobic bacteria. This study used reduced thioglycolate as a culture medium to correlate between aerobic and anaerobic bacteria presented in root canals and postobturation evaluation. Forty single-rooted teeth with chronic apical periodontitis were studied. An aseptic technique was used throughout the treatment. The root canals were prepared by a step-back method, irrigated with 2% sodium hypochlorite and medicated with calcium hydroxide. The access cavities were sealed with Cavit<sup>®</sup>. A week later, the intracanal dressings were removed by rinsing with normal saline and a sample for bacteriological examination was collected from the root canal and placed into a tube of reduced thioglycolate medium and cultivated under aerobic and anaerobic conditions. The root canals were obturated by the lateral condensation method a week after the second appointment. The results 1 week after obturation indicated that there was no significant correlation between bacterial culture result and postobturation pain and swelling ( $p > 0.05$ ). Within 6 months recall, there was no significant correlation between bacterial culture result and radiographic evaluation ( $p > 0.05$ ) as tested by Fisher's Exact. In conclusion, there was no correlation between the bacterial culture result in root canal and postobturation evaluation. This study was supported by Prince of Songkla University Grant.

**P-31c** Measurement of Enamel Fluoride in primary teeth after six years of water fluoridation in Ho Chi Minh City.

N. HA\*, H. NAKAGAKI, H. HUNG, H. LAN, D. QUAN, T. TAM (Fac. of Odontostomatology, HCM City, Vietnam and Aichi Gakuin Uni., Nagoya, Japan)

Ho Chi Minh City is the only city in Vietnam which has been fluoridated since 1990. Decrease of the prevalence and DMF-T of dental caries was shown by some previous studies. The objective of this study was to measure enamel fluoride in primary teeth after six years of water fluoridation. 21 primary teeth in the fluoridated and 18 teeth in the non-fluoridated areas were examined. We measured the phosphorus concentration, using the Colometric technique of Chen, Toribara and Warner (1956) and the fluoride concentration (ppm) by fluoride electrode as described by Hallsworth, Weatherell and Deutsch (1976). The fluoride concentration of the two groups were analyzed with t-Test. At all depths of both buccal and approximal surfaces, the enamel fluoride concentration in primary teeth in fluoridated area was higher than that in non-fluoridated area. The differences were significant ( $P < 0.001$ ) at the depths of 1.0, 3.0 and 5.0  $\mu$ m: fluoridated group had mean fluoride ion ( $\pm$  SE) of 2186  $\pm$  497, 923.6  $\pm$  200, 629.1  $\pm$  135 at buccal surface and 2613.7  $\pm$  691, 963.4  $\pm$  194, 635.3  $\pm$  113 at proximal surface versus 1221.9  $\pm$  221, 540.3  $\pm$  91, 397.8  $\pm$  65 at buccal surface and 811.2  $\pm$  162, 454.1  $\pm$  95, 349.3  $\pm$  75 at proximal surface in the non-fluoridated area. This study showed that water fluoridation increased significantly the enamel fluoride concentration in primary teeth in Ho Chi Minh City.

**P-32c** The interaction of chlorhexidine and copper with human salivary proteins. P. Anonphamthana\* and S. Koontongkaew (Dept. of Oral Biology and Occlusion, Fac. of Dentistry, Prince of Songkla University, Hat Yai, Songkhla 90112, Thailand.)

Chlorhexidine (CHX) is currently the most potential antiplaque agent. Copper (Cu) also shows an antiplaque effect. However, binding sites of both agents in the oral cavity are not well known. The aim of this study was to investigate the interaction of CHX and/or Cu on salivary proteins. Human whole saliva was used in the study. The observations were performed using solutions of 1mM CuSO<sub>4</sub> and 0.1% CHX separately or in combinations at pH 3, 5.5 or 7. Saliva was interacted with the test solutions at 37 °C for 3 h. Then precipitated proteins were removed by centrifugation at 2000g for 15 min. Patterns of unbound proteins were analysed by SDS-PAGE. We found salivary proteins to be less affected by all solutions at pH 3. However, increase in pH of the test solutions (pH 5.5 and 7) caused an increase in protein precipitation. Proteins ranging from 25-52 kDa interacted with CHX and/or Cu. The combination effect was relatively pronounced, particularly at pH 7. Two pink-staining bands with MW 25 and 28 kDa were markedly reduced. These proteins were probably similar to that referred to as acidic proline-rich proteins. The results suggest that CHX and Cu are bound to similar receptors on salivary proteins. The interaction is most probably electrostatic in nature.

