Poster Presentation

P001

Construction of the Core Clinical Competencies by Nominal Group Technique

Chen-Ying Wang[1,2], Eddie Hsiang-Hua Lai[1,2]*.

[1]School of Dentistry, National Taiwan University, [2]National Taiwan University Hospital, Taipei, Taiwan.

Introduction: Due to the extensive scope in terms of learning for dental students, coupled with regional variations, a common consensus of the educational objectives has been hard to reach.

Objectives: The aim of this study is to set out clinical dental education objectives which serve as goals to measure learning effectiveness and to review their use in current curricula.

Method: 12 voluntary faculty participants from the School of Dentistry, National Taiwan University classified the 22 dentistry clinical core competencies into two classifications, such as operational and non-operational capacity measures. These were then prioritized in order of importance by the method of nominal group technique (NGT).

Results: The top 3 non-operational capacity measures are: intellectual inquiry and readiness to respond, treatment planning, systemic dental disease handling; the top 3 operational capacity measures are: tooth-filling, infection control, and needle protection.

Conclusion: In order to provide helpful future reference to the design of clinical courses and clinical assessment of dental students, more dental teaching faculty from other dental school should be invited. Further research and discussion on designing a comprehensive curriculum and establishing appropriate assessments with validity are deemed necessary.

P002

Mouth Floor Mature Cystic Teratoma

T Wang[1]*, C Wu[2].

[1]Department of Otoloaryngology Tainan Municipal Hospital, [2]Department of Pathology, Tainan, Taiwan

Introduction: Mature cystic teratoma is a benign, well-differentiated tumor formed by the differentiation of embryonic cells, consists of more than one layer of mesoderm tissue; The ovaries, testes, and coccyx or the mediastinum are the most common sites for teratomas.

Objectives: The incidence is rare in the head and neck. According to previous study, only 6.9 percent are reported. Teratoid cysts of the mouth floor account for 1.6 to 2 percent of all such lesions.

Method: We experienced a 13 age boy complained of an un-painful mouth floor lesion for three months, the size is not fluctuated during or after meal, and the texture is not indurated; Computer tomography displays a homogenous cystic lesion. During operation, we found a smooth cyst without connecting to submandibular system and removed it completely.

Results: Pathological findings showed outer layer composing of keratinized squamous epithelium, and ectodermal structures such as sweat glands or sebaceous glands. Scanty smooth muscle tissue was found with positive SAC stain. The final diagnosis is mature cystic teratoma. There is no recurrence of postoperative follow-up.

Conclusion: Mature cystic teratoma should also be considered in the differential diagnosis of intra-oral lesions especially if the mass has regular contours and a semisolid-cystic nature radiologically despite the fact that they are.

P003

How Efficient is the Use of Students' Dental Operatories?

Norsyairah Othman, Nursyamimi Samsuddin, Jasmina Qamaruzzaman, Yew Hsu Zenn, Safura Anita Baharin, Shahida Mohd Said*, Tuti Mohd-Dom

Faculty of Dentistry, Universiti Kebangsaan Malaysia, Malaysia

Introduction: In the clinical dental education environment, opportunities for sufficient and varied patient encounters are driven by efficient use of allocated dental operatories. It has been argued that longer academic weeks contribute to more clinical experiences for dental students.

Objectives: The aim of this study is to determine the efficiency of dental operatory use among dental students during their undergraduate training.

Method: We collected prospective data from undergraduate students' dental clinics at Universiti Kebangsaan Malaysia to determine the number of operatories used and patients booked for their clinical sessions during the study period of three months in the 2015 / 2016 academic session. We identified reasons for non-usage of dental operatories from clinicians, and patients for cases of "no show".

Results: From the five surgeries included in the study, use of dental operatories ranged from an average of 23% to 55%. Reasons for non-usage were no booking (64%), non-functioning (30%) and patients did not turn up (3%). Almost all students were reported to only book one patient per clinical session (98%).

Conclusion: The use of dental operatories by undergraduate students in this study is not efficient and this will reduce opportunities for sufficient clinical training. Efforts to improve efficiency must include improving students' capability in patient management and repair of non-functioning operatories.

P004

Cytotoxicity of Mangarove Rhizopora Mucronata Bark Extracts as Intracanal Medicament

Twi Agnita Cevanti*, Aprilia*. Laboratorium Konservasi Gigi
School of Dentistry, Hang Tuah University, Surabaya, Indonesia

Introduction: A root canal disinfectant should be antimicrobial agent effective in eliminating and prohibiting microorganism growth with no toxicity towards periradicular tissues. Rhizophora mucronata bark extracts have been found in previous studies to exhibit antibacterial activity.

Objectives: This study aims to determine the cytotoxicity of Rhizophora mucronata bark extracts as an intracanal medicament.

Method: Gingival mesenchymal stem cells (GMSCs) were exposed to the Rhizophora mucronata bark extracts at different concentrations of 0.5% (Group 1), 1% (Group 2), 2.5% (Group 3), 5% (Group 4), 10% (Group 5), and 20% (Group 6) to assess its cytotoxic effect. In addition, there were two control groups; one containing only the culture medium while another only with the cells. Cell viability was assessed by 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT) assay. This was done by adding MTT solution into each well after 3 minutes and then incubating them for 4 hours. Dimethylsulfoxide (DMSO) was then added to each well and shaken to mix. The absorbance was then measured on an ELISA plate reader with a reference wavelength of 630 nm. The extract at that said concentration is identified to be non-toxic if the cell viability is ≥ 50 %.

Results: There was significant difference in cell viability of the GMSCs at various concentrations of the extract. The highest cell viability was found in group of cells which was treated with 1% concentration of Rhizopora Mucronata extract, while the with 10% concentration Rhizopora Mucronata significantly reduced the cell viability to the lowest among all groups.

Conclusion: Rhizophora mucronata bark extracts at concentrations of 0.5%, 1%, 2.5%, and 5% can be used safely as endodontic intracanal medicament.

P005

Age Estimation by Occlusal Tooth Wear in Malaysian Chinese Population Using Modified Kim's Scoring System.

Chai Kit Lu*, Margaret Chia Soo Yee, Spoorthi Ravi Banavar and Rohit Pandurangappa.

School of Dentistry, International Medical University, Kuala Lumpur, Malaysia.

Introduction: Teeth undergo physiological changes in every individual with advancing age, making it a useful tool in estimating age of an individual which can be an adjunct in forensic investigations.

Objectives: The purpose of this study is to validate modified Kim's scoring system as a practical method to estimate age of Chinese Malaysian population.

Method: 95 maxillary and mandibular full arch casts impressions were taken using alginate (age range 20 to 60 years). Teeth wear was analyzed and scored following modified Kim's Scoring System. Correlation between teeth wear scores and age were determined. A linear equation was derived by regression analysis to calculate the approximate age and was further validated by testing it on a control sample (n=30).

Results: Karl Pearson's test showed good correlation between age and tooth wear scores (r2 = 0.824 in males, 0.747 in females). Multiple regression analysis estimated 65.8% of males' and 57.9% of females' age within range of +/- 5 years, 44.7% of males' and 35.1% of females' age within +/- 3 years. Test of regression formula on control sample (n= 30) showed age estimation of 20% of males and 60% of females were within range of +/- 5 years and 20% of males' and 40% of females' age within +/- 3 years.

Conclusion: Our results showed that modified Kim's scoring system is reliable in estimating the age of Malaysian Chinese population. The regression formula developed is specific for this population. This suggests modified Kim's scoring system may be used as an alternative to other age estimation methods.

P006

Development and Validation of a Faculty Teaching Competence Scale

Wangnan Cao[1], Chun Chang[2], Jingyi Cai[2] and Gloria Hai Ming Wong[1]*.

[1]Faculty of Dentistry, The University of Hong Kong, Hong Kong, [2]Peking University, Beijing, China

Introduction: There was a need to measure teaching competence objectively. The instrument, if developed, could be used as a guiding tool to prompt faculty development among medical universities.

Objective: To develop a scale to measure faculty teaching competence (FTC) among medical universities in China.

Method: A total of 40 faculties working in medical universities joined the study and they had expertise in both teaching and faculty evaluation. The Delphi method was used to select items in the FTC scale. Precedence Chart was used to determine the weight for each item in the FTC scale.

Results: The FTC scale included four subscales, including teaching attitude (9 items), teaching process (18 items), teaching effectiveness (5 items), and teaching related research (4 items). Examples items were a strong willingness to improve personal teaching skills, making full preparations for the class, receiving high scores in student's evaluation, and publishing teaching-related papers. Teaching attitude accounted the highest weights (29.9%) in measuring FTC. The expert coordination coefficient was 0.63 for subscales, and 0.37, 0.47, 0.75, and 0.26 for items in each subscale. All coefficients were statistically significant. Specialist authority coefficients were above 0.80 for all subscales.

Conclusion: The FTC scale was valid, comprehensive, and practical.

P007

Dental Students' Perception on Competency Based Test at University of Malaya.

Arbi NA[1], Mohd Zulkiflee AH[1] and Gonzalez MAG[2,3]

[1]Ministry of Health, Malaysia, [2]Department of Restorative Dentistry, Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia, [3]Dental Education Research Group, University of Malaya, Kuala Lumpur, Malaysia

Introduction and Objective: This study was undertaken to explore the perception of Year IV and Year V University of Malaya dental students on different domains related to the competency based test (CBT).

Methods: A questionnaire was constructed and a survey conducted to explore the students' perception on four domains related to the competency test:

1) Benefits,

2) Readiness to take,

3) Timing and

4) Lecturers' supervision.

Results: In general, majority of the students agreed that they benefited from the competency tests and felt adequately prepared for each test. Students agreeing on feeling confident to sit for each test is 70.0%-81.4% for Year IV and 45.1%-70.4% for Year V. Majority of Year IV and Year V students perceived that the timing of each competency test was 'just right'. There was a high response of 'Strongly agree / Agree' to availability of patients for practice and assessment, self-confidence and amount and distribution of clinical sessions as factors affecting when they take the test. Majority of Year IV students agreed that the assessment was consistent for each test while Year V had a high percentage of 'Neutral' response. Students' agreeing that there was feedback after the test was 52.9%-71.4% for Year IV and 31.0%-56.5% for Year V. 'Strongly agree/Agree' response of 68.6%-75.0% for Year IV and 36.6%-52.1% for Year V was recorded for the level of supervision being the same after passing the test.

Conclusion: Overall, majority of students gave positive perceptions towards CBT in relation to four main domains explored in this research.

P008

Evaluation of Problem Based Learning as a Teaching Learning Tool: a Five Year Institutional Review

Jayashri Tamanna Nerali[1], Lahari Ajay Telang[1], Pishipati Vinayak Kalyan Chakravarthy[1] and Ajay Telang[1].

[1]Penang International Dental College, Malaysia

Introduction: Problem based learning (PBL) is a learner-centered instructional method which is widely used in health professions education. An understanding of students' acceptance of PBL as a teaching learning tool is necessary to ensure the quality of dental education.

Objectives: To analyse dental students' perception of PBL in problem solving, self-directed learning, cooperative learning, role of facilitator and product discussion.

Method: A self-administered, structured questionnaire was distributed to third year students' at the end of their PBL sessions. Their responses were recorded over a five point Likert scale and data collected was retrospectively analyzed using IBM SPSS software. Five cohorts of third year dental students (year 2012-2016) were compared using Multivariate test (P-value = <0.05). Students' open feedback was analyzed using thematic analysis.

Results: A total of 376 participants responded to the questionnaire (F=248 (66%), M=124 (33%). 74 % of students agreed that PBL in problem solving skill and self-directed learning and 80% perceived that it had positive impact on cooperative learning. Although 49% were unsure of role of facilitator in identifying learning goals, 90% felt that PBL product discussion prepared them for future presentation and helped to clarify concepts. No significant difference was noticed between the 5 cohorts of third year dental students.

Conclusion: The results suggested that students had a positive attitude towards PBL and motivated them to participate in learning process thus ensuring the successful implementation of PBL as an instructional method.

P009

Exploring Marine Biota in Dentistry for Student Research

Kristanti Parisihni[1]*, Lita Agustia[2], Dian Mulawarmanti[1], Syamsulina Revianti S[1], Fanny M Laihad[3]

[1]Department of Oral Biology Faculty of Dentistry Hang Tuah University, [2]Department of Public Health Faculty of Dentistry Hang Tuah University, [3]Department of Oral Surgery, Faculty of Dentistry Hang Tuah University

Introduction: Some marine biota have been consumed as folk medicine and have been historically known to have the health benefit. Recently, research on marine medicine have been rapidly developed and assumed with the natural medical content, its related in dentistry is considered to be studied for further application.

Objective: Dental students research could be directed to explore marine natural resources in dentistry. The aim of this study was to present the student research contribution in the study of marine biota exploration in dentistry.

Methods: Thesis with the topic of marine biota research related to dentistry from 300 students of Faculty of Dentistry Hang Tuah University in 2013-2016 were listed and presented as descriptive statistic.

Result: The number of marine biota research performed from total number of student thesis researches were increased: 2013 (26%), 2014 (54%), 2015 (53%) and 2016 (78%). The marine subject were various species of sea cucumber (42%), clam (15%), mangrove (15%), algae (14%), chitosan (7%), fish (6%) studied on its basic content of medical properties, antibacterial, antifungal, antioxidant, bone and wound healing, scaffold and miscelanous dental material, accomplished to dental and oral conditions.

Conclusion: Student's research experience have an important value in dental education, the encouragement to explore natural resources could lead to novel achievement in dentistry issues. The raising trend of marine biota research in dentistry revealed the basic discoveries of natural resources potency in oral treatment.

Keywords: marine biota, natural resources, dentistry, research

P010

Evaluating Dentist Licensure Examination Preparedness through Academic Proficiency Examination: University of the East Experience

Blesilda K. Formantes.

University of the East-College of Dentistry

Introduction: Simulating a real experience measures one's preparedness. The influence of Academic Proficiency Examination (APE) on passing Philippine Dentist Licensure Examination (PDLE) was evaluated to help students assess their academic capacity and preparedness for the PDLE.

Objective: This study investigated how APE score explains PDLE score.

Methods: APE questionnaires for the 9 course clusters were constructed, based on the PDLE table of specifications provided by Board of Dentistry. Following regular PDLE examination schedule, APEs were conducted in the first and second semesters of 2016 on graduating dental students determined to take the 2016 May and December PDLE, respectively.

Results: A simple linear regression was calculated to predict average PDLE score (aPDLEs) based on average APE score (aAPEs). A significant regression equation was found ($F(1,70)=53.163$, $p<.000$), with $R2=.432$, indicating that 43.2% of aPDLEs in the May 2016 PDLE is explained by aAPEs. Students' predicted aPDLEs is equal to 26.034+.737, indicating that for every unit increase in aAPEs, a .737-unit increase in aPDLEs would be expected. Likewise, a significant regression equation was found ($F(1,74)=87.377$, $p<.000$), with $R2=.541$, indicating that 54.1% of aPDLEs in the December 2016 PDLE is explained by aAPEs. Students' predicted aPDLEs is equal to 41.312+.542, indicating that for every unit increase in aAPEs, a .542-unit increase in aPDLEs would be expected.

Conclusion: Simulating PDLE through APE is an effective tool in helping students assess their academic capacity and preparedness for the DLE. Dental education leaders are encouraged to consider similar exercise as integral to student care.

P011

Accelerated Healing of Intentional Wounds on Sprague-Dawley Rats by Eggshell Membrane and Hydrogel Dressing

A.D. Doria, K.A. Malubag, M.I. Querol*, H.J. Razon, M. Resurreccion and R. Tiopianco.

University of the East- College of Dentistry, Manila, Philippines.

Introduction: Eggshell membrane has been used before for wounds because of its known healing properties. This study determined the effectiveness of eggshell membrane in wound healing compared to the commercially available hydrogel dressing histologically, by using histological healing parameters during inflammatory, proliferative and maturation phase.

Objectives: The aim of the study is to find out the difference between eggshell membrane and hydrogel dressing in accelerating wound healing process of Sprague-Dawley rats.

Method: Nine male Sprague-Dawley (SD) rats were grouped into three, anesthetized using ketamine and depilated to make a precise 2 cm long full thickness incision on the scalp of each rat. Each group was treated with eggshell membrane, hydrogel dressing and sterile water. One SD rat from each group was euthanized on the 3rd, 7th and 14th day of wound healing process to harvest tissue samples for routine histopathologic processing. The tissues were evaluated using parameters in assessing wound healing to compare the difference in the numbers of neutrophils, fibroblasts and collagen present.

Results: The results showed that in all of the phases, eggshell membrane was comparable to hydrogel dressing because both of them fell within the range of 12-15 which indicated a fair wound healing process.

Conclusion: In accordance with the parameters used in assessing wound healing, both showed fair wound healing capacity. Hence, eggshell membrane is as effective as the commercially available. Hydrogel dressing in accelerating wound healing; however, the effect of one from the other differs in terms of which phase they work best.

P012

The Use of Arcs-Based Motivational Strategies on Students Performance in Preclinical Prosthodontics 1

Marian Jane J. Magno[1]*, Maria Wanda I. Martinez[2].

Centro Escolar University-Graduate School, Manila, Philippines.

Introduction: Knowledge and skills are traditionally gained from general environments of classroom, seminar and clinic, given and maneuvered by dental educators. But, other than cognitive and psychomotor skills there are other ways, the educator can affect students. One of which is, motivating students.

Integrating Motivation in Dentistry is a difficult task. Dental education is competitive and rigorous. It places emotional, psychological, and physical demands on students. Dental education today must ensure that professionals are equipped and can deal with the challenges in the profession. Continuous innovations and discoveries are made to enhance academic performance of students using different strategies to determine and alleviate the shortcomings of traditional teaching.

Objectives: The purpose of the study is to know whether the application of ARCS strategies to instructional design and simulation instruction in Prosthodontics 1 can bring positive effect on students' overall level of motivation and academic performance.

Method: A one-group pretest/posttest type of research of pre-experimental design was used. The level of motivation was measured using Course Interest Survey while academic performance was measured using students' grades.

Results: All of the four subscales of ARCS strategies by Keller increased which indicates that the level of motivation was also increased. Likewise the academic performance of students significantly increased. However, despite the increase, the researcher could not find a relationship between the two variables.

Conclusion: The ARCS motivational strategies could be use as one of the strategy in teaching the course in conjunction with other strategies. Further studies should be conducted to associate level of motivation to academic performance.

P013

IL-17A and MMP-8 Expression after Stichopus Hermanii Application in Relapse Orthodontic

Noengki Prameswari[1], Arya Brahmanta[1].

[1]Dentistry Faculty Hang Tuah University, Surabaya, Indonesia

Introduction: Stichopus hermanii is one of the best fishery product in Indonesia, its contain various active ingredients such as flavonoid, chondroitin sulphate,cell growth factor, EPA DHA, that have known function in bone. Relapse Orthodontic is the change from the final tooth position after orthodontic treatment to the original teeth position caused by periodontal ligament remodeling need time.

Objectives: The aim of this study is to examine IL-17A and MMP-8 expression as a collagen in periodontal ligament remodeling parameter after Stichopus hermanii application in Relapse orthodontic

Method: Twenty four male Cavia Cobaya were divided into three groups. K(-) group as negative control group (without treatment), K(+) group as positive control group which were applied with orthodontic mechanical forces and after days 14, forces were removed for 7 days to get relaps, and P were applied with relaps force and Stichopus hermanii 3%. After treatment the cavia cobaya were sacrificed. IL-17a and MMP-8 were examination in tension site by immunohistochemistry.

Results: Descriptive data showed that means of IL-17A expression in K(-): 3,13±0, 99; K(+): 6,13±1, 64; P:2,5±1,4 and MMP-8 in K(-): 3,75±1, 5; K(+): 14,88±2,64; P:9,13±1,55. Anova Test showed IL-17a and MMP-8 expression was significantly differences in all group (α=0,05). Tukey HSD showed all group was significance difference except in K(-) and P group in IL-17a expression.

Conclusion: Stichopus hermanii 3% could decrease IL-17A and MMP-8 in days 7 after relapse orthodontic that means inflammation reduce and increase collagen periodontal ligament to prevent relapse.

Keywords: Stichopus hermanii, IL-17A, MMP-8, relapse orthodontic

P014

How will the Dental Student Eye Movement Change with the Visualmaterial Presentation Methods?

S. Tanaka[1]*, K. Matsuda[1], Y. Katou[2], S. Ono[3], T. Kamoda[3], A. Komatsuzaki[3], H. Karibe[2], T. Sekimoto[1]

[1]Department of Pediatric Dentistry, The Nippon Dental University School of Life Dentistry at Niigata, Niigata, Japan, [2]Department of Pediatric Dentistry, The Nippon Dental University School of Life Dentistry, Tokyo, Japan, [3]Department of Preventive and Community Dentistry, The Nippon Dental University School of Life Dentistry at Niigata, Niigata, Japan

Introduction: Currently, visual materials are indispensable for clinical dental education. There are two types of visual material presentation methods, reflected light like printed matter and transmitted light like personal computer screen. During reading characters, it is reported that these two methods differ in the cerebral physiological processing method in visual information processing. However, there are no reports on images in the dental education field. Therefore, we examined whether the eye movement pattern at the time of observation differs depending on the panoramic X-ray photo presentation method.

Objectives: In panoramic X-ray photography observation, we examined what kind of difference the eye movements have between reflected light and transmitted light.

Method: The percentage of correct answers was determined based on the detection of five findings in the panoramic X-ray photo (Hellman's dental age of IIIA, no congenitally missing teeth, maxillary central supernumerary impacted teeth, a space maintainer, and restoration), and patterns of visual perception and cognition were analyzed. Free View was used for eye movement measurement with transmitted light and Talk Eye Lite was used for reflected light.

Results: It was observed specific eye movement with both high detection rate students and low student groups. Eye movements of only saccades in which a fixation point was hardly observed in the transmitted light group were observed. The detection rate of Hellman dental age was higher in the reflected light group.

Conclusion: Differences were observed in eye movements between transmitted light and reflected light during image observation.

P015

The Difference Behaviour of Co-Assistant Dentists between High and Low Knowledge Level of Patients Safety after Pre-Clinic Briefing

(Studied at Hang Tuah University Dental Hospital)

Ayulistya Paramita[1]*, Dwi Hariyanto[2], Kristanto Wangi[3]

Paediatric Dentistry, School of dentistry, Hang Tuah Surabaya University, Indonesia.

Introduction: Dental Hospital, Faculty of Dentistry, Hang Tuah University provides some various kinds of medical services. The complexities of these services have the potential to cause not only unsafe condition but also patient safety incidents. Since 2014 we provide preclinic briefing about patient safety to co-assistant dentists. Knowledge becomes the basic formation of person's behavior.

Objectives: To compare the application of patient safety behavior between co-assistant dentists who have low level of knowledge and high level of knowledge.

Methods: Analytical research method survey with cross sectional design. The sample were selected by disproportionate stratified random sampling (n=62) followed by simple random sampling. The respondents were given questionnaire to measure the level of knowledge, then researcher did hidden direct observation by using check list to measure application of patient safety behavior. The data were analyzed using statistic software.

Result: The result showed the minimum and maximum application of patient safety behavior were 56-67% (low knowledge level) and 73-87% (high knowledge level). Statistic analyses showed that there are significant differences in application of patient safety behavior between the respondents with low level of knowledge and high level of knowledge.

Conclusion: Patient safety knowledge has close relationship with application of patient safety behavior. The higher respondents's knowledge about patient safety, the higher application of patient safety behavior.

Keywords: Knowledge, behavior, patient safety application

P016

The Differences in Professional Attitude towards Patients with Autism between Malaysian General and Paediatric Dentists.

AA Abdul Razak[1], AJ Hau[1], LA Shoaib[2], M Mohamed Rohani*[2].

[1]Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia, [2]Department of Paediatric Dentistry & Orthodontics, Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia.

Objectives: To explore professional dental attitude, behaviour and educational experience in providing treatment for patients with ASD between general and paediatric dentists in Malaysia.

Method: The data were collected with a mailed survey to a random sample of general dentists (GD) (n=200) and all paediatric dental specialists (PS) (n=40) in Malaysia. Questionnaires were distributed to PS during a conference, whilst questionnaires to GD were mailed with a cover letter and a coded reply-paid envelope. Both surveys assessed dentist's sociodemographic profile, professional attitude, behaviour, and educational experience concerning patients with ASD. Data were analysed using independent sample t-tests and chi-square tests. A p-value of 0.05 was considered statistically significant.

Results: A total of 60GD and 39PS responded (response rate=30%, 98% respectively). There were more PS who have treated patients with ASD compared to GD (94.4% vs 71.7%, $p<0.05$). The PS attitudes towards patients with ASD were significantly more positive than the attitudes of GD and both groups disagreed that their undergraduate education had prepared them well to treat patients with ASD. However, there was no statistically significant difference between professional behaviour and dental educational experience towards treating patients with ASD in both groups.

Conclusion: In Malaysia, PS have a better attitude towards patients with ASD compared to GD. This study also supports the need to reevaluate undergraduate dental curriculum towards preparing future dentists for the treatment of patients with ASD.

P017

Factor Analysis of Students' Perception of Inter-Personal Relations during "Introduction to the Behavioral Science" Class

K Tonami[1]*, S Umemori[2], HL Son[2], K Araki[3], H Nitta[2], S Mataki[2]

[1]Department of General Dentistry, [2]Depaetment of Behavioral Dentistry, [3]Department of Educational System in Dentistry, Graduate School, Tokyo Medical and Dental University, Tokyo, Japan

Introduction: Class of "Introduction to the Behavioral Science" has been conducted in Faculty of Dentistry, Tokyo Medical and Dental University, to improve professionalism. The class consists of three parts;

1) training of communication skill at class room before experiential learning,

2) experiential learning at social welfare facilities for 5 days,

3) reflection of the experiential learning at class.

Objectives: The aim of this study was to examine structure changes in students' perception of inter-personal relations during the coursework.

Method: Subjects were the second grade students of faculty of dentistry, Tokyo Medical and Dental University, from 2005 to 2014. The number was 526 in total. A self-administrated questionnaire including 20 questions asking perception of interpersonal relationship was made using 4-point rating scale. Using the questionnaire, the surveys were done at the beginning of the class, immediately before the experiential learning and at the final class. The scores of the surveys were analyzed with factor analysis for each survey point. Changes of factor components were examined.

Results: Six factors were extracted with the factor analysis of the first survey results. Among them, three factors were equally extracted from the second and the third survey results, while the other three factors 'respect to self', 'respect to others' and 'respect to human' were changed into two factors, 'respect to human' and 'self-reflection', in the factor analysis for the third survey.

Conclusion: Consequently, the experiential learning and the reflection would make students conscious about their own reflection performance.

P018

Evaluation of Osce Results as an Indicator to Review Dental Curriculum.

Kurniasih, I[1]*, Dewanto, I[1,2]

[1]School of Dentistry, Faculty of Medicine and Health Sciences, Universitas Muhammadiyah Yogyakarta, Indonesia, [2]Head of Indonesia Dental College (KDGI)

Introduction: A curriculum evaluation is the most important part of higher education. Indonesia National Board Dental Exam results is one of data sources that plays important part in curriculum evaluation process.

Objectives: To describe the importancy of evaluation on Objective Structure Clinical Examination (OSCE) results of National Board Dental Exam in order to review dental curriculum in Indonesia.

Method: A descriptive study was conducted using secondary data of OSCE on Indonesia National Board Dental Exam in 2012-2013. Descriptive analysis was performed using 2 metrics evaluation of OSCE quality. The metric number of failure was calculated based on the percentage of candidate who did not pass on every OSCE station. The calculation among groups variation was done by calculating the co-efficiency of total variation on specific group.

Results: The highest failure rate occurred at the OSCE's station that measured physical examination skills (20-36%). The lowest was appeared at the station which measured communication and patient education (9.66%). Dental Radiology was a learning content that has the highest failure rate (20,37%) during the period had been analyzed. Furthermore, there was 1-4 stations on each period of OSCE National Competency exam in 2012-2013 that has co-efficiency of variation >30 %.

Conclusion: The failure rates can demonstrate the learning content that require an evaluation. The evaluation of between-group variation could be an early indication of unequal candidate's ability. The evaluation of OSCE result on National Board Dental Exam can be an indicator to review dental curriculum in Indonesia.

P019

The Effectivity of Oral Diagnostic Room for Co-Assistant's Time Efficiency

(Study of Queuing System at Hang Tuah Surabaya University Dental Hospital)

Aulia Dwi Maharani[1]

Public Health Department, School of dentistry, Hang Tuah Surabaya University, Indonesia.

Introduction: The dentistry education system in Indonesia requires every university in Indonesia have its own dental hospital for education. The hospital management especially patient's queuing system plays an important role in co assistant dentist success to complete their study.

Objectives: The aim of this study is to find the difference between patient's waiting time before and after the hospital management provide oral diagnostic room to help co assistant dentist fill the odontogram.

Method: This study is observing the new patient's waiting time from arrival to finish complete filling in the odontogam include the service time. The sampling method is accidental sampling (n=150). The data analyzed by statistic software to find the average patient's waiting time and also the difference.

Result: The result showed the average patient's waiting time before the provide of oral diagnstic room is 16,7 minute and after provide of oral diagnostic room is 5,24 minute.

Conclusion: There is decrease in patient's waiting time after the hospital management provide oral diagnostic room to help co assistant dentist fill the odontogram. The decrease time automatically help dental co assistant dentist in time management to complete the study.

Keywords: dental hospital, management, queuing system, waiting time, dental co assistant dentist

P020

The Effectiveness of Newly Developed Computer-Assisted Simulation Materials on Overseas Learners

Tam Nguyen Thi Thanh[1]*, Naoko Seki[1,2], Janelle Moross[2,3], Keiichi Hosaka[4], Masayo Sunaga[3,5], Ikuko Morio[1,2] and Atsuhiro Kinoshita[3,5]

[1]Department of Dental Education Development, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, [2]Institute of Global Affairs, Tokyo Medical and Dental University, [3]Institute of Education, Tokyo Medical and Dental University, [4]Department of Cariology and Operative Dentistry, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, [5]Department of Educational Media Development, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University

Introduction: As globalization in the field of dentistry is rapidly progressing, to continue learning, updating and sharing the knowledge and skills from other countries is becoming increasingly necessary and important. Newly developed computer-assisted simulation materials may contribute to the quality of overseas dental professionals' knowledge.

Objectives: The purpose of our study was to investigate the usefulness and feasibility of the computer-assisted simulation materials for dental continuing education, and the needs and demands for these type of materials in Vietnam.

Method: Three interactive simulation materials regarding direct composite restoration developed by an authoring tool (SIMTOOL) were delivered via Learning Management System to fifteen learners (residents, master's students and young faculty members of dentistry) of the University of Medicine and Pharmacy, Ho Chi Minh City, Vietnam in April 2017. Assessment for the materials, learners' knowledge, usefulness, interests in the contents, and the system simplicity of operation were obtained by a post-questionnaire.

Results: Among twelve participants who responded to the survey, ten, who completed all three materials, were taken into consideration (the response rate was 75%). All the post-questionnaire's answers were positive. Out of them, 100% reflected positive feedback on learning new knowledge, the usefulness in the future, their willingness in taking a class concerning the content of the materials, and continuing to learn with more simulation materials such as those provided.

Conclusion: There was a need for simulation learning materials from Vietnam and those we developed were considered useful, practical for continuing education, and accessible by overseas dental professionals.

P021

Active Anti-Fungal Effect of 85% Ethanol Coconut Husk Extract and Nystatin against *Candida Albicans*

V. Sumo*, R. Cruz, G. Manalang, M. Manuel, H. Mateo, R. Mendoza, A. Rivera
University of the East-Manila, College of Dentistry, Manila, Philippines

Introduction: Proliferation of fungi like Candida albicans in the oral cavity leads to Candidiasis. Such condition is commonly treated with nystatin, anti-fungal oral suspension. Coconut husk extract contains condensed tannins which is responsible for its anti-fungal property.

Objective: The aim of this study was to determine the concentration of ethanol Coconut Husk Extract (CHE) that approximates the anti-candidal effect of nystatin by measuring the zone of inhibition (ZOI). Specifically, it aimed to compare the ZOI obtained with 25%, 50%, 75%, and 85% CHE with nystatin.

Method: Ethanol CHE concentrations (25%, 50%, 75%, and 85%) were produced with sterile water-solvent. C. albicans (ATCC# 141053) was diluted into 1:10, and 0.2ml was inoculated on each of the 50 agar plates using spread plate technique. Each CHE concentration (0.02ml) and nystatin (0.01ml) were introduced on 6mm paper disks, which were placed on the plates and incubated for 24 hours. The ZOI of the 20 samples for each CHE concentration and nystatin were measured to obtain their means. Data were subjected to T-test to determine their anti-candidal activity.

Results: Using 1-sample T-test, only the ZOI means of nystatin (M=14.2, SD=1.32), T(19)=0.678, p=.506 (two-tailed) and 85% CHE (M=14.59, SD=4.88), T(9)=0.382, p=.711 (two-tailed) fell on the lower limit of the active range of anti-microbial activity, 14mm. Furthermore, using 2-sample T-test, 85% CHE concentration showed no difference in mean ZOI when compared to nystatin, t(28)=0.2482, p=.8090 (two-tailed).

Conclusion: 85% CHE concentration had an equal anti-candidal effect as nystatin. This may be used to produce an oral product which can help reduce the occurrence of Candidiasis.

P022

Reductio of Stains in Discolored Acrylic-Resin Blocks by Calamansi-Baking Soda and Commercially- Available Denture Cleanser

J, Ordoñez*, K. Bonabon, O. Papin, D. Ramos, L. Shin,

A. Young. College of Dentistry, University of the East.

Introduction: More than 33% of Filipinos are denture wearers, most of whom do not have access to commercially-available denture cleansers. This study aimed to investigate a calamansi-baking soda mixture as an alternative to a commercially-available denture cleanser.

Objectives: The purpose of this study is to identify the ratios of calamansi-baking soda that reduce the stains on acrylic resin blocks compared to commercially-available denture cleanser.

Method: Seventy-five acrylic-resin blocks (2cm x 1cm x 2cm), were soaked in coffee for six days to induce stains. Different ratios of calamansi-baking soda and water were mixed to various concentrations. Stained blocks were equally divided into 5 groups. Four groups were immersed in different concentrations of the test mixtures while the last group was immersed in the commercially-available denture cleanser. The luminosity of the pre and post exposed pictures were measured using the histogram of Adobe Photoshop CS6.

Results: Mixtures B, C and D showed significant change of mean luminosity in the acrylic-resin blocks indicating stain reduction. However, of all the mixtures, only the ratio of 1000ml: 18tbsp: 500ml (calamansi: baking soda: warm water) indicated a mean luminosity (M=16.55, SD=11.52) that is equal to the commercially-available denture cleanser (M=18.97, SD=9.65). t (58) = -.991, p = .326 (two-tailed).

Conclusion: Mixture with the ratio of 1000ml: 18tbsp: 500ml (calamansi: baking soda: warm water) showed comparable stain reduction as commercially available denture cleanser.

P023

Therapeutic Effects of Chemically-Modified-Curcumin in Experimental Periodontitis in Rats

Y. GU[1], H.M. LEE[2], V. RAJA[2], P. YANG[1], J. SCADUTO[3], F. JOHNSON[4], and L.M. GOLUB[2]

[1]General Dentistry, [2]Oral Biology and Pathology, and [4]Chemistry and Pharmacological Sciences, Stony Brook University, Stony Brook, NY, USA; [3]Traverse Biosciences Inc., Stony Brook, NY, USA.

Introduction: Periodontal disease is one of the most common chronic inflammatory diseases encountered in humans. Recently we developed a newer generation of curcumin compound, CMC-2.24 and demonstrated enhanced therapeutic anti-inflammatory effects supporting a potential therapy for chronic inflammatory diseases such as periodontitis, diabetes, and other systemic conditions.

Objectives: To determine the therapeutic potential of a novel triketonic chemically-modified-curcumin, CMC2.24, in modulating the host-response including periodontal bone loss in an experimental periodontitis model.

Method: Thirty adult male Sprague Dawley rats were distributed into two experiments, (A) and (B): periodontitis was induced by injection of LPS (LPS; n=5) or PBS (N; n=5) for 3 or 4 weeks. After the establishment of periodontitis, experimental groups were orally administered CMC2.24 (30mg / kg) once per day for 1 week (experiment A) or 2 weeks (experiment B); untreated LPS and N rats received vehicle. All rats were sacrificed after 1 or 2 weeks treatment. Gingival tissue, blood, and alveolar bone were collected. Bone loss were measured morphometrically and radiographically. Both gingival extraction and blood samples were analyzed for matrix metalloproteinases (MMP-2 and MMP-9) by gelatin zymography, and cytokines by ELISA.

Results: At both 1-week (Experiment A) or 2-week (Experiment B) CMC2.24 therapy, MMP-2 and MMP-9 were significantly decreased in CMC2.24 treated rats in the gingiva samples. No significant changes were observed in pro-inflammatory cytokine levels in gingival tissues and plasma samples between the groups. LPS rats with no treatment exhibited alveolar bone loss between the maxillary first and second molars, CMC2.24 treatment effectively reduced the periodontal bone loss in these rats.

Conclusion: Systemic administration of CMC2.24, initiated in rats with active periodontitis, significantly reduced alveolar bone loss in a therapeutic rat model, indicating significant potential to treat chronic inflammatory diseases including periodontitis.

S0023

Inter-Examiner and Intra-Examiner Reliability of Gag Reflex Measurement

H. Karibe[1], A. Okamoto[1], Y. Kato[1], K. Shimazu[1], G. Goddard[2]

[1]Nippon Dental University, [2]University of California San Francisco

Objectives: Gagging problems usually deter treatment in dental patients; however, a unified management strategy for gaging may not exist. A reliable assessment method is required for evidence-based management of the gag reflex. We tested the inter-examiner and intra-examiner reliability of gag reflex measurement to assess dental problems associated with an individual's gagging and evaluated sex differences in this measurement.

Methods: Twenty-one healthy individuals (10 women and 11 men; mean age 27.1±9.9 years; age range 19-49 years) participated in this study. To measure the gag reflex, an examiner inserted a standard saliva ejector (143-mm-long with a 6.5-mm diameter) gradually down the participant's throat along the palate. When the maximum tolerance of the gag reflex was reached, the distance of the saliva ejector from the maxillary central incisor was measured as an index of gag reflex measurement. Under the same conditions, these measurements were obtained by one examiner at two different sessions (S1 and S3), and by another examiner at one session (S2). Intraclass correlation coefficient (ICC) and two-way repeated-measures analysis of variance were used for statistical analysis.