**P-33c** Bacterial aerosols in part-time and full-time private dental clinics. B. KUKIATTRAKOON,<sup>1</sup> S. CHOWANADISAL,<sup>1</sup> B. YAPONG,<sup>1</sup> S. JITSURONG,<sup>2</sup> P. A. LEGGAT<sup>3</sup> and U. KEDJARUNE<sup>1</sup> (<sup>1</sup>Faculty of Dentistry and <sup>2</sup>Faculty of Medicine, Prince of Songkla University, Thailand, <sup>3</sup>James Cook University, Australia)

The aim of this study was to investigate the number of total bacteria as well as *S. aureus* in two types of dental clinics before and during working periods. Air samples were collected before and during working periods in 24 private dental clinics, including 11 part-time and 13 full-time clinics, in Songkhla province, Thailand, using two Slit-to-Agar air samplers (Bio air checker Bac1, Nakasa, Japan), which were placed 75-80 cm. from the floor near each dental unit. Samples were taken attaching blood agar media to ascertain the total bacterial count and manitol salt agar for determining *S. aureus* count. The collecting time was 6 minutes with an airflow rate of 50 l/min. The plates were incubated for 2 days at 37°C in a CO<sub>2</sub> enriched (5%) atmosphere before colonies were counted. The mean (±SD) of the total bacteria before the working period in part-time clinics was 282±259 CFU/m<sup>3</sup>, which was not significantly different from that of the full-time clinics (212±246 CFU/m<sup>3</sup>). However, during the working period, the total bacteria in part-time clinics (387±322 CFU/m<sup>3</sup>) was significantly higher ( $p < 0.01$ , Mann Whitney U-test) than full-time clinics (120±94 CFU/m<sup>3</sup>). There were no significant differences in the total bacteria before and during the working period within these two types of clinics ( $p > 0.05$ , Wilcoxon matched pair t-test), although there was a trend towards a reduction in total bacteria during the working period in full-time clinics. *S. aureus* (10 CFU/m<sup>3</sup>) was found before the working period in one part-time clinic. Whether a dental clinic operates part-time or full-time may be one factor influencing the distribution of airborne contaminants within these clinics. Further studies are needed to explain why airborne contaminants were higher in part-time clinics during working periods.

**P-34c** Oral Health Status and Dental Treatment Demand of Nontaburi Elderlies S. SANGKHEAW, T. YOUNGNOI and W. KUSOLWISITKUL. Ministry of Public Health, Mahidol University, Bangkok, Thailand.

A few data on oral health of elderlies in Thailand have been collected. The objectives of the study were to assess oral health status and treatment needs in elderly population related to education level and dental treatment demand, denture usage and edentulousness. A cross-sectional study was done in one hundred and six elderlies aged 60 and above who participated in activities provided by Elderly Association in Prangunkiao Hospital and Tansumrit Service Center. Data were collected through interviewer-administered questionnaires and oral examinations. The prevalence of coronal dental caries and root caries were 29.1% and 6.6% respectively. Mean DMFT was 20.24±9.49 teeth/person. The prevalence of periodontitis was 98.8%. The proportion of edentulousness was 15.1%. The foremost of dental treatment needs were those of one-surface fillings and extractions (26.4% and 21.7% respectively). Full and partial denture usages were 50.0% and 49.9% respectively. Females were more edentulousness than males ( $p < 0.05$ ). There was no relationship between education level and dental treatment demand, denture usage and edentulousness. Difference between male and female in dental treatment demand and denture usage was not found. Despite all the subjects required dental treatment but only 77.4% of them indicated their demands. It is concluded that in order to promote oral health among elderlies, their oral health awareness and oral health services needs to be encouraged and provided

**P-35c** Prevalence and psychosocial impact of developmental enamel defects in a sample of Malaysian adolescents. SL SUJAK, \*TN MOHD-DOM, R ABDUL-KADIR. (University of Malaya, Kuala Lumpur, MALAYSIA)

In recent years, research in the relationship of fluoride and psychosocial impact had moved to include not only clinical examination but also qualitative measurement. In Malaysia, although there were several attempts to look at the prevalence of enamel defects, there had never been a study relating between the condition and the lay persons' perception. The aims of this study were to look into the prevalence and psychosocial impact of developmental defects of dental enamel (DDE) among 16-year-old schoolchildren in the island of Penang. The data were collected through a self-administered questionnaire and an oral examination which had used the Modified Developmental Defects of Dental Enamel Index (FDI, 1992). In all, 1024 subjects were selected using a multistage random sampling technique. About two-thirds of the sample had at least one tooth affected with DDE whereby 64.5% of all teeth examined were affected. Of all subjects who had DDE, 43.5% had at least one anterior tooth affected. Among these subjects, 18.8% of them reported covering their mouths when smiling, 8.7% avoided going out with friends and 39.1% consulted their dentists. About 17% of these subjects reported that their parents had complained about the colour of the subjects' front teeth and only 5.7% cited of having experienced being teased by their friends concerning their front teeth. Generally, the psychosocial impact of the DDE on the subjects was very low. It is recommended however that a review of current fluoride levels in Penang water supplies be undertaken as an effort to compromise on a dosage that will provide maximum prevention of dental caries yet with a minimal prevalence of enamel defects possible.