Results: The ICCs for the gag reflex measurement were 0.91 between S1 and S2, reflecting inter-examiner reliability, and 0.93 between S1 and S3, reflecting intra-examiner reliability. Neither gag reflex measurement-related sex differences (P=0.28) nor the main effect of session (S1 vs. S2 vs. S3) or interaction effect (sex × session) were significant (P=0.43 and 0.22, respectively).

Conclusions: The present method of measuring gag reflex exhibited excellent inter-examiner and intra-examiner reliability, which was unaffected by sex. This previously unreported method of measuring gag reflex appears to have potential for both clinical and laboratory-based application.

S0024

The Effect of Nudge Intervention in Seeking Dental Consultation

R. Briones[1,2], G. Balein[2]

[1]Manila Central University, [2]University of the East Ramon Magsaysay Memorial Medical Center

Objectives: Dental caries continuously affect all individuals throughout their lifetime. Identified barriers in seeking oral healthcare include dentists not giving advices to their patients, and patients are not aware of the importance of a regular dental checkup. The study aimed to measure the effect of nudge intervention in dental consultation seeking behavior of the participants and to determine the types of nudge that show higher impact in terms of number of responses and response time.

Methods: Using a randomized controlled trial including 180 participants from a university workplace, personalized letters of positively-framed, negatively-framed and neutrally-framed nudge intervention were delivered.

Results: Twenty five percent of the participants responded and sought dental consultation in all types of nudge intervention. Participants' response time among responded and sought dental consultation was immediate. Positively-framed, negatively-framed and neutrally-framed, letters increase the number of dental consultation regardless of participants' age, gender and position.

Conclusions: Nudge intervention is effective to improve the dental consultation seeking behavior of the participants which can be a way to break barriers in the improvement of oral health of all individuals.

S0025

Outcomes of Mother's Education Based on Health Belief Model (HBM)

P. Detsomboonrat, P. P. Pisarnturakit

Chulalongkorn University

Objectives: To evaluate the influence of an oral health program at the time of birth in children residing in rural Thailand and identify the related caries risk factors.

Methods: A quasi-experimental study were assigned into experimental and comparison groups. Primary caregivers in the comparison group received only routine oral health services and those in the experimental group additionally received a video clip based on Health Belief Model (HBM) at the post-partum ward and a booklet at 18 months. Data were collected at baseline, after 18 months and after 36 months by using a questionnaire and clinical oral examination. Gathered data were analyzed by Chi-square test, ANOVA test and multiple logistic regression analysis.

Results: A total of 90 children were categorized as high and low risk group. The overall mean±SD dmfs at 18 and 36 months were 6.8±10.9 and 15.5±14.7, respectively. The crude caries increment between 18 and 36 months was 8.7±8.8 surfaces. After implementing the oral health programs, mean scores of perceived susceptibility, perceived severity and perceived benefits of ECC prevention did not increase over time for all groups. Only the measure of perceived barriers significantly decreased over time. Low risk children had significantly earlier first tooth brushing, more frequent re-brushing and less dental plaque than high risk group.

Conclusions: In conclusion, this oral health education program effectively decreased the perceived barriers but did not effect on the perceived severity. Early first tooth brushing and parental assistance by re-bushing had a strong relationship with dental caries.

S0026

Stop Smoking Awareness Survey among Malaysian University Students

R. Abdul Kadir[1,2], R. Jani[3,2], A. Amer Nordin[4,2], R. AZIZI[3,1]

[1]Lincoln University College, [2]University Malaya, [3]University Malaya, [4]University Malaya

Objectives: Malaysia with a high prevalence of youth smoking envisioned to achieve the Tobacco Endgame in 2045. This study investigates on the extent of smoking and stop smoking awareness among University Malaya (a Smoke-free campus) students

Methods: An online survey to look into initiation, habit patterns and awareness on quit smoking was conducted among currently-enrolled University Malaya students. A validated and pretested smoking questionnaire consisting of 93 items and divided into 7 sections were made accessible through their official university email addresses. Participation was voluntary. Descriptive statistics and Chi-square test ($p<0.5$) of the first three-month-responses were analysed using SPSS Version 22.0.

Results: A total of 744 students responded to the survey. The mean age of students was 22.3 (±4.0) years with two-thirds being female (69%) respondents. In all, 20.4% respondents stated that they have ever smoked (78.9% males, 21.1% females; $p=0.000$). Respondents started smoking as early as 4 years old with the majority starting at 15 years old. Of those who smoked, 10.5% have quit smoking while 9.9% are still smoking. Majority who succeeded in quitting took 1–5 attempts (52.9%), 6-10 (17.6%), 16-20 (14.7%), 21 and more (8.8%), and 11-15 (6.0%). Most of them quit smoking based on their own personal choice (97.1%) and only 2.9% get help from government quit clinics. Two-thirds (64.7%) attempted to quit smoking using the cold turkey (without help) method, 23.5% used medications, and counselling 11.8%.

Conclusions: The results urged for more enhancement on awareness toward consequences of smoking among university students. Advocacy efforts towards the initiation of the No-Cotine Clubs in the campus is certainly relevant

S0027

Cost of Oral Health Prevention Program: A Case Study of Community Dentistry, Mahidol University

N. Luksamijarulkul
Mahidol University

Objectives: This research project determines the cost of school oral health program under the academic setting.

Methods: The data of resource consumption and unit costs were obtained from community department and procurement section that included the estimated cost of Labor, Material, Capital and transportation. The cost estimates were based on retrospective averages. The cost of fluoride varnish and sealant in caries prevention is based on Mahidol school oral health program for the year 2015.

Results: the estimated costs of school oral health program was 1,373,754.39 baht comprised of labor cost (20.85%), material cost (8.45%), capital cost (42.73%) and miscellaneous (27.97%). Capitation of this program equal to 2,348.298 baht per child. Salaries of supervisor, costs of equipment and material for sealant, PRR and filling were a majority part of labor costs, capital costs and material costs respectively. Particularly, in capital cost and material costs were accountable for more than half of total costs.

Conclusions: This research project gives information about the estimated cost of the program that may be useful for program evaluation efficiency of the procedure. Some findings may be useful to other dental faculties which provide oral health school program and help to anticipate the favorable decision in the future. Furthermore, policy maker from government or school can use the data findings to develop policies; planning, implementation and evaluation of the preventive dental program.

S0028

Correlation between Parenting Styles, Anxiety and Compliances of Pediatric Patient during Dental Treatment

L. T. Alphianti[2,1], R. Fitriana[2], a. A. Puteri[2]

[1]Universitas Muhammadiyah Yogyakarta Dental Hospital, [2]Universitas Muhammadiyah Yogyakarta

Objectives: The study aimed at examining positive and / or negative correlations between parenting styles, anxiety, and compliances of pediatric patient during dental treatment.

Methods: This was an observational analytic study with cross sectional design. Patients (as subjects, n=60) aged 8-12 year-old, who had first visit for dental treatment (DT) at Universitas Muhammadiyah Yogyakarta Dental Hospital (tooth filling or extraction), were selected using purposive sampling. Visual Analog Scale (VAS) and Frankl Behavior Scale (FBS) used for measurement level of anxiety and compliance during DT. Parents were asked to fill out the parenting-styles (PS) questionnaire which highlight the characteristic of parenting styles (permissive, authoritative, or authoritarian). All data were analyzed using Spearman-correlation test.

Results: The result shows strong positive correlation between PS and anxiety (Coef.=0,262; $p<0.05$), as well DT and anxiety (Coef.=0,338; $p<0,05$). Strong negative correlations were found between PS and compliances, DT and compliances, anxiety and compliances (Coef.=-0.265,-0.458 and-0.843; respectively, $p<0.05$). No correlation was found between age and anxiety, likewise age and compliances.

Conclusions: In this study, parenting styles was strongly correlated to anxiety and compliances of pediatric patient. It is important to consider parenting styles to optimize physiological development, minimize anxiety, increase compliance or cooperativeness of children, especially during dental treatment.

S0029

Effectiveness of an Oral Health Program for Caries Prevention

P. P. Pisarnturakit, P. Detsomboonrat, P. Bhuridej

Chulalongkorn University

Objectives: To evaluate knowledge and factors based on Health Belief Model (HBM) of the mother on Early Childhood Caries (ECC) prevention

Methods: An oral health program for ECC prevention session was given to mothers of healthy newborn at postpartum ward. The oral health program consisted of a video clip on cause of dental caries and child's oral care for ECC prevention. The necessary instruments including wiping clothes, toothbrush, and small cup were provided prior to discharge. Data collections were done by self-administered questionnaire at postpartum ward and 18 months later. Descriptive statistics and Chi-square test were employed for analyzing the categorical data. Paired t-test was employed for comparison of knowledge and the HBM factors.

Results: A total of 217 mothers, aged 29.95 (9.61), were recruited into the study. Most (47.5%) of them had child rearing experience. Score of knowledge, perceived susceptibility, perceived severity, perceive benefit, perceived barrier and self-efficacy related to dental caries prevention prior to the program were 4.26 (3.85), 13.17 (3.99), 23.5 (3.27), 20.8 (2.60), 14.5 (4.34) and 15.6 (1.92), respectively. The scores at 18 months later were 4.31 (3.87), 14.5 (3.80), 24.3 (3.27), 21.3 (2.31), 15.4 (4.74) and 16.1 (1.95), respectively. Paired t-test indicated statistical significant (p-value <0.001) on perceived susceptibility, perceived severity, perceive benefit, and perceived barrier.

Conclusions: Provision of a video clip on ECC prevention and necessary instrument to the mother at postpartum ward could change mother's perception related to ECC prevention but did not change the knowledge and self-efficacy on ECC prevention.

S0030

The Correlation between Decayed Teeth and Difficulties on Bitting Foods

S. Susilawati[2], T. Astoeti[1], G. Monica[3], P. Fadilah[4], A. Nawawi[4]

[1]Faculty of Dentistry Trisakti University , [2]FKG Unpad, [3]FKG Maranatha University, [4]FKG Unjani

Objectives: The highest of primary decayed teeth is still mayor oral health problems in Indonesia. Decayed teeth among school children might have an impact on children's daily activities including functional limitations such as difficulties on bitting foods. The study objective was to analyze the correlation between primary decayed teeth and difficulties on bitting foods.

Methods: An analytic study has been carried out on 665 school children in South Sumatera, in the age group of 5-6 years. The sampling technique was pathfinder survey. Data collected by using dental examination and self–assessment of oral health questionnaire based on WHO Oral Health Surveys Basic Methods 2013.

Results: This study showed that the number of primary decayed teeth in South Sumatera was 321 (48,3%). The percentage of children who had decayed teeth and had difficulties on bitting foods was 60,7%. There were significant correlation between primary decayed teeth and difficulties on bitting foods (p=0,000).

Conclusions: Mayority of the children who had primary decayed teeth having troubles in bitting foods.

S0031

Diet, Body Mass Index and Dental Caries among Thai Children Aged 2 To 5 Years

K. Mitrakul
Mahidol University

Objectives: The aim of this study was to determine if there is an association between dental caries and body mass index (BMI) among Thai children aged 3 to 5 years.

Methods: We randomly selected 100 students attending Suan Missakawan School, Bangkok, Thailand. We examined each child to determine the number of decayed, missing and filled teeth giving a DMFT score. We measured the height and weight for each subject and calculated their body mass index (BMI) in kilograms divided by height in meter squared. Parents were completed a questionnaire asking general information and the diet of the child. Data from the questionnaire were analyzed using the Kruskal-Wallis test. Associations between caries and variables were examined using the Spearman's correlation with significance set at $p<0.05$.

Results: Total participants were 100 (0% drop out rate). The mean±SD age of the subject, the mean±SD DMFT score of the subject and the mean±SD BMI for the subjects were 4.21 (±0.71) years old, 5.27 (±4.78) and 16.46 (±2.56) kg / m2, respectively. Seventy-one percent of subjects had a normal BMI, 25% were overweight and 4% were underweight. Eighteen percent had no caries (DMFT score=0), 32% had a few caries (DMFT score=0.1-3.0), 14% had many caries (DMFT scores=3.1-6.9), and 36% had very many caries (DMFT≥7). The DMFT score was not significantly associated with a history of sugar consumption or BMI. The DMFT score was negatively associated with fat and iron consumption based on the diet reports.

Conclusions: No association between caries and BMI or diet.

S0032

Dental Decay and Oral Hygiene of Deaf-Mute Children in Zhengzhou

B. Liu, Y. Cheng, S. Yang
Zhengzhou University

Objectives: To investigate dental decay and oral hygiene status, as well as oral health knowledge and behaviors of deaf-mute children in Zhengzhou city of central China.

Methods: Clinical oral examination was carried out in the school to record the dental decay and oral hygiene status. Questionnaires were used to assess the related oral health knowledge and habits of the children and their teachers.

Results: A total of 172 deaf-mute children aged 6-18 years in a special care school was recruited. Mean age of them was 14.06 years. A total of 102 boys (mean age 13.90 years) and 70 girls (mean age 14.30 years) were recruited. Among 54 deaf-mute children aged 6-12 years, prevalence of dental decay was 59.26% (dmft / DMFT =1.83). Caries prevalence for deciduous teeth was 66.67% (dmft=1.09), for permanent teeth was 27.78% (DMFT=0.74), and for the first permanent molars was 22.22% in the above age group. Among 118 children aged 13-18 years, caries prevalence was 33.90% (DMFT=1.02). Coverage rate of pit and fissure sealing was 47.67% in the deaf-mute children. Bleeding on probing was found in 62.20% and dental calculus was found in 70.30% of the children. Questionnaire investigation found that less than 1/5th of the children adopted suggested method to brush and less than half brushed teeth twice a day, only 13% of the children knowing some etiology of dental decay. Percentage of teachers with good oral health knowledge was high, but seldom any oral health education program or class was provided to the children.

Conclusions: Prevalence of caries in deaf-mute children was at comparable level with normal child population in Henan Province, while prevalence of gingivitis and dental calculus was relatively high, accompanied by poor oral health knowledge & habits and lack of oral health education program in this group of children.

S0034

Shear-Bond-Strength and Remineralisation-Effect of CPPACP-Modified Glass-Ionomer to Artificial Caries-Affected Dentine

S. Zhao[1], L. Mei[1], M. Burrow[1], E. Lo[3], C. Chu[2]

[1]The University of Hong Kong, [2]the university of Hong Kong, [3]The University of Hong Kong

Objectives: To investigate the effect of casein phosphopeptide-amorphous calcium phosphate (CPPACP) modified glass-ionomer cement (GIC) on shear bond strength (SBS) and remineralisation to artificial caries-affected dentine.

Methods: Human dentine slices were demineralised to mimic caries-affected dentine. They were then randomly allocated to three restoration groups (n=16 per group): group-1, conventional GIC; group-2, CPPACP modified GIC; and group-3, resin modified GIC. The SBS of the samples was measured using a universal testing machine (n=8 per group). The failure modes of the fractured samples were analyzed by scanning electronic microscopy (SEM). The remaining samples (n=8 per group) were subjected to pH cycling for 28 days. After pH cycling, lesion depth and micro-mechanical properties of the samples were investigated by micro-computed tomography (micro-CT) and nano-indentation, respectively.

Results: The SBS for group-1, group-2 and group-3 were 4.5±1.6 MPa, 4.3±1.2 MPa and 6.6±1.7 MPa, respectively (p=0.01; group-1, group-2 < group-3). The results of failure modes of the 3 groups were summarized in Table 1. Representative modes of failure under SEM were shown in Figure 1. Micro-CT determined lesion depths for group-1, group-2 and group-3 were 186±8 μm, 149±14 μm and 178±8 μm, respectively (p<0.001; group-2 < group-1, group-3). The mean nano-hardness values for group-1, group-2 and group-3 were 0.17±0.04 GPa, 0.25±0.06 GPa and 0.14±0.05 GPa, respectively (p<0.001; group-1, group-3 < group-2). The mean elastic moduli for group-1, group-2 and group-3 were 6.02±0.59 GPa, 7.27±0.86 GPa and 5.70±1.14 GPa, respectively (p=0.005; group-1, group-3 < group-2). The load-displacement curve of the 3 restoration groups was shown in Figure 2.

Conclusions: The results indicate that the incorporation of CPPACP into GIC would not adversely affect the adhesion to artificial caries-affected dentine. Furthermore, it is superior to conventional GIC in promoting remineralisation on artificial caries-affected dentine and hence can be a better restorative material than conventional GIC for restoration.

S0035

Common Mechanistic Studies and Demineralization-Remineralization Models Used for Cariology Research

Y. Yu[1], L. Mei[1], E. Lo[1], C. Chu[2]

[1]The University of Hong Kong, [2]the university of Hong Kong

Objectives: Mechanistic studies and demineralization-remineralization models play a critical role in investigating caries pathogenicity, testing effects of new caries prevention methods and developing new caries-preventing products. This study aimed to explore the common mechanistic studies and demineralization-remineralization models used for cariology research in recent literature.

Methods: A search in the Web OF Science from 2014 to 2016 using the keywords (demineralization OR remineralization) AND (dental caries). The title and abstract of potentially eligible publications were screened. Reviews, irrelevant studies such as those on bone studies laboratory and studies using substrate other than teeth were excluded. The remaining publications were laboratory studies using demineralization and remineralization models of enamel or dentin substrate.

Results: A total number of 1,095 articles were found and 350 publications were mechanistic studies in cariology research. Nearly all studies (294 / 350, 84%) studies were vitro studies. These *in vitro* studies consumed least expense and time and the conditions were easy to be controlled. Not many studies were in situ studies (40 / 350, 11%), natural-caries studies (13 / 350, 4%) and animal studies (3 / 350, 1%). Among the 294 *in vitro* studies, nearly all (257 / 294, 87%) used chemical models which could be simple mineralization model (159 / 257, 62%) or pH-cycling model (98 / 257, 38%) to generate artificial carious lesions. Not many (37 / 294, 13%) studies used microbial models. The main advantages of the chemical model included simplicity, low cost, efficiency (time saving), reproducibility and stability of the experiment. However, the caries generated was not biological. Moreover, the chemical demineralization-remineralization models were generally basic and could not mimic the carious lesion in the complex oral environment.

Conclusions: In conclusion, chemical model using either simple mineralization or pH-cycling method was the most common demineralization-remineralization model adopted by researchers in recent publications. The model used was simple and low cost but it ignored the biological aspects of caries pathogenesis.

S0036

Colorimetric Detection of Mutans Streptococci Using Magnetic Nanoparticles

P. Thanyasrisung[1], A. Vittayaprasit[2], O. Matangkasombut[1], M. Sugai[3], V. P. Hoven[4]

[1]Faculty of Dentistry, Chulalongkorn University, [2]Faculty of Science, Chulalongkorn University, [3]Hiroshima University Graduate School of Biomedical and Health Sciences, [4]Faculty of Science, Chulalongkorn University,

Objectives: Chair-side detection of mutans streptococci (MS: *Streptococcus mutans* and *Streptococcus sobrinus*) is an important aid to clinical dental caries risk assessment. Automutanolysin (Aml) is a peptidoglycan hydrolase whose cell wall binding domain (CWBD) has substrate specificity towards MS. This study aimed to develop a visual detection assay using magnetic nanoparticles (MNPs) conjugated with CWBD of Aml.

Methods: MNPs were grafted with poly (acrylic-acid) providing active carboxyl-groups for conjugation with CWBD of Aml. To determine the binding specificity to MS, the CWBD-conjugated-MNPs were mixed with pure cultures of standard strains of 4 different species of streptococci. Bacteria-bound MNPs were then separated from unbound-cells by magnets and re-suspended in phosphate buffer saline. The suspension was then filtered through a membrane (pore-size 0.8μm). The color intensity of MNPs remained on the membrane represents the quantity of bound-bacteria. Moreover, to determine the capture efficiency (CE) of the CWBD-conjugated MNPs, bacterial cultures were incubated with the CWBD-conjugated MNPs and the amounts of cells before and that remained after the incubation were determined by colony count (CFU). The CE was calculated using the formula: CFU_{before}-CFU_{after} / CFU_{before} x 100.