**P-36c** Histologic change of grafted tongue tissue for closure of large palatal fistula. K. ARYATAWONG\*, S. SUTAPREYASRI, S. CHUNGPANIC (Faculty of Dentistry, Prince of Songkhla University, Hat Yai, Songkhla, THAILAND)

Pedicle dorsal tongue flap has been proved to be an effective method for closure of large palatal fistula. However little is known about the histologic change of grafted tissue. From the author's literature reviews there are no reports about the epithelial change of lingual tissue except one emphasizing reinnervation after 2-3 years. It was the aim of this study to sequentially observe the histologic change of the grafted tongue tissue. The grafted dorsal tongue tissue from two patients were biopsied at the time of separation of the tongue flap, at 6 and then 12 months as follow up. Histologic results showed chronically inflamed fibromuscular tissue covered by keratinized squamous epithelium with areas of filiform papillae and evidence of muscle degeneration at the time of graft separation. At 6 and 12 months the lingual segment revealed no feature of filiform or fungiform papillae. The surface epithelium was parakeratinized with a certain degree of edema. Chronic inflammation and muscle tissue was still seen underneath. Compared to clinical status, the grafted area became smoother and less wrinkled. This observation shows that after 1 year the grafted tongue tissue histologically still resembles the tongue, consisting of stratified squamous epithelium and muscle fibers, but without papillae.

**P-37c** A Stereomorphological Study of Microcirculatory Change following Hydroxyapatite or DFDBA implantation C-M CHENG, C-S CHANG and C-Y SU (Institute of Dental Science, National Yang-Ming University, Taipei, Taiwan)

The purpose of this study was to investigate the microcirculatory changes in bony defect following HA or DFDBA implantation using corrosive resin cast and scanning electron microscopy. Twelve mongrel dogs, average weight 10 kg, were used as experimental animals. Porous type HA were implanted into a cavity (7mmx15mm) created in one side of dog's tibia. A cavity the same size at the corresponding site on the opposite side of dog's tibia was implanted with DFDBA. At the postoperative intervals of 2 weeks, 4 weeks, 8 weeks, and 12 weeks, each implanted site was perfused with Ringer's solution and injected with low viscosity resin (Mercox), then was subsequently macerated with 5N KOH and 15% EDTA for about 24 hours to obtain the corrosive resin casts. Specimens were then coated with gold and observed under scanning electron microscope. Observation on a corrosive resin cast 2 weeks postoperatively revealed that the new formed vascular network formed in a porous HA implanted defect showed significantly dense than that implanted with DFDBA. The vascular network in porous HA implanted defect 4 weeks and 8 weeks postoperatively gradually showed a specific vine-like architecture however network in DFDBA implanted defect didn't show such a specific pattern but a stockade-like vasculature enclosing the defect, center of which was found a space network. This study clearly demonstrated that from a view point of guiding vascularization, porous HA showed a superior capacity to DFDBA

**P-38c** Collagen fiber arrangement of rats' discs after posterior teeth loss CY TSAI\*, ML HSU, CY SU (Institute of Dental Science, National Yang-Ming University, Taipei, Taiwan)

The purpose of this investigation was to study the influence of posterior teeth loss on the arrangement of collagen fibers in discs of rats. Thirty three adult rats were divided into three groups with one group of thirteen rats without extraction designed as control (group C). Bilateral upper posterior teeth of ten rats (group B) and unilateral upper and lower posterior teeth of another ten rats (group U) were extracted to create bilateral or unilateral bite collapse. Rats of each group were harvested after 5 months. Scanning electron microscope was used to study the collagen fiber arrangement of the discs. By using the modified NaOH method in combination with the freeze-cracking method, fibrils in the superficial and internal structures of the discs were exposed and the cellular components retained their structural integrity. The results indicated that the arrangement of the collagen fibers in the central area are found to be mainly antero-posterior direction, while the peripheral part are not tidy. No obvious change in the collagen arrangement was found among the three groups. It is concluded that neither bilateral nor unilateral posterior teeth loss in experimental rats caused a significant change in collagen fiber arrangement of discs after posterior teeth loss.

**P-39c** A study of bond strength of resin sealant onto bovine enamel in the laboratory N.D. KHANH\*, C.S. DURWARD, and J.A. HOOD (Institute of Odonto-Stomatology in HCM City, Vietnam; School of Dentistry, Otago University, New Zealand).

In previous studies, a dentin bonding agent applied to an etched by salivary contaminated enamel surface has been shown to permit adequate adhesion of resin sealant. This study investigated the shear bond strength of a resin based-sealant in the laboratory following different conditions and application techniques. Sixty four bovine lower incisor crowns were separated randomly into eight groups (8 teeth each): group 1: no salivary contamination, air-water spray, no primer; group 2: salivary contamination, air-water spray, no primer; group 3: no salivary contamination, air-water spray, primer; group 4: salivary contamination, air-water spray, primer; group 5: no salivary contamination, air-water bulbs, primer; group 6: salivary contamination, air-water bulbs, primer; group 7: no salivary contamination, air-water bulbs, no primer; group 8: salivary contamination, air-water bulbs, no primer. 35% phosphoric acid etching for 30 sec was used in all groups. Shear bond strengths were evaluated using an Instron testing machine. Data were analyzed using an unpaired t test and ANOVA. The mean shear bond strength (MPa) were as follow: group 1: 8.04±1.63; group 2: 1.55±1.03; group 3: 11.59±3.62; group 4: 9.09±2.35; group 5: 9.43±2.74; group 6: 9.09±2.41; group 7: 7.93±2.36; group 8: 1.30±0.90. There was significant difference techniques. Bonding agent used with contamination yielded bond strengths significantly greater than the bond strength obtained when using sealant alone without contamination ( $p < 0.01$ ). Bonding agent under sealant on wet contamination and air bulb yielded bond strengths equivalent to the bond strengths obtained when sealant was bonded to clean, etched enamel, air spray ( $p > 0.05$ ). This study demonstrates beneficial effects of a primer step when placing sealant to enamel bond strength. It is appropriate for use in dental health programmes in developing countries where dental equipment is lacking. This study was supported by School of Dentistry, Otago University, New Zealand.

**P-40c** Finite Element Analysis of Thermo-debonding Mechanisms in Composite Systems. H.-C. CHIANG\*, S.-Y. LEE<sup>1,2</sup>, C.-T. LIN<sup>1</sup>, H.-M. Huang<sup>3</sup> (School of Dentistry, <sup>1</sup>Wan-Peng Hospital, <sup>2</sup>Instrumentation Center, Taipei Medical College, Taipei, Taiwan, ROC).

To evaluate the properties of medical materials and the relationship between these materials and natural tissue, finite element analysis has been proved to be a useful tool. In this study, finite element analysis was carried out to study the debonding mechanisms of filler and matrix in model composite systems which were heated by laser power source. Also, thermal stress behavior and its distributions were calculated. Based on our former Laser Acoustic Emission Thermal Technique experiment and SEM observations, plane strain finite element models which include different filler weight volume (0%, 25%, 50% and 75%) were developed. The material properties (elastic modulus and thermal expansion coefficient) of silane coupling agent were adopted from the literature. Beam elements were modeled to simulate the isolation effect of thermal stress between filler and matrix in unsilanated model. ANSYS (Rev. 5.3), a general purpose finite element package, was executed on a personal computer. The thermal stress contour and strain energy were both computed using transient couple-field method. The findings demonstrated: 1) The stress distribution patterns of 0% and 25% filler weight volume composites are similar, in which the surroundings of the outer field of heated area were destroyed. However, 2) failure of 75% filler weight volume composite was seen both in the inner and outer fields of the heated area. 3) The strain energy of silanated group is higher than that of unsilanated group, indicating that silanated group is more destruction-resistant. All the computed results reasonably matched a series of experimental measurements which were executed in our laboratory. Finite element analysis appears to be a powerful method in studying the thermo-debonding mechanisms of composite systems. This work was supported by a grant (NSC 86-2314-B-038-026) from the National Science Council, Taipei, Taiwan, ROC.

**P-41c** **Axiographic Tracings and Condylar Parameters on Healthy Vietnamese**

HOANG TU HUNG and NGUYEN PHUC D.T.\* (Faculty of Odonto-Stomatology HoChiMinh City, Vietnam).

The objectives of this study are to determine on healthy young adult Vietnamese the characters of axiographic tracings and condylar movement parameters of 62 individuals (32 men and 30 women) free of signs or symptoms of TMJ disorders using Quick-Axis® system. In addition, condylar parameters were determined for direct transferring to articulator. The main results were as follows:

Axiographic parameters	Men		Women	
	Right Joint	Left Joint	Right Joint	Left Joint
Maximal opening (mm)	13.56 ± 2.31	13.31 ± 2.50	13.52 ± 1.98	13.50 ± 1.82
Maximal protrusion (mm)	10.13 ± 2.26	8.99 ± 2.16	9.54 ± 2.09	9.25 ± 2.01
Maximal laterotrusion (mm)	12.70 ± 2.41	11.70 ± 2.45	12.33 ± 2.62	11.63 ± 2.29
Condylar inclination (degrees)	39.44 ± 7.71	41.43 ± 7.88	38.93 ± 7.59	41.27 ± 7.47
Condylar angulation (degrees)	7.59 ± 2.80	7.58 ± 3.08	7.17 ± 3.08	6.33 ± 2.87
Immediate side shift (mm)	0.90 ± 0.20	0.94 ± 0.20	0.98 ± 0.16	0.97 ± 0.13

No highly significant differences could be found between the two joints and between genders. The results of this study, applying for the first time axiographic technique on healthy individuals in Vietnam, can be used as reference data for further investigations on Viet people with TMJ disorders.

**P-42c** **Coronal leakage of obturated root canals using a polymicrobial marker. P. CHAILERTVANITKUL\*, W.P. SAUNDERS and D. MACKENZIE.** (\*Khon Kaen University, Thailand. University of Glasgow Dental School, UK).