Results: The color intensity of CWBD-conjugated MNPs bound to MS was higher than those bound to the non-MS. This result implies that the CWBD-conjugated MNPs have greater binding specificity towards MS than non-MS. Moreover, the capture efficiency of the CWBD-conjugated MNPs for S. *mutans* and S. *sobrinus* were 77 and 69%, respectively, whereas that for S. *sanguinis* and S. *salivarius* (non-MS) was 38 and 15%, respectively. These values confirmed the specificity of the CWBD-conjugated MNPs towards S. *mutans* and S. *sobrinus*, but not to non-MS.

Conclusions: These results suggest that the colorimetric assay using MNPs conjugated with CWBD can specifically bind to MS and could be developed into a visual MS detection tool.

S0037

Liquid and Cream Toothpastes Demonstrated Similar Effects on Plaque Score

P. Auychai[1], N. Chakthranont[2], P. Butsabul[2]

[1]Chulalongkorn University, [2]Chulalongkorn University

Objectives: To investigate the effectiveness of a liquid and a cream toothpaste on dental plaque score.

Methods: Thirteen subjects, aged 20-23 years old participated in this randomized controlled crossover clinical study. The study was conducted in 2 phases of 4-weeks each with a washout period of 1 week between phases. The subjects were randomized into two groups: Jintan-NUDE aqua mint® and Colgate Total Advance Fresh® and instructed to perform routine brushing with the assigned toothpastes. Total plaque scores (PS) and proximal plaque scores (PPS) were assessed by one examiner using a Turesky modification of the Quigley and Hein plaque index (TMQHI) 4 times during each phase: baseline (t_0), immediately after use (t_1), after the second week (t_2), and fourth week (t_3) of toothpaste use. Repeated ANOVA was used to compare the differences within each group and the independent t-test was used to compare the differences between groups at t_0, t_1, t_2, and t_3 at $p<0.05$.

Results: The mean PS and PPS of the groups were not significantly different at each evaluation point, except for the PS of the liquid group at t_2, which was significantly higher than that of the cream group. The PS and PPS in each group at t_1 were significantly lower compared with t_0, t_2, t_3 and the PS of the liquid toothpaste group at t_2 was significantly higher than that at t_0. The differences between the other time points were not significant.

Conclusions: Overall, the liquid and cream toothpastes have similar effectiveness in controlling plaque scores at the proximal surfaces of the teeth and total plaque scores. This study indicates that liquid toothpaste is an alternative to cream toothpaste.

S0039

Effect of X-Ray on the Topographical Properties of Human Teeth

X. Liang[1], J. Li[3], X. Huang[2]

[1]The School and Hospital of Stomatology of Fujian Medical University, [2]School and Hospital of Stomatology, Fujian Medical University,, [3]West China School of Stomatology

Objectives: Rapid tooth loss occurs from radiotherapy, which is given for most malignant cancer treatment. In fact, it is the major cause of tooth loss. This study was performed with the intentions of finding out how much damage the exposure to radiation causes to the topography of human enamel and dentine.

Methods: Human third molars (n=50) randomly placed into five different tests, including a controlled group (no radiation). Energy of high level X-rays were exposed to the test groups (2Gy / day, 5days / week; including a 10Gy group, a 30Gy group, a 50Gy group, and a 70Gy group), tested (0.5N / m, 24^0C, 35%H) by Atomic Force Microscopy (AFM), the 3D surface topography images were taken (1Hz, 256lines), and statistically analyzed (ANOVA ,Kolmogorov-Smirnov and Shapiro-Wilk, T-test, $p<0.05$).

Results: The results of the radiation dose-response analysis for enamel and dentine indicated a statistically significant change with dose. The 3D morphological images of the irradiated groups were shown that the crystals on sound human enamel (Fig.1b) and dentine (Fig.1a) surface revealed a series of orderly particles, arranged and closely contacted while irradiated sites showed increasing cracks and arranged disorderly with unclear outline, there had also been an increase in the troughs, and in the height of each peak (Fig.2,3). Properties of the surface topography for the enamel and dentine revealed a significant response relationship to the dosage given ($P<0.05$).

Conclusion: Once the teeth were exposed to the radiation their surface roughness not only increased, but were also prone to the micro-tensile, and reduced strength. Furthermore, the changes in the topographical areas of the hard dental tissue was susceptible to the increase of caries, on the other hand, the hard dental tissue could possibly lead to a quick development of caries.

S0040

Remineralization Potential of Three Toothpastes on Initial Carious Lesions: An *In-Vitro* pH-Cycling Study

A. Pasasuk, P. Niltawee, K. Kongraksakiat

Faculty of Dentistry, Khon Kaen University

Objectives: This *in-vitro* study evaluated the remineralization potential of 3 different toothpastes on initial enamel lesion using surface microhardness (SMH).

Methods: A total of 40 extracted sound human upper premolars were decoronated, coated with nail varnish except for a 4mm x 4mm window on buccal surface. Artificial enamel carious lesions were created by immersing specimens in demineralizing solution for 96h. SMH of demineralized specimens were measured using Vickers microhardness testing machine. Specimens were randomly assigned into 4 groups (n=10); Group 1: artificial saliva (control), Group 2: sodium fluoride (NaF) containing toothpaste, Group 3: NaF and functionalized tricalcium phosphate (NaF / f-TCP) containing toothpaste and Group 4; NaF and calcium sodium phosphosilicate (NaF / CSP) containing toothpaste. 10 days of pH cycling regimen was carried out, SMH of remineralized specimens were evaluated and calculated for difference of SMH (dSMH). The mean-dSMH of all groups were statistically analyzed (One-way ANOVA, Bonferroni, $p<0.05$).

Results: Mean-dSMH of group 1, 2, 3 and 4 were -2.47±0.17, 37.28±11.04, 44.84±12.18 and 37.14±10.12 kgf respectively. The results showed that mean-dSMH of group 2, 3 and 4 were significantly higher than that of group1 ($p<0.02$). No statistically significant difference in mean-dSMH was found among group 2, 3 and 4 ($p=0.356$).

Conclusions: With the *in-vitro* conditions chosen, toothpastes containing NaF, NaF / f-TCP and NaF / CSP performed the remineralization potential of initial enamel carious lesions, while no significant difference was observed between three toothpastes.

S0041

Comparison of Apical Sealing Ability of Root Canal Filling between Bioceramic and Methacrylate Resin Sealer

Y. Muharsya, E. Suprastiwi, M. Usman

Faculty of Dentistry

Objectives: Analyze and compare the capability of apical sealing ability of root canal filling between bioceramic and methacrylate resin sealers

Methods: Thirty single root canal teeth were cut in the coronal section, root canal prepared by ProTaper Next. All samples were divided into two groups at random. Group 1 filling of root canals using bioceramic sealer and group 2 with resin-methacrylate sealer. After filling the root canal the apical part was soaked in moisture for 24 hours. Then soaked in chinese ink for 7 x 24 hours. Roots were cut horizontally at 2mm dan 4mm from apical. Sealing ability was analyzed by stereo microscopy on 2mm and 4mm pieces using 5 scores.

Results: Group 1 with bioceramic sealer showed scor 0 as much as 63.3% while group 2 sealer methacrylate resin only 38.3%. If the two groups are compared, then there is a significant differences.

Conclusions: Apical sealing ability of root canal filling with bioceramic sealer was better than that of a methacrylate-resin sealer.

S0042

Comparison of Apical Leakage in Single Cone Obturation Using Bioceramic and Polydimethylsiloxane Sealer

B. Amanda, E. Suprastiwi, M. Usman

Faculty of Dentistry

Objectives: To evaluate the comparison of the apical leakage between obturation using Bioceramic sealer (BS) and Polydimethysiloxane sealer (PS).

Methods: Thirty six mandibular premolars were equally divided into two groups and obturated with single cone technique. The sealer used for Group I and Group II were BS and PS respectively. After the obturation, the samples were incubated (37°C, 24h), sealed with two coats of nail polish except for 2mm from the apex, immersed in the Indian ink for 7 days, decalcified, dehydrated, and made transparent according to Robertson technique. Dye penetration were evaluated under stereomicroscope. Sample with no dye penetration were given score 0, ≤0.5mm dye penetration were given score 1, 0.051-1mm were given score 2, and >1mm were given score 3.

Results: The largest proportion distribution in BS was at the score 1 (55.6%) and in group PS at the score 2 (44.4%)

Conclusions: Bioceramic sealer showed similar apical leakage to Polydimethylsiloxane sealer.

S0043

Human Beta-Defensin-1 Promotes Osteoclastogenesis via the p44 / 42 Mitogen-Activated Protein Kinases

A. Makeudom[1], C. Supanchart[5], P. Montreekachon[3], T. Sastraruji[2], S. Krisanaprakornkit[4]

[1]Faculty of Associated Medical Sciences, Chiang Mai University, [2]Faculty of Dentistry, Chiang Mai University, [3]Faculty of Dentistry, Chiang Mai University, [4]Faculty of Dentistry, Chiang Mai University, [5]Faculty of Dentistry, Chiang Mai University

Objectives: The objectives of this study were to investigate the enhancing effect of human beta-defensin-1 (hBD-1) on osteoclast formation and function and to elucidate the involved signaling pathway *in vitro*.

Methods: Human peripheral blood mononuclear cells (PBMCs) were first incubated with various doses of hBD-1 and cell viability was assayed by MTT. PBMCs were treated with macrophage-colony stimulating factor and receptor activator of nuclear factor kappa-B ligand (RANKL) in the presence or absence of non-toxic doses of hBD-1. *In vitro* osteoclastogenesis was analyzed by tartrate-resistant acid phosphatase (TRAP) staining, osteoclast-specific gene expression, and a resorption pit assay. Involvement of mitogen-activated protein kinases (MAPKs) was studied by immunoblotting and specific MAPK inhibitors.

Results: HBD-1 potentiated induction of *in vitro* osteoclastogenesis by RANKL, as shown by significantly increased number of TRAP-positive multinuclear cells and resorption areas on the dentin slices and further up-regulated expressions of osteoclast-specific genes, compared to those by RANKL treatment ($p<0.05$). However, hBD-1 treatment without RANKL failed to induce formation of osteoclast-like cells. A significant and further increase in transient phosphorylation of the p44 / 42 MAPKs was found by hBD-1 co-treatment ($p<0.05$), consistent with the inhibitory effect of pretreatment with U0126 and PD98059 on hBD-1-enhanced osteoclastogenesis.

Conclusions: Taken together, hBD-1 potentiates the induction of *in vitro* osteoclastogenesis by RANKL via enhanced phosphorylation of the p44 / 42 MAPKs.

S0044

Neutrophil-Mediated In-Vivo Bone Regeneration in a Rabbit Calvarial Defect Model

T. Herath[1], L. Saigo[1], B. Schaller[2], A. Larbi[3], S. H. Teoh[4], C. J. Kirkpatrick[5], B. T. Goh[1]

[1]National Dental Centre, [2]University Hospital Berne, [3]Singapore Immunology network, Agency for Science, Technology and Research, [4]Division of Bioengineering, School of Chemical and Biomedical Engineering, Nanyang Technological University, [5]REPAIR-Lab, Institute of Pathology, University Medical Centre, Johannes Gutenberg University

Objectives: Bone reconstruction is a challenging issue in the regeneration of surgically removed bone and disease-related bone defects. It is known that the immune system exerts positive immuno-modulatory effects on tissue repair and regeneration. The purpose of this preliminary study was to evaluate the in-vivo efficacy of autologous neutrophils on osteogenesis and angiogenesis using a rabbit calvarial defect model. In addition, combined effect of neutrophils with beta-tricalcium phosphate (β-TCP) on bone defect healing was also examined.

Methods: Eighteen rabbits, each with surgically created two calvarial bone defects (10mm diameter), were randomly divided into three groups (n=36). Group 1: single-application of neutrophils + fibrin carrier vs fibrin carrier alone (Control), Group 2: single-application of neutrophils+ β-TCP + fibrin carrier vs β-TCP + fibrin carrier alone, Group 3: repetitive application of neutrophils + fibrin carrier vs fibrin carrier alone. Animals were sacrificed and the treatment outcomes were evaluated by micro-CT and histological analysis at 4 and 8 weeks post operatively.

Results: Micro-CT analysis showed that application of neutrophils enhance more bone formation compared to the control at 8 weeks ($P<0.05$). Interestingly, repetitive application of neutrophils significantly increased the amount of new bone formation accompanied by new capillary vasculature regeneration as compared with the control group ($P<0.05$). In addition, immunohistochemistry results showed that expression of CD31 increased significantly in neutrophil treated group compared with control at 8 weeks which is an evidence for vessel formation. However, there was no significant difference in new bone formation in combined application of β-TCP with neutrophils as compared with β-TCP alone ($P>0.05$).

Conclusions: This preliminary in vivo study demonstrated the potential efficacy of standardized neutrophil-mediated response for bone regeneration by promoting new bone and vasculature. This new strategy, if proven feasible in subsequent studies, can be applied clinically in the field of oral and maxillofacial surgery, bringing enormous benefits to patients.

S0045

Temporomandibular Disorders in Violinists of Alliance Violin Community Bandung

A. N. Lukman, R. Rikmasari, E. Kurnikasari

Padjadjaran University

Objectives: Technique of playing violin requires violinist to adjust the instrument on their left shoulder while the mandible helps holding it. The outcome is continuous mechanical force to area of craniofacial and neck. This force can induce temporomandibular disorders (TMD). The aim of this research was to obtain the description of diagnosis of TMD in violinists of Alliance Violin Community Bandung.

Methods: This was a descriptive research. The subjects for this research were (n=34) violinists who became the members of Alliance Violin Community Bandung. Purposive sampling was used as sampling technique of this research. The procedure used for this research was referred to Diagnostic Criteria for Temporomandibular Disorders (DC / TMD).

Results: The result of this research was 30 (16 females and 14 males) violinists with age ranging from 15-30 years old of Alliance Violin Community Bandung were diagnosed with TMD (88,24%). The description of diagnosis of TMD in violinists of Alliance Violin Community Bandung was dominated by disc displacement with reduction with 23 cases (67,65%), arthralgia with 5 cases (14,71%), and myalgia with 4 cases (11,77%).

Conclusions: The conclusion of this research was TMD were common in violinists of Alliance Violin Community Bandung.

S0046

The Bone Biological Effects of Local Anesthesia Drugs

T. Huang[1], C. k. Kao[2], C. Kao[1]

[1]School of Dentistry, Chung Shan Medical University; Dental Department, Chung Shan Medical University Hsopital, [2]Chung-Hua Christian Hospital

Objectives: The purpose of this study was to investigate the drug of local anesthesia effects on the osteogenic effects

Methods: The Scandonest 3% (mepivacaine hydrochloride, Septodont Co., S-) , Septanest with adrenaline (Articaine hydrochloride , Septodont Co, S+) of the local anesthesia were used in present study. The human periodontal ligament cell line (PDL) were as target to test the cellular changes. The various concentration of the anesthesia drugs (0. 2.5, 5, 10um) were added to the PDL culture plates. After 24 hrs cultured, the cultured PDL extracts were added to the osteroblast cell line (MG63). After cultured 24 hrs, the osteoblast differentiation markers RANKL and ALP expression were analysed by western blot analysis.

Results: The PDL or MG63 cell morphologies were no changes as compared with control groups. As the concentration of extracts increased, the RANKL expression were decreased on S- and S+ group, but no effect on ALP expression.The The RANKL and ALP expression were decreased under the 10um of S- group. ($p<0.05$),

Conclusions: From the present study, the local anesthesia drugs without adrenaline can affect the bone cell differentiation ability on the RANKL expression.

S0047

Modified Wet Mechanochemical Method for Synthesis of Optimized Bioceramic Nano-Particles

M. Ebrahimi[1], M. Botelho[3], W. Lu[2], N. Monmaturapoj[4]

[1]The University of Hong Kong, [2]The University of Hong Kong, [3]The University of Hong Kong, [4]National Metal and Materials Technology Center (MTEC)

Objectives: To introduce a new production technique for synthesis of bioceramic nano-particles with controlled and optimized physico-chemical properties considering biological, economic and ecological factors.

Methods: Nano hydroxyapatite (nHA) was produced from $CaCO_3$ and $CaHPO_4$ raw powders using a conventional (nHA-1) and modified (nHA-2) wet mechanochemical synthesis technique and controlled solid-state reaction. The production variables were modified from our last report (*Ebrahimi et al. 2012*) involving, **1)** selection of smaller (3mm) and uniform milling balls, **2)** increasing the wt.% of aqueous medium (H_2O), **3)** increasing total milling time (>48hrs), **4)** modified powder refinement using double sieving (106 and 25μm), and , **5)** accurate control of sintering program (900°C at 300°C / hour heating rate). Crystallography (XRD), laser diffraction, scanning electron microscopy (SEM) and elemental analysis were used to characterize the powders and compare them to commercial nHA-F (nanoXIM, Fluidinova).

Results: XRD indexed major characteristic peaks of nHA, and two minor peaks corresponding to β-$Ca_3(PO_4)_2$ in nHA-2 rendering the sample a biphasic nature. Both nHA-2 and nHA-F were detected as calcium deficient nHA. Compared to nHA-1 and nHA-F, the nHA-2 was detected with a higher Ca / P molar ratio displaying a narrower and sharper XRD peaks that indicate increased crystallinity, and reduced amorphous ratio and crystallite size (Table 1). In addition, the powder laser diffraction of nHA-2 exhibited a single peak which denote monomodal particle size distribution pattern of smaller dimension (Figure 1). This resulted in smaller and more homogenous particle agglomeration size which was obvious on SEM examination (Figure 2).

Conclusions: A simple, economic and ecologic (no byproducts), low-sintering synthesis method is introduced for production of nano-particles through careful control of processing variables and sintering program. This method allows production of biphasic bioceramics with customized physico-chemical properties that offer additional control of their biodegradation, bioactivity, and osteoinductivity. Such features may allow higher adsorption of growth factors, increased osteoblast adhesion, higher osteoblast activity, and more uniform cellular response with minimum toxicity for various tissue engineering applications.

S0048

Evaluations of Sandblasting and Plasma Treatments on CIM Zirconia Implants

Y. Liu[1], J. Hsieh[1], S. Chuang[1,2], T. Chang[3]

[1]National Cheng Kung University, [2]National Cheng Kung University Hospital, [3]Alliance Global Technology co. LTD

Objectives: Zirconia is accepted as the next-generation implant materials due to its good biocompatibility and tooth-color. The study aimed to compare the effects of sandblasting and atmospheric-pressure oxygen plasma (AOP) treatments on the ceramic-injection-molding (CIM) zirconia, on changing their surface morphology, hydrophilicity, and surface roughness, and the attachment and proliferation behaviors of osteoblast.

Methods: Zirconia discs were prepared by using CIM and from the same mold of the zirconia implant. The discs were debindered and then sintered up to 1500°C. The test pieces were divided into four groups and subject to the combinations of sandblasting and / or AOP treatments. The surface roughness and hydrophilicity of the treated specimens were measured by a profilometer and a contact angle test. The surface morphology was observed by field-emission electron microscopy (FE-SEM). MG63 cells were seeded on these discs to examine the cell attachment and proliferation after 1 and 24 hours.