This *in vitro* study investigated the effect of long-term storage on the coronal leakage of a microbial marker on teeth root filled with lateral condensation of cold gutta-percha and one of two sealers. Sixty single-rooted teeth were prepared chemomechanically to a size 40 master apical file. The teeth were divided into experimental and control groups. In the experimental group, 20 teeth each were obturated with lateral condensation and Apexit sealer. Another 20 teeth were obturated with lateral condensation and Tubiseal EWT sealer. In control group, 10 teeth were obturated with lateral condensation and sealer and sealed completely, as negative controls. The other 10 teeth were not obturated, as positive controls. The teeth were stored for 6 months in artificial saliva and tested for leakage using a marker consisting of *Streptococcus sanguis* and *Prevotella intermedia*. The teeth were checked for bacterial leakage daily for 90 days. All positive control teeth leaked after 24 h, whilst the negative control teeth remained uncontaminated throughout the test period. Leakage through the experimental teeth varied between 17 and 88 days, 50% and 70 % of the specimens of the Apexit and Tubiseal EWT groups respectively showed leakage at 90 days. There was no statistically significant difference ( $P > 0.05$ ) in leakage between the Apexit and the Tubiseal EWT groups.

**P-43c** **Caries development in relation to parental oral health knowledge and attitudes.** MCM WONG\*, ECM LO, E SCHWARZ. (Faculty of Dentistry, University of Hong Kong)

A 4-year field demonstration trial was set up in Conghua, Southern China to compare caries development in children who participated in a daily teacher supervised toothbrushing with fluoride toothpaste programme (T-group) with children who had no organized prevention programme (C-group). Baseline and annual follow-up clinical examinations were conducted. Questionnaires were given to parents at baseline and at the final examination. The objectives of this analysis were to describe the change in oral health knowledge and attitudes among the parents over 4 years and their effects on caries increment among the kindergarten children. At baseline, information was collected from 272 children (T: 161; C:111), the number of cohort children who remained after 4 years dropped to 159 (T:98; C:61). No significant change in oral health knowledge and attitudes was found over 4 years in either group of parents. Net 4-year caries increment of the children was found to be significantly different between the test and control groups (T: 3.6 surfaces; C: 7.6 surfaces). Results from a multiple regression analysis showed that the prevention programme, baseline dmfs, oral hygiene level and oral health attitudes of the parents had significant effects on caries increment. It was concluded that implementation of the prevention program in the kindergarten did not result in a significant change in the parents' oral health knowledge and attitudes but the parents' attitudes were related to the caries increment of their children. Supported by University of Hong Kong and Colgate (Guangzhou).

**P-44c** **The Effect of the Musculoskeletal Assembly on Bite Force Performance** C.W. HSU\*, Y.Y. SHIAU, and C.M. CHEN (Graduate Institutes of Clinical Dentistry and Biomedical Engineering Center, NTU, Taipei, Taiwan).

The purpose of this study was to observe effects of the size and orientation of the jaw closing muscles and the craniofacial morphology on the exertion of biting force. Twenty-seven male subjects having complete dentition and normal muscles were observed and TMJ condition were observed. Their facial cephalometric radiographs were taken for facial type analysis. Magnetic resonance images at axial and coronal sections were taken for the measurement of the cross-section area and then the volume of the masseter and medial pterygoid muscles. A system was developed for such measurement. The orientation of the muscles was also derived. Maximal bite force and EMG activity of the masseter muscle were obtained when the subjects were biting the device with their habitual side first molars. It was found that the average maximum biting force was  $83.05 \pm 21.50$  Kg and the muscle activity was  $124.15 \pm 51.23$  mV/sec. The average corresponding maximum cross-section areas of the masseter and medial pterygoid muscles were  $6.22 \pm 0.87$  cm<sup>2</sup> and  $3.38 \pm 0.47$  cm<sup>2</sup>. The volume of the masseter muscles was  $31.38 \pm 6.50$  cm<sup>3</sup> and that of medial pterygoid was  $10.93 \pm 2.09$  cm<sup>3</sup>. The masseter muscle was located more vertically than the medial pterygoid muscle. The stepwise regression analysis on the effect of the musculoskeletal assembly showed that the sum of the volume and the orientation of the masseter and the medial pterygoid muscles, the average EMG activity of the masseter muscle, the antero-posterior aspect of the facial dimension have significant power to affect the bite force performance ( $R^2 = 0.86$ ,  $p < 0.0001$ ). It was concluded that the bite force performance is determined by a combination of many factors rather than by any single factor. (This study was supported partly by a NSC ROC grant. NSC 85 2331 B002 273)

**P-45c** **Using Standardized Testfoods for the Observation of Chewing Function.** C.C. Peng\*, C.W.Hsu and Y.Y. Shiau ( School of Dentistry, National Taiwan University, Taipei, Taiwan).

Human masseter muscle is the main power source used for crushing or grinding the foods. It's size is regarded as an determining factor of chewing force and function. However, for the observation of the masseter function, the testfoods should be standardized. New testfoods were developed in our laboratory which contained CaCO<sub>3</sub> and microcrystalline cellulose in different weight ratio. The ingredients were mixed with MgO and pressed under different pressure. The products were 1.0cm in diameter and 0.5cm in thickness with smooth surface. Three types of testfoods were obtained having 20, 40 and 80kg in hardness and the coefficient of variance was limited to 15%. Twelve male subjects having complete dentition and healthy masticatory function were used to chew the testfoods. The subjects' masseter muscle volume was obtained from MR images which were in turn transformed into volume via the use of a custom made program. It was found that the volume of masseter muscle was positively related to the body size and the muscle activity in total contraction EMG during chewing. The increase of the muscle activity during crushing and grinding was almost parallel to the increase of the testfood hardness. It was concluded that the testfoods can be used for chewing function examination with high reliability. (Supported by NSC85-2331-B002-273)

**P-46** **Effect of Different Forms and Concentrations of Fluoride in Toothpastes on the Deposition of Calcium Fluoride Like Material on Human Enamel.** P.Phanumvanit, E. Benjavongkulchai, P.Puansawat, A. Sinsawat and M.Guay.\* (Thammasat U., Chulalongkorn U., Thailand).

The aim of this study was to determine the effect of fluoride-containing toothpastes with different forms and concentrations of fluoride to the deposition of calcium fluoride like material on human enamel surface *in vitro*. Four commercial toothpastes, Close-up (NaF), Colgate (Mono-fluorophosphate; MFP), Fluocaril (NaF+MFP) and Twin lotus (no fluoride), were tested. In addition NaF was also added to Twin lotus toothpaste to make 500, 1000 and 1500 ppm F and tested. One gram of toothpaste was mixed with 3 ml of distilled water and centrifuged. Human enamel specimens size =  $3.14$  mm<sup>2</sup>,  $n = 7-10$  were soaked in the toothpaste supernates for 24 h. Calcium fluoride like material was then extracted with KOH from each specimen and then analyzed for fluoride ion with fluoride selective electrode (Orion). The result showed that NaF toothpaste yielded more calcium fluoride like material on human enamel surface ( $3.3 \pm 1.0$  µg/mm<sup>2</sup>) which was statistically significant different (ANOVA  $p < 0.05$ ) from those of MFP ( $1.6 \pm 0.3$  µg/mm<sup>2</sup>), NaF+MFP ( $1.6 \pm 0.4$  µg/mm<sup>2</sup>) and no fluoride ( $0.7 \pm 0.2$  µg/mm<sup>2</sup>). Toothpastes with different NaF concentration increased significantly the deposition of calcium fluoride like material from 1500 ( $18.0 \pm 5.8$  µg/mm<sup>2</sup>) to 1000 ( $9.8 \pm 3.0$  µg/mm<sup>2</sup>) and 500 ( $6.3 \pm 2.7$  µg/mm<sup>2</sup>) ppm F. In conclusion, calcium fluoride like material deposition on human enamel surface *in vitro* correlates with the concentration of free fluoride ion in the toothpaste.

**P-47**

Morphology of enamel initial lesion treated with different commercial dentifrices under pH cycling model. SEM observations. A. Itthagarun, SHY Wei, JS Wefel. (Children's Dentistry and Orthodontics, Faculty of Dentistry, The University of Hong Kong, Hong Kong, Dows Institute for Dental Research, College of Dentistry, The University of Iowa, Iowa City, Iowa, USA)

The aim of this study was to evaluate and compare the 'calcium fluoride-like reaction products' formed, both on the surface and in the subsurface caries-like lesions of enamel, from different commercial dentifrices manufactured locally from developed and developing countries. The experiment was conducted by using the *in vitro* single-section technique under the pH-cycling system. The results were compared to those obtained from microradiography (MRG) and polarized light microscopy (PLM) from our previous studies using the same dentifrices. The tested dentifrices include: Maxam DFP®, Maxam Tartar Control®, First®, Tianqui Medicated® (China); Vicco Vajradenti® (India); Colgate MFP®, Crest Tartar Control (USA); and a non-fluoride dentifrice used as control. Sound extracted molars were painted, leaving a 1 mm wide 'window' on the buccal and/or lingual side, placed in the demineralization solution for 96 h to produce artificial caries, 80-100 µm deep. The teeth were then longitudinally sectioned, 100µm thick, and randomly divided into 8 groups (22 sections/group). The pH cycling model was utilized for 10 days. The surface and subsurface of the lesions, before and after treatment, were examined using scanning electron microscope (JEOL, Japan). Varying degrees of fine globular patterns on the surface (5 out of 8 groups) and in the subsurface enamel lesions (4 out of 8 groups) were noted. Two test groups showed a 'similar appearance' compared with the control and untreated groups. This study suggests and supports that, when compared to 'multinational dentifrices', some Chinese and Indian dentifrices manufactured locally failed to show the 'caries inhibition' efficacy, even though they claimed to contain varying levels of F. (supported in part by CRC Grant #345/251/0058, The University of Hong Kong, Hong Kong)

**P-48** **Fluoride and Chlorhexidine Reduced Lactic Acid from *Streptococcus mutans* in vitro** K. Koompirojn, S. Sukswang, T. Meka-apiruk and S. Kaewkrasessin\* (Department of Biochemistry, Faculty of Dentistry, Chulalongkorn U., Thailand).