Results: The CIM zirconia show intact surfaces without obvious pores. The polygonal grains were 440-500nm in size, and was not changed by AOP. The surface roughness of untreated zirconia was 1.7μm. The sandblasting reduced the surface roughness (1.0μm), while AOP slightly increased the roughness (1.9μm). The original contact angle by water was 53.9°, which increased to 70.0° after sandblasting. AOP greatly reduced the water contact angle to 10.1° (without sandblasting) and 6.6° (with sandblasting). After 1 hour, cells adhered firmly to zirconia, and the cell numbers increased in all groups (121-212%). After 24 hours, cells continuously proliferated. Cell growth was accelerated by sandblasting (658 vs. 528%), but was suppressed after AOP (378-420%).

Conclusions: AOP significantly enhanced the hydrophilicity of CIM-zirconia without changing the roughness. Contrarily, sandblasting reduced the roughness and wettability. For the cell growth, sandblasting is expected to promote the cell attachment and growth.

S0049

In Vitro Comparison of Microleakage of Bulk-Fill Resin Composite Restorations in Classii Cavity

K. Sukjit

Khon Kaen University

Objectives: The purpose of this in vitro study was to compare the microleakage score at occlusal and gingival margins of classII cavity, restored with bulk-fill resin composites [Filtek™ Bulk Fill Posterior Restoration=FBF, SonicFill™ =SF, Tetric® N-Ceram Bulk Fill=TNF and X-tra fil=XF]and nanofill resin composite (Filtek™ Z350 XT=Z350) restorations.

Methods: One hundred sound extracted human upper premolars were prepared for class II (slot) cavities (4mm. in width and depth). The prepared teeth were randomly divided into 5 groups (n=20) and restored with five resin composites following the manufacturer's recommendations. All the restored teeth were subjected to 500 thermal cycles in water at 55°C and 5°C and immersed into the 2% methylene blue dye solution for 24 hours. The restored teeth were sectioned in mesiodistal and horizontal direction. All specimens with marginal dye penetration were evaluated microleakage score using polarized light microscope and scanning electron microscope. Statistical analysis was performed using One-way ANOVA and bonferroni test at 95% confidence interval.

Results: At occlusal margin, Average microleakage score (mm.) and standard deviation (SD) of Z350, FBF, SF, TNF and XF are 0.24±0.12,

0.35±0.12, 0.23±0.11,0.30±0.14 and 0.51±0.18 respectively. At gingival margin, Average microleakage score (mm.) and standard deviation (SD) of Z350, FBF, SF, TNF and XF are 0.59±0.17, 0.77±0.21, 0.76±0.15, 0.82±0.16 and 0.75±0.16 respectively.

Conclusions: X-tra fil presented the highest mean of microleakage score at occlusal margin. Filtek™ Z350 XT presented the lowest mean of microleakage score at gingival margin. There were no significant differences in the mean microleakage scores at gingival margins of all four bulk-fill resin composite restorations (p>0.05).

S0050

Innovation of Dental Interim Prosthesis-Silver Nanowires Composite Resin

T. Lan[1], C. Pan[2]

[1]Kaohsiung Medical University, [2]Kaohsiung Medical University Hospital

Objectives: The most notable concern regarding interim fixed partial dentures are their poor mechanical properties and the formation of microbial biofilms in the oral cavity. Therefore, the objective of the current study was to develop novel enhanced interim fixed partial dentures.

Methods: Polymethyl methacrylate (PMMA) and silver nanowires (AgNWs) were incorporated into manufactured PMMA / AgNW composite resin by using the uniform design (UD) method. The mechanical properties of the composite resin were evaluated using the nanoindention method and its antibacterial properties were examined using the desk diffusion method under the JIS Z 2801-2000 experimental standard. In addition, surface hardness, roughness, and color stability were investigated after restoring the composite resin in 37°C water.

Results: Through the UD method for manufacturing PMMA composite resin, the following factors were identified as affecting surface hardness, in order of weighting: polymerization pressure > polymerization time > aspect ratio > concentrations. The optimal conditions were found to be polymerization pressure of 1.6 bar, polymerization time of 10 minutes, AgNW aspect ratio of 14, and concentration of 0.5%. Compared with pure PMMA, the PMMA composite resin was 1.7 times harder. Furthermore, according to the antibacterial experiments, the AgNW composite resin had a superior mechanical strength and inhibitory effect against *Escherichia coli* than the composite resin did.

Conclusions: AgNWs are an attractive alternative to traditional antibiotics because of their antimicrobial activity and low bacterial resistance. They can optimize initiator systems to produce commercially useful dental and medical resins.

S0051

Impact Strength of Temporary Crown Materials after Brushing with Toothpaste

v. ariestania, S. Marcelina Tanumihardja Tanumihardja

Hang Tuah University

Objectives: The purposes of this experiment are to know and compare the impact strength of artificial crown materials PMMA and bis-GMA composite resin after brushing with toothpaste.

Methods: In this experiment, N=12 plates samples made out of PMMA and bis-GMA composite resin each with the size of 60mm x 10mm x 1,5mm and divided randomly into two groups for each materials, so each groups consist of 6 samples. The groups consist of control groups and treatment groups. All groups were submersed in distilled water for 24 hours in 37°C then the control groups were brushed without toothpaste while the treatment groups were brushed with toothpaste. The brushing time was 2 minutes. To determine the difference of the impact strength, all samples were tested using Mini Impact Tester Type KRY with Charpy method. The measurement results were analyzed statistically using One Way ANOVA.

Results: There are significant differences between groups but the decay of PMMA's impact strength is more significant than bis-GMA composite resin's.

Conclusions: The impact strength of artificial crown materials bis-GMA composite resin is higher than PMMA's after brushing with toothpaste.

S0052

An Evaluation of the Surface Changes in Denture Base of Toothbrush / Dentifrice Abrasion

M. Hsu[1,2], Y. Chang[3], C. Lee[1], J. Du[3,4], K. Chen[3,4], J. Wu[1,4]

[1]Kaohsiung Medical University, 80708 Kaohsiung, Taiwan, [2]Shu-Zen Junior College of Medicine and Management, 82144 Kaohsiung, Taiwan, [3]Kaohsiung Medical University, College of Dental Medicine, 80708 Kaohsiung, Taiwan, [4]Kaohsiung Medical University Hospital, Kaohsiung 80708, Taiwan

Objectives: The objective of this study was to evaluate the abrasion resistance and surface roughness of poly (methylmethacrylate) denture base materials by simulating toothbrushing.

Methods: According to manufacturers' instructions, an autopolymerizing resin (Heraeus Kulzer GmbH, Hanau, Germany) were fabricated in 25 × 25 × 3mm. Ten specimens divided into 2 groups according to the cleaning method used. The simulated toothbrushing included a control group (without dentifrice, WD) and a toothbrush / dentifrice group (the ratio of dentifrice and water is 1:2, TD). Toothbrushing was performed 60Hz with using 50,000 strokes of brush by reciprocating abrasive machine (PAT-2012, PROyes, Taiwan) at a load of 200g. A profilometer (Surftest SJ-410, Mitutoyo Corporation, Japan) was used to determine the surface roughness (Ra) before and after toothbrushing. The surface characteristics were evaluated by SEM, and the weight loss was also measured.

Results: The cumulative values for weight-loss of each 10,000 strokes in the TD showed the reduction in the weight of the specimens to be a fairly linear loss in character. On the contrary, the WD specimens showed constant during toothbrushing. The mean values of initial/finial roughness (Ra, m) were as follow: WD (0.024 / 0.064); TD (0.024 / 20.11). The micrograph of abraded specimens showed that the grooves be scraped, and the phenomenon of denture base material flaked from the surface in microcosmic.

Conclusions: Brushing with water alone produced no detectable wear on any of the materials. Dentifrice played a significant role in abrasion that increased surface roughness and resulting in the intense vertical wear.

S0053

Developing a Biocompatible and Antibacterial Silver-Nanoparticles Solution for Dental Use

I. Yin[1], L. Mei[1], Q. Li[2], C. Chu[1]

[1]The University of Hong Kong , [2]Anhui Medical University

Objectives: Silver composites such as silver diamine fluoride (SDF) are effective antibacterial agent but they stain caries black. This study aimed to synthesize a biocompatible silver nanoparticles (AgNPs) solution with antibacterial properties and does not stain caries lesion.

Methods: The solution containing new AgNPs were prepared using silver nitrate, epigallocatechin-3-gallate (EGCG) as reducing agent and chitosan as dispersant. The AgNPs were characterized by transmission electron microscopy (TEM) and ultraviolet-visible spectrophotometry (UV–vis). Its antibacterial properties were evaluated by minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against *Streptococcus mutans* using spectrophotometric microdilution method and agar dilution method. Chitosan and silver diamine fluoride (SDF) were used for comparison. The MTT (3- (4,5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide) assay was used to study cytotoxicity of AgNPs and SDF against mouse osteoblast precursor cell (MC3T3-e1). Their half maximal inhibitory concentration (IC_{50}) were measured. The staining property was assessed by measuring the colour of AgNPs-treated and SDF-treated demineralised dentine using CIELAB system. Total colour change (ΔE) was calculated and ΔE>3.7 would be visible.

Results: TEM and UV-vis showed formation of a homogeneous spherical AgNPs, with mean diameter of 38nm. The MIC for the AgNPs, chitosan and SDF were 31.28±1.19μg / mL 182.29±63.79μg / mL and 40.31±5.1μg / mL ($p<0.001$, AgNPs < SDF < chitosan). The MBC for the AgNPs, chitosan and SDF were 59.44±1.14μg / mL, 572.91±127.58μg / mL and 86.62±6.7μg / mL ($p<0.001$, AgNPs < SDF < chitosan). The IC50 of the AgNPs and SDF were 32.44±2.13 and 35.06±0.56 ($p=0.015$). ΔE of AgNPs-treated dentine was 3.59±0.69 and SDF-treated dentine was 38.54±12.92 ($p=0.04$).

Conclusions: A biocompatible silver nanoparticles solution with antibacterial properties was developed. It did not stain caries lesion and could be used as an alternative for silver composites in controlling bacteria in caries lesion.

S0054

Observation of Ag-Rich Precipitates on Ti-12Nb-1Ag Alloy

K. Chiu[1], J. Wu[2,4], C. Chao[3], J. Du[1,2]

[1]Kaohsiung Medical University, [2]Department of Dentistry, Kaohsiung Medical University Hospital, [3]National Pingtung University of Science and Technology, [4]Kaohsiung Medical University

Objectives: Ti and Ti alloys have been applied widely because of favorable mechanical properties, corrosion resistance and biocompatibility. However, excessive modulus of Ti and Ti alloys may cause the phenomenon called stress shielding effect which will lead to more failure on implant surgery. Therefore, βTi systems such as Ti-Nb, Ti-Mo, Ti-Ta, Ti-Zr and so on, have been researched recently. In addition, there are still some problems on clinical application such as insufficient antibacterial property and biocompatibility for long-term implantation. To solve the problems, Ag element has been coated on the surface of material by various methods to inhibit the growth of bacterial. However, the surface coating is limited to long-term use because of wear and abrasion.

Methods: Based on the above, bulk Ti-12Nb-1Ag alloy was designed, the result of corrosion resistance showed that the corrosion potential of Ti- 12Nb-1Ag(-0.254eV) was higher than Ti-6Al-4V alloy (-0.476 eV), and even outperformed G2 pure Ti(-0.255eV). In addition, the preliminary antibacterial result also indicated that Ti-12Nb-1Ag alloy possess the best antibacterial property test. The present study focused on the microstructure of Ti-12Nb-1Ag alloy, analysis the microstructure of Ti-12Nb-1Ag after various heat treatments by TEM (transmission electron microscope).

Results: The results showed that α and α'phase were observed after 850°C solid solution, In addition, Ag-rich precipitates could be found after 400°C aging treatment, and the particle size was about 20nm.

Conclusions: Additionally, owing to diffusion of Ag elements, the size and shape of Ag-rich precipitates turned into 50~100nm polygon particles with the increase of aging treatment time or increasing aging temperature resulting to various antibacterial property.

S0055

Antibacterial Property of Different Fabricated Low Copper-Addition 304 Stainless Steel

Y. Jhong[3], . Yu[2], C. Chao[2], J. Wu[4,1], J. Du[1,3], K. Chen[1,3]

[1]Kaohsiung Medical University Hospital, [2]National Pingtung University of Science and Technology, [3]Kaohsiung Medical University, [4]Kaohsiung Medical University

Objectives: The aim of this study was to investigate the characteristics of the antibacterial property of copper ion between casted and forged AISI 304 stainless steel incorporated with 0wt%~2.0wt% copper.

Methods: This study adopted the commercial 304 stainless steel (304SS) with the addition of various copper concentration (0, 0.5, 1, 1.5, 2%wt) and casted or forged into rods in 10mm diameter and 120mm length. The rods were heat-treated at 890°C for 1h on solid solution and cut into disc in 10mm diameter. The antibacterial property of the 304SS specimens was investigated by *E Coli* examination and the detection of the copper ion dissolution by ICP-MS.

Results: With the increasing addition of copper, the amount of copper ion dissolution from 304SS was shown from 0.10ppm to 0.19ppm for forged 304SS and from 0.13ppm to 0.24ppm for casted 304SS. The copper ion dissolution amount was far below the upper limitation of the daily intake amount (10ppm) in human being. Regardless of the fabrication method of copper-addition 304SS, the increase of copper ion dissolution caused a increasing tendency of antibacterial effect. The *E. Coli* existence was less than 99.9% in 0.5%wt copper-addition 304SS and more less in 2.0%wt copper-addition 304SS.

Conclusions: The copper content of 304SS below 2.0wt% reveals a high copper ion dissolution amount and correlates to the low existence of *E.Coli* that indicated a strong antibacterial ability of this low copper-added 304SS.

S0056

Effect of Internal-Glazed on Bond Strength of Resin Cement to Zirconia Crown

T. Rattanakangwanwong, C. Kuphasuk
Mahidol University

Objectives: Reduced bond strength of resin cement normally occurs when being applied with zirconia restorations. In low-fusing silica-based ceramic (glazing technique), the glassy matrix is selectively removed by hydrofluoric acid (HF) etching which increasing micromechanically retentive area. Consequently, it is possible to improve better retention for resin cement. The objective of this study is to evaluate effect of internal-glazed on tensile bond strength (TBS) of RelyX Ultimate resin cement to Ceramill ZI zirconia crown.

Methods: Twenty-four human upper premolar teeth were obtained. The teeth were prepared to create a flat occlusal surface, 16° total occlusal convergence, 0.8mm deep chamfer margin and 4mm height. Each abutment was scanned and designed to fabricate 2mm-thickness crown. Subsequently, zirconia discs were milled and sintered. All specimens were divided randomly into two groups as internal-glazed (n=12) and control groups (n=12). In internal-glazed group was glazed by VITA AKZENT Plus glazing spray on internal surface of crowns. The glazed surfaces were etched (10% HF, 20 seconds), rinsed, cleaned and air-dried. All specimens were applied Singlebond Universal, cemented and applied 50N during cementation. Then, they were kept in distilled water (37°C, 24 hours). TBS were performed by using universal testing machine at a constant crosshead speed of 1 mm / min. T-test was used for statistic analysis.

Results: The means TBS of internal-glazed and control groups are 2.83±3.701MPa and 3.68±2.604MPa, but were not significantly difference. All failures occurred in the adhesion zone.

Conclusions: Within the limitations of this study, the use of internal-glazed did not increase bond strength of resin cement to zirconia crown.

S0057

Effect of Mixed Adhesive-Silane Coupling Agent on the Repair of Hydrofluoric Acid-Etched Ceramic Restoration

C. Lin[1,2], C. Chen[1], K. Chen[1]

[1]Kaohsiung Medical University and Hospital, [2]Kaohsiung Medical University

Objectives: It is well known that the application of silane coupling agent (S) is essential for enhancing the bonding ability of composite-resin to the ceramic restoration before the application of adhesive (A). This study was planned to find out whether the application of different mixting ratio of A and S could gain a bond strength similar to that of the respective application of these two materials during the ceramic repair procedure.

Methods: Ceramic blocks (8 x 8 x 6mm, n=20) were prepared and divided into four groups. Each ceramic block was etched (10%HF), washed (5m) and applied with one of the different mixing ratio of S (Ceramic primer) and A (G-Premio Bond) as the following: **1)** Group 1: 1S5A; **2)** Group 2: 5S1A; **3)** Group 3: 1S1A. Another group (Group 4) treated with S and A separately was served as control. Composite-resin was piled onto each ceramic block with each 2mm / 40s light-curing successively to 4mm in thickness. After water immersion (37°C, 24h), each resin-ceramic block was sectioned into non-trimming microtensile test specimens tested with observation of the fractured surface and statistically analyzed (Bonferroni, $p<0.05$).

Results: The bond strength showed a decreasing order from Group 3, Group 4, Group 1 to Group 2. The bond strength showed no significance between Group 3 and 4. Group 2 presented was significantly lower than other groups with the largest number of pre-test dislodgement specimen during sectioning procedure.

Conclusions: A mixture of less than 50 vol% ratio of silane coupling agent in adhesive-silane coupling agent might have a potential of maintaining bond strength similar to that of the conventional application method.

S0058

A Novel Model of Substitute for Human Dentin Barrier Tests

T. Liang, S. Hsu, W. Tseng
National Taiwan University

Objectives: The dentin barrier test, which mimics the diffusion of components from restorative materials via dentin *in vivo*, is widely used *in vitro* cytotoxic testing. Due to the large variation of dentin and difficult collection of human teeth, some researchers have tried to find substitutes for human dentin. In the experiments, we used Sawbones®, a commercialized biomechanical material, to compare with human dentin in evaluation of eluted HEMA concentration.

Methods: Extracted human molars were collected. Human dentin and Sawbone® discs (Solid Rigid Polyurethane Foam 40 pcf Density) were prepared in two thickness, 0.5mm and 1.5mm. Two kinds of dentin bonding systems, Single Bond Universal Adhesive (SBU, 3M ESPE) as self-etch system and Adper™ Single Bond 2 (ASB, 3M ESPE) as total-etch system, were used and photo-cured according to manufacturer instruction. The leached-out concentration of HEMA through the dentin and Sawbone® (after 1hr, 4hr, 8hr, 12hr, 24hr, 48hr, 72hr) were quantified by high performance liquid chromatography (HPLC). Statistical analyses were performed using the T-test.

Results: The result of HPLC showed that:

1. HEMA concentration (after 72hr) was higher in SBU in both thickness of dentin ($p<0.05$).
2. With ASB in both thickness, HEMA concentration (after 72hr) was higher in dentin than in Sawbone® ($p<0.05$).
3. There was positive correlation of accumulating leached-out HEMA concentration on dentin barrier group and Sawbone® group.

Conclusions:

1. The leached-out concentration of HEMA was higher in SBU groups.
2. The concentration of HEMA was higher in 0.5mm thickness with same barrier material and same bonding agent.
3. Sawbone® is a stable and predictable substitute for human dentin barrier tests.

S0059

Biocompatibility of Resin-Based Sealant Prototype, LAS-Opaque And-Clear, in Subcutaneous Tissue

P. Thunyakitpisal[1], N. Thunyakitpisal[2], D. Godoy[2], W. Banlunara[3], O. Saravari[4], D. P. Kashima[4]

[1]Chulalongkorn University, [2]Chulalongkorn University, [3]Chulalongkorn University, [4]Chulalongkorn University

Objectives: To evaluate the biocompatibility of the light-activated pit and fissure resin-based dental sealant prototypes, LAS-clear and LAS-opaque, after subcutaneous implantation in rats for 7 and 60 days.