The efficacy of fluoride and chlorhexidine gluconate for inhibition of lactic acid production from *Streptococcus mutans* strain KPSPK2 were testing *in vitro*. Fluoride and chlorhexidine in different concentrations were treated and compared with control in Todd Hewitt media containing 4% sucrose. The results showed that lactic acid production was decreased when either sodium fluoride or chlorhexidine gluconate concentration was increased. By Anova test, fluoride ion concentration 5, 10, 15 and 20 ppm inhibited bacterial lactic acid production significantly ( $P < 0.05$ ). Treatment group comparison showed no difference in 15 and 20 ppm group. Chlorhexidine gluconate at 0.01, 0.1, 0.5 and 1 mg% inhibited bacterial lactic acid production significantly ( $P < 0.05$ ), however, no differences were found between 0.5 and 1 mg%. It was concluded that sodium fluoride and chlorhexidine gluconate could reduce lactic acid production from *Streptococcus mutans* *in vitro*.



**P-49**

The condition of dental health among children of aborigines and newcomers in the Far North of Russia. N.ALIMOVA\* and V.ELIZAROVA (Moscow Medical Stomatological Institute, Russia).

This study is concerned with establishing the prevalence of caries and oral hygiene among schoolchildren in the Yamal Peninsula, and correlating caries occurrence with general health conditions, climate and geography of the peninsula. 2939 schoolchildren between the age of 7 and 15 were examined, among them 2514 were indigenous and were 425 newcomers' children. Situated completely above the Arctic Circle in the extreme north of western Siberia the Yamal Peninsula contains one of the harshest inhabited environments and some of the largest oil and gas deposits in the world.

Age, years	7	8	9	10	11	12	13	14	15
DMFT	2.85	3.64	3.86	4.64	4.48	5.76	6.67	7.24	7.81
% active caries	97.5	100.0	99.2	98.3	95.5	99.2	97.1	93.4	98.0

It has been found that 87.3% of all children knew nothing of oral hygiene. The mean OHI-S was found to be 3.8. The DMFT and caries occurrence are significantly higher than those in other regions of the Russian Federation with warmer climate and better oral hygiene education.

The DMFT for aboriginal children was found to be smaller by 1.02±0.01 than that for the children of newcomers who have lived in Yamal for less than 3 years. This is associated with a better ability of the aborigines to adapt to severe climate conditions than that of non-aborigines who come from regions with milder climates.

Severe climate conditions, small content of minerals in water and food result in high prevalence of caries among children who have lived more than 3 years in the Yamal Peninsula.

Season	Winter	Spring	Summer	Autumn
Excess of "stain" caries per tooth	0.97±0.03	0.92±0.03	1.1±0.03	1.26±0.06

Seasonal variation of the occurrence of caries during the arctic night and arctic summer is associated with the range of phosphorous and calcium content in saliva which weakens its regeneration properties.

**P-50**

Oral health status of schoolchildren in Southern Thailand. J FROMMAJAN\* (Prince of Songkla University, Thailand) PE PETERSEN, (University of Copenhagen, Denmark), N HOERUP (ROHC, Southern Thailand)

In Thailand, systematic informations on oral health status are scarce. The present study was undertaken in order to describe the oral health status of children of grade 1 (6 yrs) and grade 6 (12 yrs) in the province of Suratthani, Southern Thailand. The WHO pathfinder sampling procedures were applied to obtain representative samples of the target groups: grade 1 (n = 1156) and grade 6 (n = 1116), and the participation rate was 99%. Clinical data were collected in 1996 according to the criteria of WHO, including dental caries and CPITN. In grade 1 children, 96% were affected by dental caries in the primary teeth and the dmft was 8.1. At grade 6, the caries prevalence rate was 70% and the mean DMFT was observed at 2.4. At both grades and in both dentitions, untreated dental caries constituted most of the caries index. Only minor differences in dental caries were found according to sex, urbanization, and ethnic group. The gingival conditions were poor, e.g. at grade 6 89% of the children had CPI score 1+2 (gingival bleeding or calculus). In conclusion, the implementation of community-based preventive oral health care programmes for Thai children is urgently needed.

**P-51**

Oral hygiene behaviour of schoolchildren in Southern Thailand. N POOMVISET\* (Prince of Songkla University, Thailand), PE PETERSEN (University of Copenhagen, Denmark), N HOERUP (ROHC, Southern Thailand)

Few studies have been conducted to highlight the oral health behaviour of children in Thailand. The objective of the present survey was to describe and analyse selfcare practices of grade 6 schoolchildren in Southern Thailand. The number of 1140 children were selected according to the WHO pathfinder procedure in the province of Suratthani, Southern Thailand, and 1084 children (95%) participated in personal interviews. The structured interviews included questions on toothcleaning habits, means of cleaning the teeth, and socio-cultural backgrounds of the children. In total, 78% of the children brushed their teeth two or more times a day; girls more often (89%) than boys (67%). Use of fluoride toothpaste was claimed by 89%. Moreover, other means of toothcleaning were mentioned, e.g. use of wooden toothpicks (45%) and chewsticks/miswak (19%). Toothbrushing habits were associated with ethnic group and level of education of the mothers. In conclusion, planning of oral health education for schoolchildren in Thailand should give emphasis to important socio-cultural subgroups.