Methods: The commercial light activated resin-based sealants, Delton-clear (DC), Helioseal-clear (HC), Helioseal-opaque (HO), and Clinpro-Sealant (CL) served as control. Fourteen 8-week old Sprague-Dawley rats were used. Two rows of three 5mm subcutaneous incisions were created on the back of each rat parallel to the midline. The materials were randomly implanted and the incisions were closed using sutures. The implants were left *in situ* for 7 and 60 days. The implanted samples and the surrounding skin were removed, sectioned, and stained for histopathological evaluation: inflammatory cell infiltration (ICI) and tissue response (TR). The histopathological scores were analyzed by the Kruskal-Wallis and Bonferroni multiple comparison tests ($p<0.05$).

Results: The average ICI score between DC, HC, LAS-clear, HO, CL, and LAS-opaque were not significant difference at 7 and 60 days post-operation ($p>0.05$). The average ICI score of DC, HC, LAS-clear, HO, CL, and LAS-opaque for 7 and 60 days post-operation were 3.5±1.41, 3.63±0.74, 3.13±0.83, 3.25±1.04, 3.13±0.99, and 3.13±1.25 and were 2.33±1.15, 2.33±1.15, 2.83±1.03, 2.38±0.76, 2.23±0.83, and 2.41±0.79, respectively. Although all the material revealed a persistent inflammatory response mediated by lymphocytes and macrophages at all time point evaluation, the tissue reaction of all groups to material implantation was that of typical wound healing. The tissue response score between DC, HC, LAS-clear, HO, CL, and LAS-opaque were also not significant difference at 7 and 60 days post-implantation. The average TR score of DC, HC, LAS-clear, HO, CL, and LAS-opaque for 7 and 60 days post-operation were 1.38±0.52, 1.38±0.51, 1.38±0.52, 1.25±0.46, 1.38±0.52, and 1.25±0.46 and were 2.0, 1.91±0.29, 2.0, 1.62±0.51, 1.62±0.51, and 1.83±0.39, respectively. The tissue response we observed was material encapsulation without marked pathology. The capsule thickness was gradually increased in time depending manner.

Conclusions: LAS-clear and LAS-opaque materials were biocompatible with the subcutaneous layer.

S0060

Newly Developed Long-Term Effective Dental Desensitizing Agent

C. Lin[1,3], C. Ke[2], K. Chiu[2], M. Chen[3], L. Lin[4], J. Yang[2]

[1]Taichung Hospital, Ministry of Health and Welfare, Taiwan, [2]China Medical University Hospital, [3]National Taiwan University, [4]China Medical University

Objectives: Dentinal hypersensitivity (DH) is a common problem. Our novel alginate-microcapsule encapsulated potassium-nitrate was used to be a desensitizing agent.

Methods: Teeth samples were eroded to mimic clinical situation and randomly separated into 4 groups: "no-erosion", "eroded but no treatment", "eroded and treated by Sensodyne®", "eroded and treated by alginate-microcapsule". The efficiency of damaged surface smoothing and exposed dentinal tubule filling rate were measured. Statistical significances were determined using Student's t-test ($p<0.05$).

Results: This microcapsule was prepared by ultrasonic-emulsion and selected 330-nm size (figure 1). The efficiency of damaged surface smoothing and exposed dentinal tubule filling rate were shown in figure 2.

Conclusions: Our newly developed desensitizing agent was mostly composed of alginate, which presented better biocompatibility and biodegradability than commercial CPM products. It possessed the characteristic of slowly-released potassium nitrate,which induced long term desensitized effect, showing potential on DH therapy.

S0061

Phytochemical and GCMS Profile of *Curcuma Xanthorrhiza* Roxb

R. Vaiga[1], M. D. Ranggaini[3], F. Sandra[2], M. H. S. Djamil[2]

[1]Trisakti University, [2]Trisakti University, [3]Trisakti University

Objectives: The use of herbal medicines in Indonesia is increasing. One of the material is *Curcuma xanthorrhiza* Roxb. *C. xanthorrhiza* Roxb. is a native plant from Indonesia and has spread to several countries due to its benefit in healing. Several reports have shown the potency of *C. xanthorrhiza* Roxb. rhizome for human health.

Methods: To disclose potential compounds of *C. xanthorrhiza* Roxb. rhizomes extract in providing therapeutic effect, an observational study was conducted. *C. xanthorrhiza* Roxb. rhizome was extracted using 80% ethanol and evaporated. The extract was examined by using phytochemical screening and Gas Chromatography-Mass Spectrophotometer (GC-MS) analysis.

Results: From phytochemical screening, compounds of the extract were flavanoid, alkaloid, saponin and steroid/triterpenoid. From GC-MS analysis, 10 of 20 compounds of the extract had percentages higher than 1%. While in essential oil, 9 of 19 compounds had percentages higher than 1%. GC-MS results showed that Camphor (1.31%), Curcumene (11.16%), Isogermafurene (2.27%), Beta-curcumene (11.26%), Germacrone (5.66%), Cedrene (16.22%), Phenol (29.33%) were consisted in *C. xanthorrhiza* Roxb. extract and essential oil.

Conclusions: In conclusion, this study indicates that *C. xanthorrhiza* Roxb. contains several compounds that might have therapeutic effect.

S0062

Grafting of Anadara Granosa Shell and Sardine Oil on Expression of RANKL-OPG

R. P. Sari[1], E. Hermanto[2], P. B. Prabowo[3]

[1]Hang Tuah University, [2]Hang Tuah University, [3]Hang Tuah University

Objectives: In dentistry, complication post-extraction, disease periodontal, prosthetic surgery, pathological conditions, and trauma can cause alveolar bone loss. Osteoprotegerin (OPG) and the receptor activator of nuclear factor (NF)-kB ligand (RANKL) are key regulators of bone healing process. Anadara granosa's (AG) shell is waste that can be used as a bone graft. Omega-3 in Sardinella longiceps (SL) oil has ability to stimulate the bone healing process. The aim of this research was to discover grafting of combination Anadara granosa shell and Sardinella longiceps oil paste to the gene expression of RANKL and OPG.

Methods: The experimental units (male wistar rat, n=6 / gp) were divided into three groups. All of the wistar rat were made defects as big as of half diameter 1.5 mm-sized round bur in femur. Control group were not given graft application (K), treatment group were given AG shell paste alone (P1) and AG shell-SL oil (30%) combination (P2). Rats were sacrificed 7th days after surgery. RANKL's and OPG's Expression were measured (IHC staining) on the 7th day and statistically analyzed (ANOVA, LSD, $p<0.05$).

Results: Data of RANKL expression showed K (7,33±1,33), P1 (8,33±2,02) and P2 (5,17±1,32). Anova test showed that there were no significant differences RANKL ekspression. Data of OPG expression showed K (8,67±2,33), P1 (24,33±2,93) and P2 (40,5±4,36). the results of ANOVA's and LSD's test, it showed significant differences between groups K(-) with P1 ($p=0.004$), with P2 ($p=0,000$), and between P1 and P2 ($p=0,003$).

Conclusions: Grafting of Anadara granosa shell and Sardinella longiceps oil paste increased gene expression of OPG, but not for RANKL.

S0063

The Effects of Blood Cockle's Shell and Golden Sea Cucumber on Osteoblast-Osteoclast in Vivo

W. Prananingrum[1], R. P. Sari[2], P. B. Teguh[3], S. Revianti[2,l]. Nurlaily[4], R. P. Heryana[4], F. M. Laihad[5]

[1]Hang Tuah University , [2]Hang Tuah University, [3]Hang Tuah University, [4]Hang Tuah University, [5]Hang Tuah University

Objectives: The complication of tooth extraction, periodontal disease, pathological conditions can followed by the alveolar bone loss. Calcium carbonate derived from blood cockle shells has an osteoconductive properties. On the other hand, golden sea cucumber contains hyaluronic acid can stimulate the healing process by decreasing the pro-inflamatory cytokines. We have developed the sea cucumber and calcium carbonate from blood cockle shells for biomedical application. This study aimed to determined the effects of combination blood cockle shell and sea cucumber on osteoblast and osteoclast's number in vivo.

Methods: 25 male wistar rats were divided into 5 groups: Group 1= sham; Group 2= blood cockle's shell; Group 3= blood cockle's shell and sea cucumber 0.4%; Group 4= blood cockle's shell and sea cucumber 0.8%; Group 5= blood cockle's shell and sea cucumber 1.6%. The graft material were implanted into rat femur for 14 days. Thereafter, histological analysis were perfomed and the number of osteoclast and osteoblast were evaluated. The statistical anaysis done by Anova One-Way, LSD, $p<0.05$.

Results: The average number of osteoblast showed in Group 1 (9.7±3.6), Group 2 (20.7±0.5), Group 3 (32.46±0.557), Group 4 (40.73±0.894) and Group 5 (49.5±1.178). On the other hand, the average number of osteoclast showed in Group 1 (12.5±2.8), Group 2 (4.2±2.1), Group 3 (3.8±0.8), Group 4 (2.8±1.3) and Group 5 (2.0±0.9). In the comparison between the groups, there were significant differences for the number of osteoblast and osteoclast.

Conclusions: It was revealed from our study that the combination graft material that contain with blood cockle's shell and sea cucumber 1.6% has a good effect on the number of osteoblast and osteoclast in vivo.

S0065

The Promotion of Osteointegration Using Calcium Silicate / Chitosan Composites on 3D-Printed Titanium Scaffolds

C. Chen[3], C. Kao[2], M. Shie[1,4]

[1]China Medical University, [2]Chung Shan Medical University, [3]Chung Shan Medical University, [4]China Medical University Hospital

Objectives: The calcium silicate/chitosan (CS / CH) composites in 3D-printed titanium scaffolds is a promising approach to produce biomaterials with better osseointegration capacity. In addition, the natural bone has an ordered composition of organic fibers with dispersion of inorganic apatite among them.

Methods: In this study, Ti scaffolds were fabricated with 3D printing and coated with CS / CH mixer. The microstructure, chemical component, and contact angle of CS / CH-Ti composites were analyzed by scanning electron microscopy, X-ray diffraction, and Fourier transform infrared spectroscopy. In vitro, various CS / CH-Ti increased the formation of hydroxyapatite on the specimens' surface when soaked in cell cultured medium.

Results: During culture, several biological characteristics of the human mesenchymal stem cells (hMSCs) cultured on CS / CH-Ti groups were promoted as compared to those on pure Ti scaffold. Increased secretion levels of Collagen I and fibronectin were observed in calcium silicate-powder content.

Conclusions: Furthermore, with comparison to Ti scaffold without CS / CH, CS10 and CS15 mats markedly enhanced the proliferation of hMSCs and their osteogenesis properties, which was characterized by osteogenic-related gene expression. These results clearly demonstrated that the biodegradable and electroactive CS / CH-Ti scaffolds are an ideal and suitable candidate for bone tissue engineering.

S0066

The Role of Calcium in *Anadara Granosa* Shell Grafts to Osteocalcin Cells in Bone Formation

H. Kurniawan, W. Soemarno

Hang Tuah University

Objectives: This study aimed to analyze the effect of *Anadara granosa* graft to the expression of osteocalcin in the process of bone formation at day 15.

Methods: The experimental units used were 21 male Wistar rats were divided into 3 groups: negative control group (K-) is a group without a graft applications, positive control group (K+) is a group with the graft application with bovine graft and a treatment group (P) was the group with the graft applications *Anadara granosa*. Osteocalcin expression was measured by histopathology preparations anatomy with IHC staining. Data were analyzed with Mann-Whitney test.

Results: showed a significant difference in group K- with K+ (p=0.004) and group K- with P (p=0.001) but there were no significant difference between K+ group with P (p=0.473).

Conclusions: *Anadara granosa* graft increased the expression of osteocalcin in the process of bone formation at day 15.

S0067

Excessive Lateral Dental Arch Expansion in Experimentally Developed Acromegaly-Like Rats

M. Iikubo, I. Kojima, M. Sakamoto, T. Sasano
Tohoku University Graduate School of Dentistry

Objectives: Insulin-like growth factor-I (IGF-I) acts downstream of growth hormone and promotes growth in various tissues in patients with acromegaly. We have previously shown that exogenous administration of IGF-I stimulates acromegaly-like specific mandibular enlargement in rats. Information about changes in the size and form of the dental arch is important for clinicians in orthodontics, prosthodontics and oral surgery. Hence, the aim of this study is to investigate morphological changes in the dental arches of the acromegaly-like rats developed by means of exogenous IGF-I administration.

Methods: Human recombinant IGF-I (640mg / day) was continuously administered subcutaneously for 4 weeks by osmotic mini-pumps to 10-week-old male rats (IGF-I group; n=6). Control animals were injected with saline alone (control group; n=6). After administration, all the rats were housed for 4 more weeks. Arch width (W), length (L) and angle (q) in the mandible and maxilla were measured on a plaster dental model of the animal, and rat and human IGF-I serum levels were measured by radioimmunoassay once a week during and after IGF-I administration.

Results: Human IGF-I was detectable in the IGF-I group during administration, whereas the rat IGF-I decreased. Total IGF-I (human + rat) increased significantly during administration, and thereafter returned to the control level. In the mandible, W and q were significantly greater in the IGF-I group as compared with the control group from age 12 weeks to the end of the experiment; whereas, L showed no significant intergroup difference throughout the experiment. In the maxilla, no intergroup differences were present for W, L nor q, during and after IGF-I administration. Although the mandibular dental arch stopped expanding after administration ended, it did not return to the control size.

Conclusions: In our acromegaly-like rat model, mandibular dental arch growth is greater in the lateral than antero-posterior direction during and after IGF-I administration.

S0068

Imaging Features to Predict Development of Bisphosphonate-Related Osteonecrosis of Jaw

Y. Ariji[2], R. Kubo[2], m. tsuzuki[2], S. Sakuma[1], E. Ariji[2]

[1]Aichi Gakuin University, [2]Aichi-Gakuin University School of Dentistry

Objectives: Although the imaging features of bisphosphonate-related osteonecrosis of the jaw (BRONJ) have been described, their use as predictive indices for the development of BRONJ has not been established. The purpose of this study was to clarify which panoramic radiographic features can predict the development of BRONJ.

Methods: Subjects consisted of 24 patients medicated with bisphosphonate (BP) for osteoporosis who developed osteonecrosis of the jaw (ONJ^+ group). Controls consisted of 179 patients medicated with BP who did not have osteonecrosis (ONJ^- group) and 200 patients who had no history of BP administration (unmedicated group). The mandibular cortical width (MCW), mandibular cortical index (MCI), sclerosis of trabecular bone, and thickening of the lamina dura were evaluated by panoramic radiography.

Results: The MCW was significantly smaller in the ONJ^- group than in the other groups. Class II MCI (semilunar defects of endosteal margin) was frequently recorded on the affected and contralateral sides in the ONJ^+ group, but not in the ONJ^- and unmedicated groups. Sclerosis of the trabecular bone was significantly more frequently observed on the affected side in the ONJ^+ group than in the other groups. Thickening of the lamina dura was observed significantly more frequently in the BP-treated groups than in the unmedicated group.

Conclusions: Class II MCI could be an indicator to predict the development of BRONJ. Sclerosis of trabecular bone was considered to be a resultant imaging feature of BRONJ. Thickening of the lamina dura could be an imaging feature caused by BP administration.p

S0069

Panoramic Radiography Measure for Identifying Asymptomatic Osteoporosis in Radiology Clinic

N. Sugino[1], K. Uchida[1], N. Mochizuki[1], S. Yamada[1], H. Osanai[1], H. Kuroiwa[1], T. Fujiki[1], Y. Kitamura[2], A. Taguchi[1]

[1]Matsumoto Dental University, [2]Center of Oral and Maxillofacial Surgery and Dental Implant in Shinshu

Objectives: To clarify the usefulness of cortical shape of the mandible on panoramic radiographs for identifying asymptomatic individuals at risk of osteoporosis in general practice of our radiology clinic in Matsumoto Dental University Hospital.

Methods: Of the patients who visited our radiology clinic and had panoramic radiographs for the diagnosis of dental diseases such as dental caries between 2012 and 2015, panoramic radiographs of 4459 Japanese men and women (2112 men and 2347 women) aged 40 years and older were used in this study. Eight certificated oral and maxillofacial radiologists whose year of experience was between 6 and 37 years had classified cortical shape of the mandible into three categories (normal, mildly to moderately eroded, and severely eroded cortices) on panoramic radiographs independently during general practice of radiology clinic. Logistic regression analysis in forward selection, adjusted for gender, age, number of teeth present, hypertension (yes or no), diabetes mellitus (yes or no), was used to evaluate the association between cortical shape of the mandible and osteoporosis diagnosis.

Results: Of 4459 subjects, 244 (5.5%) had been diagnosed as osteoporosis by physician. Progression of cortical erosion of the mandible was significantly associated with gender (women) and advancing age ($P<0.001$). The odds ratio of having osteoporosis diagnosis for individuals with mildly to moderately and severely eroded cortices were 2.50 (95% confidence interval [CI], 1.65-3.78) and 3.83 (95% CI 2.37-6.17), respectively.

Conclusions: Our study suggested that mandibular cortical shape detected on panoramic radiographs was useful tool for identifying individuals at risk of osteoporosis in general practice of radiology clinic.

S0070

Sonographic Appearances of Cervical Lymph Nodes in Young Japanese Adults

H. Osanai[1], H. Kuroiwa[2], K. Uchida[2], N. Sugino[2], N. Mochizuki[1], . Kagami[3], A. Taguchi[2]

[1]Matsumoto Dental University, [2]Matsumoto Dental University, [3]Matsumoto Dental University

Objectives: We investigated whether there was any association between age, sex, and body mass index (BMI) and nodal morphology and vascular pattern in healthy young Japanese adults.

Methods: Three neck regions in 100 healthy subjects, 19-40 years old, were examined by gray-scale and color Doppler sonography. Vascular pattern was classified into three groups: avascular, hilar, or scattered. A linear mixed-effect model was used to identify associations of age, sex, or BMI with the short-axis diameter and the short-to-long axis diameter ratio (S / L). A cumulative link mixed model was used to identify any association between age, sex, BMI, and vascular pattern.

Results: In the upper cervical region, a decrease in the short-axis diameter was statistically significantly associated with aging ($p=0.04$), and an increase in the short-axis diameter was significantly associated with greater BMI ($p<0.001$). An increase in short-axis diameter was significantly associated with female sex ($p=0.02$) and higher BMI ($p=0.002$) in the submandibular region, whereas it was associated with higher BMI ($p=0.001$) in the submental region. A greater S / L was significantly associated with higher BMI and female sex in all regions. The scattered vascular pattern tended to be associated with lower BMI ($p=0.051$) in the upper cervical region, but it was significantly associated with higher BMI ($p=0.01$) in the submental region.

Conclusions: Nodal morphology and vascular pattern may be associated with age, sex, and BMI.

S0071

Analysis of the Anterior Maxillary Facial Bone Wall Dimensions on Cone-Beam Computed Tomography Images

P. D. Lam

University of Medicine and Pharmacy at HoCHiMinh City

Objectives: The purpose of this study was to analyze the thickness of the facial bone wall at teeth in the anterior maxilla based on cone-beam computed tomography (CBCT) images.

Methods: Standardized CBCT images were conducted in 156 patients (78 males and 78 females), aged between 18 to 56 years old. The distance from the cementoenamel junction (CEJ) to the facial bone crest was determined. The thickness of the facial bone wall in the respective sagittal scans was measured perpendicular to the long axis of the tooth at two locations: P1 (4mm apical to the cementoenamel junction) and P2 (at the middle of the root).

Results: The distance between CEJ and FBC increased with age. At position P1 and P2, all examined teeth exhibited a thin facial bone wall (<2mm). There was no significant difference between age groups or between genders. However, there was a statistically significant difference between the values of right and left sides. Most of the teeth had a bone wall thickness varied between 0.5 and 1mm, no case had the thickness of 2mm.

Conclusions: The facial bone wall in most maxillary anterior teeth was mostly thin. CBCT analyses of the facial bone wall and the sagittal angle are recommended to ensure the most appropriate of immediate dental implant treatment approach.

S0073

Glow Discharge Plasma Surface Modified HA / β-TCP Bone Substitute.

E. Salamanca, W. Chang
TAIPEI MEDICAL UNIVERSITY

Objectives: The aim of this study was to used GDP treatment to modify HA / β-TCP particles surfaces and enhanced their properties for bone regeneration. The physical and chemical properties of HA / β-TCP particles after GDP surface treatment (HA / β-TCP + Ar-GDP) where tested, and its biological effects within MG-63 cells viability and differentiation into osteoblast like cells were measured and compared with the ones of HA / β-TCP.

Methods: The HA / β-TCP particles were treated with GDP treatment under argon gas at room temperature under the following conditions: power, 80W; frequency, 13.56MHz; pressure, 100mTorr for 15 minutes, and later test the material.

Results: In the results, we could see Scanning Electron Microscope (SEM) observations showed HA / β-TCP+Ar-GDP presented a rough surface within macro and micro porous similar to the HA / β-TCP characteristics. In the Energy Dispersive Spectrometer more elements were found in the HA / β-TCP surfaces than in the HA / β-TCP+Ar-GDP. The Ca / P ratio measured for HA / β-TCP particles was 1.74; while HA / β-TCP+Ar-GDP ratio was better with 2.05. The treated and non-treated bonegrafts substitute in the X-ray diffraction patterns test presented its highest intensity at 27 degrees with 600 a.u. HA / β-TCP+Ar-GDP and HA / β-TCP at 25 and 40 degrees demonstrated with peaks of 200 a.u. intensity similar degree and value to the human natural bone. The HA / β-TCP+Ar-GDP and HA / β-TCP in the cell vitality test demonstrated with the MG-63 cells a progression from attachment to spreading, enhancing cells viability, with HA / β-TCP+Ar-GDP demonstrating a better differentiation into osteoblast like cells than HA / β-TCP group in the Alkaline Phosphatase test.

Conclusions: With the limitations of the present study results evidence GDP surface treatment only modified HA / β-TCP surface, consequently helping to enhance this graft material for better bone regeneration.

S0074

Effects of Implant Macrodesign and Drilling Protocols on Primary Stability

C. Lin[1,2], T. Wang[1,2], T. Yang[1,2], L. Lin[1,2]

[1]National Taiwan University Hospital, [2]National Taiwan University

Objectives: To investigate the effects of implant macrodesign and drilling protocols, in low-density artificial bone blocks, by monitoring primary stability parameters: implant insertion torque (IT); implant stability quotient (ISQ); periotest value (PTV) and implant micromotion (MM).

Methods: Polyurethane cellular-typed (10-pcf, density: 0.16g / cc) sawbone blocks (30mm x 15mm x19mm) with and without 1-mm lamination (50-pcf, density: 0.80 g / cc) were used to simulate cancellous bone with and without a thin cortical layer. Two different implant design (Nobel Biocare Mk IV-4.0, and NobelActive-4.3) were used. Implant site preparation was performed according to manufacturer's soft-bone protocol. In laminated group, standard drilling protocol (SDP), counterbore drill were used as the final drills before implant placement. In Modified drilling protocol (MDP), 2.4 / 2.8 twist step drill was used as the final drill. Five implants were tested for both SDP and MDP. IT, ISQ, PTV and MM were recorded for each implant. IT was recorded during implant placement, and then ISQ was measured. A 5-mm healing abutment was connected to the implant for measuring PTV and MM. MM was measured (1mm above implant platform) with micro-miniature LVDT when a lateral force 10N applied to the top of healing abutment by a Dynamic Loading Machine. Mann-Whitney U test was performed for statistical analysis.

Results: Significantly increased IT and ISQ and decreased MM were noticed with the present of cortical bone. MDP significantly increased IT and decreased MM in Mk IV and NobelActive implants. However, no obvious changes were noted in ISQ and PTV with MDP.

Conclusions: The data suggest that low-density bone block with 1-mm cortical layer can significantly increase insertion torque and decrease micromotion. Modified drilling may improve implant stability indicated by increased insertion torque and decreased micromotion under loading. However, parallel changes could not be significantly observed with ISQ and periotest value.

S0075

Antioxidant Activity of Various Oral *Lactobacillus* Strains

R. Teanpaisan[1], A. Chooruk[1], S. Piwat[2]

[1]Prince of Songkla University, Faculty of Dentistry, [2]Prince of Songkla University, Faculty of Dentistry

Objectives: This study aims to evaluate the antioxidant activity of various *Lactobacillus* strains derived from human oral cavity an *in vitro*.

Methods: A total of 201 Lactobacillus strains were investigated for antioxidant activities: free radical scavenging (DPPH), inhibition of linoleic acid peroxidation (TAALA), superoxide dismutase (SOD) and glutathione (GSH). Resistance to reactive oxygen species was also assessed. A correlation of antioxidant activities and dental status were examined. Differences for median values of DPPH, TAALA, SOD and GSH among the *Lactobacillus* species were analyzed using the Kruskal-Wallis test followed by the Mann-Whitney U test.

Results: It showed that there was a wide range of individual antioxidant properties of DPPH, TAALA, SOD and GSH between / within the species of *Lactobacillus* strains. *Generally, all tested Lactobacillus, except L. oris and L. gasseri, showed relatively high antioxidative parameters* indicating that antioxidative properties are strain specific. *L. fermentum, L. paracasei* and *L. rhamnosus* strains with high DPPH and TAALA activities (>60%) could survive under oxidative stress (incubated in 1.0mmol / l hydrogen peroxide for 8h or 1.0mmol/l hydroxyl radicals for 1h) better than *L. salivarius, L. oris* and *L. gasseri* strains. It was also observed that more than 50% of caries free strains (25 isolates from 9 caries free subjects) possessed higher antioxidant than caries strains (176 isolates from 79 caries subjects).

Conclusions: This is the first study to investigate the antioxidant properties of human oral *Lactobacillus* strains. The different antioxidants were found among *Lactobacillus* strains. The strains with high antioxidants could tolerate well under the oxidative stress. Significant results were found that the certain *Lactobacillus* strains might be a source of antioxidants. Further studies in animals and humans are needed to prove their benefits in promoting oral health.

S0076

Candida Albicans Up-Regulates Synthetic Bacterial Components-Induced Proinflammatory Cytokine Production.

R. Tamai, M. Kobayashi-Sakamoto, Y. Kiyoura

Ohu University School of Dentistry

Objectives: It has been reported that *Candida albicans* enhanced invasion of oral epithelial cells by *Porphyromonas gingivalis* although the fungus is not a periodontalpathogen. *C. albicans* is recognized by many receptors, such as Toll-like receptor (TLR) 2, TLR4, dectin-1 and dectin-2 and can cause sepsis by bloodstream infections in immunocompromised hosts. In this study, we investigated whether *C. albicans* augmented proinflammatory cytokine production by mouse macrophage-like J774.1 cells incubated with synthetic bacterial components.

Methods: *C. albicans* was heat-killed (95°C, 30m). Mouse macrophage-like J774.1 cells (2×10^5 cells / well) were pretreated with or without heat-killed *C. albicans* or the substitutes for *C. albicans* cell wall components in 96-well flat-bottomed plates (37°C, 3h). Cells were then washed and incubated with 100ng / ml Pam3CSK4, a Toll-like receptor (TLR) 2 ligand, or 100ng/ml lipid A, a TLR4 ligand (37°C, 24h). The culture supernatants were analyzed by ELISA for secreted mouse IL-6, MCP-1, and TNF-α. Data were statistically analyzed (ANOVA, Bonferroni or Dunn, $p<0.05$).

Results: Heat-killed *C. albicans* up-regulated TLR ligands-induced proinflammatory cytokine production by J774.1 cells. However, pretreatment of the cells with curdlan, a dectin-1 ligand, did not augment IL-6, MCP-1, and TNF-α production induced by Pam_3CSK_4 or lipid A.

Conclusions: *Candida albicans* up-regulates synthetic bacterial components-induced cytokine production via TLR pathway not dectin-1 pathway by J774.1 cells.

S0077

Overexpression of Cd36_03760 in *Candida Dubliniensis* Abrogates Development of Biofilms

P. Tsang[1], W. Chow[1], C. Yeung[1], W. Yip[2], W. Fong[2], O. Lam[3], L. P. Samaranayake[3]

[1]Technological and Higher Education Institute of Hong Kong, [2]The Chinese University of Hong Kong, [3]The University of Hong Kong

Objectives: To investigate the in vitro effects of overexpression of Cd36_03760 on the development of biofilms in *Candida dubliniensis*

Methods: *C. dubliniensis* strains that overexpress Cd36_03760 were constructed using a PCR-based gene targeting method. Overexpression was verified by real time quantitative PCR (RT-qPCR) using gene-specific primers upon addition of doxycycline. *C. dubliniensis* biofilms were prepared in polystyrene, flat bottom 96-well microtiter plates. The cell suspension (1mL, 10^7 cells / mL in PBS) was transferred to the wells and incubated at 37°C, 75rpm for 90min. After the removal of loosely adherent cells, fresh YPD (1mL) with doxycycline (50µg / mL) was added to the wells and incubated for 48h for biofilm formation. The amount of protein in the extracellular matrix of the *C. dubliniensis* biofilms was determined using a BCA protein assay. The development of biofilms was qualitatively assessed by scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM).

Results: BCA protein assay indicated that the amount of protein in *C. dubliniensis* biofilms that overexpressed Cd36_03760 was reduced by~ 35% ($P<0.05$) compared to its control. The SEM and CLSM results confirmed that overexpression of Cd36_03760 in *C. dubliniensis* abrogated the biofilm architecture: the biofilms were scanty, less dense, and less organised compared to its control which was relatively confluent.

Conclusions: Cd36_03760 is a gene that is involved in biofilm development in *C. dubliniensis*. Overexpression of Cd36_03760 in *C. dubliniensis* disintegrates the biofilms. It sheds light on further development of novel antifungal interventions against this emerging human fungal pathogen by selectively inhibiting the activity of enzymes that are involved in biofilm development.

S0078

Probiotic-Based Antifungal Formulation for Oral *Candida Albicans* Infections

N. Venkiteswaran[1], Y. Wang[2], L. Y. Chai[3], C. J. Seneviratne[1]

[1]National University of Singapore, [2]Institute of Molecular and Cell Biology, A STAR, [3]National University Health System

Objectives: *Candida albicans* is a major fungal pathogen in humans which causes superficial mucosal infections as well as systemic mycoses with higher morbidity and mortality. Adverse effects of current antifungal regimes and alarming rise in drug resistance highlight the need for adjunctive therapies with better efficacy and minimal toxicity. The present study examined the efficacy of probiotic-based antifungal formulation on oral Candida infections. The primary objective of this study was to explore the antifungal potential of the cell free supernatant of oral probiotic bacteria *L.plantarum* 108 against *Candida albicans*.

Methods: *Lactobacillus plantarum* 108 strain was selected after a preliminary screen. The cell-free culture supernatant (CFS) of this probiotic strain was first used to examine its antifungal activity against planktonic and biofilm modes of *C. albicans*. Thereafter, the CFS was fractionated using graded-molecular weight cut-off filters of sizes 10kDa, 5kDa, 3kDa, the fractions thus derived were used to test the antifungal activity. *L. plantarum* was also cultured under various pH and temperature to test the effect of culture-conditions on the antifungal activity of the supernatant. LDH assay was used to test the cytotoxicity of the probiotic products against human primary oral keratinocytes.

Results: Probiotic CFS demonstrated promising antifungal activity against both planktonic and biofilm mode of growth of *C. albicans* compared to the control samples ($p<0.05$). Microscopic analysis revealed that the CFS inhibits the yeast-to-hyphal transformation of *C. albicans*. Moreover, fractionation products retained the antifungal activity, which was independent of the initial pH of medium. LDH assay showed minimal cytotoxicity to human oral keratinocytes.

Conclusions: The present study demonstrated the therapeutic efficacy of probiotic-based antifungal formulation for *Candida albicans*.

S0079

Association between Bacteria on the Tongue Dorsum and Oral Malodor

M. Dang Vu[1], H. Nguyen[1], V. H. Pham[2]

[1]University of Medicine and Pharmacy in Ho Chi Minh city, [2]University of Medicine and Pharmacy in Ho Chi Minh city

Objectives: Oral malodor is thought to originate primarily from tongue microbiota which produce volatile sulfur compounds. This study aimed to investigate the association between oral malodor and tongue periodontal pathogens including *Porphyromonas gingivalis (Pg), Tannerella forsythia (Tf)* and *Fusobacterium nucleatum (Fn)*.

Methods: Oral malodor was assessed by levels of hydrogen sulfide (HS), methyl mercaptan (MM) and dimethyl sulfide (DS) measured by a portable gas chromatography. Subjects were then divided into two groups: malodor (25 subjects) and non-malodor/healthy group (25 subjects) matched by age and sex. Bacterial samples were collected from tongue dorsum coating following by real-time PCR analysis for *Pg*, *Tf* and *Fn*. Clinical parameters were recorded including tongue coating index, tongue discoloration index, gingival index, plaque index and non-stimulated salivary flow.

Results: Only *Pg* was present with significant difference between malodor group (56%) and healthy group (16%) ($p<0.05$). The proportions of *Pg* exhibited strong correlation with HS level ($r=0.77$, $p<0.01$) and moderate correlation with gingival index ($r=0.43$, $p<0.05$) in malodor group. The proportions of *Tf* was significantly higher in malodor group than healthy group. In malodor group, the proportions of *Tf* exhibited strong correlation with MM level ($r=0.72$, $p<0.001$) and moderate correlation with HS level ($r=0.53$, $p<0.01$) and DS level ($r=0.43$, $p<0.05$). *Fn* was present in all 50 specimens and the proportion of *Fn* was not significantly different between two groups. Tongue coating index, tongue discoloration index and plaque index of malodor group were significantly higher than healthy group ($p<0.05$).

Conclusions: *Pg* and *Tf* may contribute greatly to volatile sulfur compound production resulting in oral malodor; higher proportion of *Pg* and *Tf* is associated with more severe malodor condition. The association between *Fn* and oral malodor was not found in this study. Plaque and tongue indexes may be used as aids in oral malodor diagnosis where there are not sulfide detector.

S0080

Antifungal Susceptibility of Oral *Candida* Isolates from HIV-Infected Individuals

W. Satitviboon[3], S. Howattanapanich[3], P. Thanyasrisung[1], O. Matangkasombut[1,2]

[1]Faculty of Dentistry, Chulalongkorn University, [2]Chulabhorn Research Institute, [3]Faculty of Dentistry, Chulalongkorn University

Objectives: Oral candidiasis is among the most common opportunistic infections in HIV-infected patients and often originates from existing *Candida* strains being carried in the oral cavity. Since antifungal drug resistance has become a global concern, this study aimed to determine the antifungal susceptibility of oral *Candida* isolates obtained from HIV-infected individuals without oral lesions.

Methods: *Candida* strains were isolated from oral rinse samples of 60 Thai HIV-infected individuals in Bangkok as described in our previous study (Thanyasrisung et al, 2014). The susceptibility of these isolates to two antifungal drugs, amphotericin B (AP) and fluconazole (FL), was examined by using Epsilometer test (E-test) to determine the minimum inhibitory concentration (MIC) following the manufacturer's instructions.

Results: Among the 66 *Candida* isolates obtained from the oral rinse samples, 41 (62.1%) were *C. albicans* and the rest were non albicans species, including *C. parapsilosis* (16.7%), *C. krusei* (7.6%), *C. lusitaniae* (6.1%), *C. tropicalis* (3%), *C. dubliniensis* (3%), and C. glabrata (1.5%). The MIC of FL ranged from 0.38 mg / ml to >256 mg / ml, while that of AP ranged from 0.032 to 2 mg/ml. Among *C. albicans*, 4 isolates (9.75%) were resistant to FL, 8 isolates (19.5%) showed intermediate level of resistance to FL, and one (2.44%) was resistant to AP. Among non-albicans *Candida* species, 4 (16%) isolates (2 isolates of *C. lusitaniae*, 1 of *C. parapsilosis*, and 1 of *C. krusei*) were resistant to FL, and 6 (24%) showed intermediate level of resistance to FL. For susceptibility to AP, 3 (12%) isolates (2 *C.krusei* and 1 *C.parapsilosis*) showed intermediate level of resistance.

Conclusions: We observed a degree of antifungal drug resistance to fluconazole and, to a lesser extent, amphotericin B among *Candida* species found as oral carriage in HIV-infected patients. These may be a source of antifungal resistance in cases with oral candidiasis.

S0081

Protective Effect of Immunized Mouse Serum on Pyocyanin-Induced Macrophage Cell Death

H. Susilowati[1], S. Hutomo[2], I. Rosyadi[3], S. Artanto[4], S. Kristina[5]

[1]Gadjah Mada University, [2]Duta Wacana Christian University, [3]Gadjah Mada University, [4]Gadjah Mada University, [5]Gadjah Mada University

Objectives: *Pseudomonas aeruginosa* is an important bacterium causing nosocomial infection. It can be found in dental and oral chronic infections. Pyocyanin (PCN) produced by *P. aeruginosa* plays an important role in bacterial invasion. The macrophage is responsible for defense mechanism toward chronic infection. This study was aimed to investigate the effect of immunized mouse serum to protect macrophage from cell death induced by PCN.

Methods: BALB / c mice were immunized with 50μg PCN intraperitoneally. The serum was collected from retro-orbital vein one week after the second booster. The intraperitoneal macrophages (1 x 10^5 cell / well) were cultured for 24h prior to the stimulation. The cells were pretreated with various concentration of mouse serum (10, 20, 40, 80, 160, 320, 640 times dilution) for 30min and underwent treated with 50 μg / mL PCN for 24h at 37°C in the presence of 5% CO_2. Percentages of living cells were assessed after MTT assay. The results were analyzed using one-way ANOVA followed by subsequent analysis using LSD Scheffe test at significance level of 95%.

Results: The ANOVA results showed a significant difference between experimental groups. Those results demonstrated that the treatments were affecting cell viability. The results of LSD test indicated significant differences between control and each treatment group, except with the group treated with 640 times dilution serum and 50 μg / mL PCN. Moreover, no significant differences were found between the group treated with serum at 40 times and 80-time dilution, 80 times and 160-time dilution, 160 times and 320-time dilution, 160 times and 640-time dilution, 320 times and 640-time dilution.

Conclusions: It is suggested that immunized mouse serum enhanced macrophage viability under PCN exposure. The protective effect of serum increased as the increasing serum concentration. The 20-time dilution of serum recommended as the effective concentration to inhibit macrophage cell death.