**P-52**

Utilization of dental services in schoolchildren of Southern Thailand A WATANAPA\* (Prince of Songkla University, Thailand) PE PETERSEN (University of Copenhagen, Denmark), N HOERUP (ROHC, Southern Thailand)

At present, no informations on utilization of dental services are available in Thailand. The purpose of this survey was to study the dental visiting habits of schoolchildren at grade 6 (12 years) in relation to socio-cultural background. The number of 1140 children were selected according to the WHO pathfinder procedure in the province of Suratthani, Southern Thailand, and 1084 children (95%) participated in personal interviews. The structured interviews included questions on dental visits, reason of last visit to the dentist, and the treatment received. In total, 68% of the children saw the dentist within the last 12 months; 58% of the children had appointments initiated by the dentist whereas 24% went to the dentist because of pain or troubles with teeth. At the last visit, 81% of the children had an examination, 58% had instruction of care for the teeth, 25% had a tooth extraction and 20% had fillings. The utilization of dental services varied by ethnic group, e.g. more muslims than buddists had fillings and tooth extractions. To conclude, systematic oral health programmes should be developed in order to meet the dental care needs of schoolchildren.

**P-53**

Gingival Microleakage of Cast Inlays Luted with Different Cements. M. TUNTIPRAWON\*, N. SERMSUTI-ANUWAT and N. PROMIENG (Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand)

This study investigated the microleakage of Class II cast inlays (Silver-Palladium Alloy) luted with: zinc phosphate (Phosphacap), glass-ionomer (Fuji Cap I) or composite resin cement (Panavia 21). Forty-two extracted intact molar teeth were prepared using a milling machine (KaVo EWL). Three standardized Class II cavities were performed on each tooth with 1 mm of gingival shoulder margin, 2 mm in width and 3 mm in height. Three cast inlays were fixed on each tooth with different cements. All specimens were thermocycled for 300 cycles in water between 5 degrees and 55 degrees C. The linear penetration of silver nitrate solution at the dentin/cement interface was measured from the external gingival margin. Means (SD) of each cemented group in µm were: zinc phosphate = 3197.62 (234.96), glass-ionomer = 2217.86 (321.93), resin cement = 1179.17 (317.23). ANOVA showed highly significant differences among groups (p<0.0001). Duncan test revealed significant differences between groups (p<0.05). The results indicated that Panavia 21 provided the best resistance to microleakage. The greatest amount of leakage was found in inlays cemented with Phosphacap. This study was supported by Dental Research Fund, Faculty of Dentistry, Chulalongkorn University, Thailand.

**P-54**

Dental Fear and Anxiety in The Thai at Chulalongkorn Dental Clinic. S. Rapisuan, P. Bhuridej and S. Theerajetkool\* (Dept. of Community Dentistry, Fac. of Dentistry, Chulalongkorn Univ., Bangkok, Thailand).

The objective of this study was to evaluate the dental fear and anxiety level of a group of the Thai who attended the out patient dental clinic of Chulalongkorn Dental School and factors that related to dental fear and anxiety. Of the 650 persons who completed the Corah's Dental Anxiety Scale questionnaire, 10.6 percent had no fear and anxiety, 30.7 percent had moderate dental fear and anxiety. The average of DAS score of this group was 8.30 ± 3.24. Male had low score of DAS than female. Younger people had high score than older people. Past experience of dental pain from the first dental visit had an affect of dental fear and anxiety on this groups of people very significantly (P ≤ 0.001). In the conclusion, sex, age and past dental experience were the factors that related to dental fear and anxiety on this group of people.

**P-55**

Antimicrobial Efficacy of Chlorhexidine Varnish in High Caries-risk Children. W. CHIDCHUANGCHAI\*, S. THAWERORN, Y. KI PHASUK and S. TANAKUN (Faculty of Dentistry, Mahidol University, Bangkok, THAILAND)

Chlorhexidine sustained-release varnish was developed to be applied on tooth surfaces for prevention of dental caries. This study investigated effects of a chlorhexidine varnish on levels of mutans streptococci in saliva and dental plaque. Fourteen children with high levels of mutans streptococci (greater than 2.5x10<sup>5</sup> cfu/mL saliva) were selected and participated in this clinical experiment. After a dental prophylaxis, each subject was treated with a single application of the varnish containing 20% chlorhexidine diacetate onto all tooth surfaces. Plaque and pooled plaque samples were taken for bacteriological examination before (baseline) and sequentially at 1, 2, 3 and 4 weeks after the treatment. Analyses of sequentially collected salivary and dental plaque samples showed an immediate reduction of the numbers of mutans streptococci after the varnish application. And the levels were found to remain significantly lower than baseline values (p<0.05) over the whole experimental period. The results suggest that the sustained-release varnish can be used as an alternative delivery system for the in vivo application for suppression of mutans streptococci levels for at least 1 month.

[Original was a facsimile damaged in transit.]

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