S0083

Antibacterial Effect of Bioceramic and Mineral Trioxide-Aggregate Sealer on Enterococcus-Faecalis

R. Rusdiana, E. Suprastiwi, M. Usman

Faculty of Dentistry

Objectives: To analyze antibacterial effect of Bioceramic and Mineral Trioxide Aggregate sealer on E.faecalis isolate clinic at 2 minutes (freshly mixed), 4 hours (initial setting), 1 day and 7 days after mixed the sealer

Methods: Antibacterial effect of Bioceramic and Mineral Trioxide Aggegate sealer was assessed by direct test contact. Each sealer contacted with E.faecalis isolate clinic at 2 minutes, 4 hours, 1 day and 7 days after mixed the sealer. This suspension was poured in agar medium and incubated for 24 hours. The colony in agar plates counted with colony forming unit (CFU)

Results: The significant differences were shown by Bioceramic and Mineral Trioxide Aggregate sealer at 7 days, between Bioceramic at 2 minutes (freshly mixed) and 4 hours (initial setting), and also between Bioceramic at 4 hours (initial setting) and 7 days after mixed the sealer.

Conclusions: Both of Bioceramic and Mineral Trioxide Aggregate sealer have a good antibacterial effect when freshly mixed, initial setting and 1 hour after mixed the sealer, but at 7 days Mineral Trioxide Aggregate was greater. Mineral Trioxide Aggregate sealer has a constant antibacterial effect until 7 days.

S0084

Hemodynamic Changes in Prefrontal Cortex during Pain Stimulation in Gingiva

S. Sakuma[1], Y. Ariji[2], M. Tsuzuki[2]

[1]Aichi Gakuin University, [2]Aichi Gakuin University

Objectives: Elucidating the transmission mechanism of pain signals from the orofacial area not only aids our understanding of pain mechanisms, but also provides useful information for the development of pain mitigation methods. In the present study, the involvement of the pain-inhibitory-system in the trigeminal area was investigated through an analysis of activation status over time in the prefrontal cortex (PFC) using functional near-infrared spectroscopy (fNIRS) when a mildly pain stimulus was given to the gingiva.

Methods: Using 28 healthy male volunteers (average age 30.1±4.2 years) as subjects, mild, intermittent, acute pain stimulus was administered six times over one minute through the implementation of pocket probing in the gingiva surrounding the right maxillary central incisor. In PFC, the levels of oxygenated hemoglobin (oxy-Hb) and deoxygenated hemoglobin (deoxy-Hb) were measured using a fNIRS measurement system and the connected 22-channel probes. Average values for both oxy-Hb and deoxy-Hb levels were calculated for four stages at rest for 20 seconds prior to the pain stimulus and three 20 second intervals within the one minute of stimulation and were used as representative values for each subject. Subsequently, statistically analyzed (ANOVA, Scheffe's, $p<0.05$) using the representative values obtained from all subjects were conducted and change due to pain was investigated.

Results: Oxy-Hb level decreased the most during the 20-second stage directly after the start of stimulation. This change was seen mainly on the contralateral side, after which it returned to the resting baseline from before the pain stimulus. Change in deoxy-Hb level was not observed.

Conclusions: It was suggested that for healthy males, a mechanism exists to mitigate pain involving the pain-inhibitory-system in the 20 seconds after feeling mild pain to the gingiva. These results provide useful information for understanding the mechanism of acute pain suppression in the oral cavity.

S0085

Effect of Chewing Speed on The Masseteric EMG-Force Relationship

J. Paphangkorakit, K. Chartkittikunwong, J. Chongcharoenkamol

Faculty of Dentistry, Khon Kaen University

Objectives: Chewing speed might affect the force-velocity property of jaw closing muscles.The purpose of the present study was to investigate the effect of chewing speed on the force-EMG relationship of the masseter muscles.

Methods: Ten healthy volunteers, aged 21-23, with Class I occlusion participated in the study. Chewing force was measured by a 3-mm thin U-shaped bite force transducer placed on the lower first molar on subjects' preferred side. Surface EMG was used to record the activity of both masseter muscles and a sirognathograph was used to monitor jaw movements. In the first experiment, subjects chewed vertically on a silicone pad placed on top of the transducer at either 60 (slow) or 120 (fast) cycles/min and the relationship between IEMG (integrated EMG) and chewing force was determined. In the second experiment, the chewing force on a piece of paraffin wax was estimated from EMG at the same speed as in the first experiment.

Results: The average slope of the force-IEMG amplitude curve was significantly greater with slow chewing speed than the fast one (0.790±0.581 μV / N and 0.558±0.275 μV / N respectively). The force values predicted from the muscle activity on the working side during slow chewing yielded the best approximation of the actual chewing force (R=0.95±0.70).

Conclusions: It was concluded that masseter muscles were more efficient during fast than slow chewing task. This could not be explained by the force-velocity property of the muscle.

S0086

A Nationwide Register-Based Study of Burning Mouth Syndrome in Taiwan

N. Su[1,2], Y. Chang[1,2]

[1]School of Dentistry, Chung Shan Medical University, [2]Department of Dentistry, Chung Shan Medical University Hospital

Objectives: Burning mouth syndrome (BMS) is defined as a chronic burning pain of the oral mucosa with no associated clinical signs or apparent extraneous cause. Limited epidemiologic data have been published. In this study, we probed the nationwide registered database to assess the prevalence, gender distribution, age, income, and urbanization status of BMS patients in Taiwan.

Methods: A retrospective study was conducted to analyze the registered database compiled by the National Health Insurance provided by the Department of Health, Taiwan, from 2004 to 2013. The diagnosis of BMS was identified in accordance with the International Classification of Disease, Ninth revision (ICD-9-CM 781.1, 529.0, and 529.6). To increase the validity of diagnoses in the administrative data set, we only included dental visit patients who received ≥3 diagnoses of BMS. In addition, gender and age were analyzed by multivariate Poisson regression.

Results: The overall prevalence of BMS revealed steadily? from 2.61 (per 10^5) to 3.11 (per 10^5) over past 10-year period. A significant increase with age was observed in both male and female populations ($p<0.05$). Female has higher risk of BMS than male (RR, 1.39; 95% CI, 1.37-1.41). The age group 60-69 y / o (RR, 3.30; 95% CI, 3.21-3.39) and >70 y / o (OR, 3.89; 95% CI, 3.78-3.99) had the higher risk of BMS, respectively.

Conclusions: Taken together, the estimated prevalence of BMS remained stable over this 10-year period in Taiwan. In addition, the risk for BMS was higher among women than among men.

S0087

Oral Health Status of Adolescent and Adult Drug Addicts

J. Lertsirivorakul[2], K. Bubphawas[3], P. Dangsee[4], L. Luangthamma[5], R. Noisombut[1]

[1]Faculty of Dentistry, [2]Khon Kaen University, [3]Changhan hospital , [4]Nongsung Hospital, [5]Chonpratan Hospital

Objectives: The aim was to assess dental caries and periodontal status, and oral health care behaviors of adolescent and adult drug addicts in a rehabilitation center.

Methods: This cross-sectional descriptive study examined the drug addicts receiving treatment at Thanyarak Khon Kaen hospital during August-September 2015. Data were obtained from hospital record, questionnaires and oral examination. Caries was diagnosed as DMFT using criteria of World Health Organization. Periodontal health was assessed using Simplified Oral Hygiene Index (OHI-S) and Community Periodontal Index (CPI). Data were analyzed using Statistical Package for the Social Sciences (SPSS for Windows version 19.0).

Results: Of 93 drug addicts, 24 were adolescents (aged 15-19 years, mean age=17.67±1.24 years) and 69 were adults (aged 20-51 years, mean age=29.03±8.04 years). Most drug addicts (87.5% of adolescents, 88.4% of adults) used central nervous system stimulants. The youngest age for first taking drug in these patients was 11 years old. Dental caries presented in 91.7% of adolescents (mean DMFT=4.08) and 89.9% of adults (mean DMFT=6.28) which most of them (87.5% of adolescents, 85.5% of adults) were left untreated. The average OHI-S of adolescents and adults were 3.44 and 3.48, respectively, which were poor oral hygiene status. None of these patients had healthy gingiva and periodontium. Average 5.37 of 6 parts of the mouth in adolescents, and 5.64 of 6 parts of the mouth in adults exhibited some degree of periodontal diseases. Adult drug addicts had more severe periodontal diseases than adolescents did. Most of drug addicts in both groups have been visited a dentist and brushed their teeth twice a day. Only 19.1% of adult drug addicts used dental floss while 41.7% of adolescents did. Most of them (66.7% of adolescents, 60.9% of adults) consumed sugary snack more than twice a day.

Conclusions: These findings indicate the poor dental and periodontal health of both adolescent and adult drug addicts. General health and specialty addiction care providers in a rehabilitation center should be aware of oral health problems among these patients. Early interventions are of importance.

S0088

Oral Health and Associated Risk Factors among Vietnamese University Students

Q. T. Trinh

Ho Chi Minh Medicine University

Objectives: This study aims to examine the oral health status and to find the correlation between periodontal diseases, dental caries, oral hygiene status and relational factors among first year students of Sai Gon University in academic year 2015-2016. Students should understand the importance of their oral health status and then be assisted by the school to improve their overall knowledge and behavior

Methods: A total 3.333 students (850 males, 2483 females) were surveyed in a cross sectional study using a self-administered structured questionnaire which includes a questionnaire and WHO Oral Health Assessment Form (2013). The data was statically analyzed using Chi-squared, T-test and logistic regression at significance level of 0.05.

Results: The percentage of students with decayed teeth was 61.33%. The percentage of students with bleeding on probing was found to be significantly high at 93.10%. The mean DMFT (decayed, missing or filled teeth) was 1.84. The mean percentage of oral health knowledge and behavior was 10.66% and 11.21% successively. The regression analysis showed that the mean DMFT and the mean OHIS were higher for male students and dependent on the students' dental clinic visits frequency and their oral health behavior.

Conclusions: It can be concluded that the oral health status among 1st year students of Sai Gon University was at moderated level according to WHO Classification. Bleeding on probing is the most popular problem. The results also show that gender, frequent dental care and good health behavior are closely related to the number of decayed teeth and the oral heath status of the students.

S0089

Oral Health Status of Institution Elderly People with Disabilities

H. Chen[1,2], Y. Huang[3,2], L. Chi[1,5], J. Yao[2,4]

[1]National Yang-Ming University, [2]National Defence Medical Center, [3]Taipei Medical University,
[4]The Association of Family Dentistry, [5]Taipei City Hospital

Objectives: The population of people with disability in Taiwan reached 1.17 million in 2016, among whom 40% were aged 65 and over. Oral health is a mirror of general health, and affects quality of life. To understand disabled elderly people's oral health status and their need of relevant services to provide a supportive environment is an important issue.

Methods: The database was from the 2013 National Oral Health Survey of Institution people with disabilities in Taiwan. The targeted population was those disabled people living in institutions and aged 65 and over . Oral health status was examined by standardized dentists, and a structured questionnaire was used to collect other relevant information including types and degree of disabilities, oral hygiene practice, dental visit experience, and demand for oral health services.

Results: A total of 944 disabled elderly people whom living in the institutions completed oral examination and questionnaires. Nearly half of the participants (49.3%) were female, with mean ±SD of age as 72.6±5.4 years old. The most frequent type of disability was Dementia (26.4%), followed by Chronic Mental Disability (24.7%). More than 70% were in the severity catories of Moderate or Severe. The mean ±SD of DMFT index was 22.91±6.83. Almost all (97.0%) of the participants needed assisted oral hygiene care, while only 15.1% of them had regular dental check. More than one third there is (36.3%) of the participants received dental care due to pain or uncomfortable, and more than half (55.5%) of them needed assistance in cleaning their mouth. The prevalence of edentulism was 15.4% and prosthesis was in need.

Conclusions: Disabled elderly people suffered from poor oral health. Most of them had their oral hygiene kept thanks to their caregivers . To improve the oral health and quality of life of disabled elderly people, it is necessary to increase access to oral health services bedside dental care, and to reinforce caregivers' ability to help cleansing oral cavity for disabled elderly people.

S0090

How Much Does It Cost to be a Dentist in Thailand: A Case Study of Faculty of Dentistry Mahidol University

T. Tussanapirom, N. Luksamijarulkul

mahidol university

Objectives: To estimate overall expenses of a dental student in Mahidol University including tuition, living costs, additional study related expenditures and the opportunity cost for two addition years of study.

Methods: A cross-sectional study was conducted using questionnaires to all Mahidol dental students during the academic year 2015. 487 returned and were analysed using descriptive statistic.

Results: The students who live with their family spent an average 194,070 baht per year. The greater spending is personal expenses. Students who have to rent dorm or apartment, which is the main expense, spent 302,568 baht per year on average.

Conclusions: The expenses of a dental student per year is around 80% of the average yearly income of Thai families.This could imply that average Thai families cannot afford the cost of dental education even in public universities. Therefore few students from working class background enrolled in dental schools and established an under-represented health professional workforce. The suggested solutions are to make dental education personnel recognise this issue, provide cheap dormitory, limit unnecessary educational cost and increase full scholarship.

S0091

Effects of 810nm Diode-Laser on Human Gingival Fibroblasts Proliferation and Migration.

N. Y. Tran

University of Medicine and Pharmacy in Ho Chi Minh city, Viet Nam

Objectives: The objective of this study was to evaluate the effects of 810nm diode-laser on proliferation and migration of the human gingival fibroblasts (hGF) according to different settings.

Methods: hGF was obtained from gingival tissue in the maxillary anterior tooth region of healthy donors. The cell monolayer was irradiated with 810nm diode laser which operated at different parameters following manufacturer's instructions: group 1- elimination of inflamed tissue and pocket epithelium; group 2- disinfection; group 3- biostimulation and group 4- control group (non-irradiated). Cell proliferation was evaluated by MTT assay after 1, 3, 5, 7, 9 days. Cell migration was evaluated by scratch wound healing assay at 0, 24, 48, 72h. Kruskal-Wallis test and Mann-Whitney one were applied to analyze these data.

Results: Cells in group 1 had lowest proliferation at all-time points. Cells in group 3 showed a better proliferation than those in the remaining groups at day 1, day 5 and day 7 and a lower proliferation than the control group at the day 3 and day 9. However, the difference in cell proliferation among groups was only statistically significant at day 9 ($p<0.001$). At this time point, cells in both group 2 and group 3 showed a significant increase in comparison with group 1 ($p<0.05$) but no difference compared to control one ($p>0.05$). The migration rate of cells in group 3 was faster than the other groups (48 hours versus 72 hours after irradiation).

Conclusions: Laser can modulate proliferation and migration of hGF. This study contributed more evidence for possible effects of laser on wound healing process after periodontal treatment.

S0092

Oral Health Status of Institution Residents with Special Needs

M. Hung, P. Lin, L. Chi, M. Hsu

Department of Dentistry, School of Dentistry, National Yang-Ming University

Objectives: According to the World Health Organization's report, 10% people can be categorized as with special needs, which are defined as those individuals who have permanent or transitory mental, physical, organic social and / or behavioral impairments. More than two-thirds of them do not receive any type of oral dental care regularly. The objective of this study is to evaluate the oral health status among institution residents with special needs.

Methods: A cross-sectional study used structured questionnaires and oral examination for institution residents with special needs aged 40 and over (n=464). The protocol of the oral examination was in accordance to the World Health Organization's criteria and carried out by standardized dentists. After data collection, numbers of decayed-missing-filled teeth (DMFT), decayed teeth (DT), missing teeth (MT) and filling teeth (FT) of each participants were calculated for further analyses. T test, ANOVA, and Chi-square tests were employed to compare between participants who received regular dental visits and those who did not.

Results: 87.5%(n=406) of eligible participants were cooperative, 9.7% (n=45) were barely cooperative and 2.8% (n=13) were unable to cooperate. Of all the participants, 64.7% (n=464) were male. The mean DMFT, DT, MT, FT scores among these participants were 16.30±7.77, 1.35±2.26, 11.69±8.82, and 3.24±4.46, respectively. 77.5% (n=313) of the participants who received regular dental care had fluoride varnish applications, which was significantly higher than that of those who did not receive regular dental care 22.5% (n=136) (P=0.002).

Conclusions: This study revealed that institution residents with special needs who had received regular dental care were more likely to have fluoride varnish applications Preventive oral health care should be taken into consideration to maintain a high standard oral health status among the institutional resident with special needs.

S0093

Change of Oral Health Behavior from 12-, 15- to 18-Years-Old

H. Wong, L. Li, W. Cao, C. McGrath
The University of Hong Kong

Objectives: To investigate the change of oral health behavior among Hong Kong students from 12 through 15 to 18 years old.

Methods: A longitudinal cohort study was conducted among 12-year-old students in Hong Kong. These students were randomly selected and followed-up in their 15 and 18 years old. The data of oral health behavior which included frequency of tooth brushing and use of fluoride toothpaste were collected by self-completed questionnaires. The frequency of tooth brushing was classified into “less than twice a day” and “at least twice a day”. Use of fluoride toothpaste was divided as “yes” and “no or not sure”. The study was approved by the Institutional Review Board of the University of Hong Kong / Hospital Authority Hong Kong West Cluster (UW 15-178). The work described in this abstract was fully supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (Project No. 17115916).

Results: 282 participants completed three rounds of surveys. Related-sample Cochrane’s Q test were employed to analyze the data. The percentage of students who used fluoride toothpaste increased significantly from 37.9% to 57.0% during these six years ($P<0.001$). However, the percentage of adolescents who brushed their teeth at least twice a day dropped from 74.8% to 70.1% though this change was not statistically significant.

Conclusions: Our findings showed that the students of 18 years old had developed better habit and knowledge on the use of fluoride toothpaste compared with that when they were 12 years old. The promotion of oral health care and the reinforcement of oral health instruction should be continued among adolescents in Hong Kong.

S0094

Remineralization Effect of Novamin in Primary Teeth Using Micro-CT

P. BENJASUWANTEP

Mahidol University

Objectives: To evaluate and compare the remineralization effect of Novamin on enamel caries-like lesion in primary teeth using micro-computed tomography.

Methods: Fifty sound primary incisors were coated with nail varnish, leaving a 1 x 1mm window and then immersed in a demineralizing solution for 96 hours to produce artificial enamel caries like lesions. Then the specimens were randomly divided into five groups (A to E; n = 10) Group A: control (artificial saliva), Group B: Novamin toothpaste (Dr.Collins Restore®), Group C: 0.11% NaF 500ppm F toothpaste (Colgate® Babies), Group D: 0.11% NaF 1000ppm F toothpaste (Colgate® great regular), and Group E: CPP-ACP (GC Tooth Mousse®). The pH-cycling method was carried out for 7 days. The specimens were measured mineral density by using a micro-CT (Skyscan1173; Bruker, Belgium) three times: at baseline, at post-lesion, and at post-treatment. The results were calculated the percentage change of mineral density and compared among the groups using one-way ANOVA and LSD tests at 95% level of confidence.

Results: The mean percentage changes of mineral density in all treatment groups were significant higher than control group. Group D had the highest mean percentage changes of mineral density compared to the other groups. However, there was no statistically significant difference among Group B, Group C, and Group E.

Conclusions: All dentifrices were effective for remineralization on enamel caries-like lesion in primary teeth. However, Novamin showed effect of remineralization similar as 500ppm F, and CPP-ACP but less than 1000ppm F containing toothpaste.

S0095

Association between Fluoride Varnish Application and Risk of Endodontic Treatments

P. Lin[1,3], Y. Chu[1,4], J. Wang[5], L. Chi[2,6]

[1]Department of Dentistry, School of Dentistry, National Yang-Ming University, [2]Department of Dentistry, School of Dentistry, National Yang-Ming University, [3]Department of Dentistry, Shin Kong Wu Ho-Su Memorial Hospital, [4]Division of Medical Devices and Cosmetics, Taiwan Food and Drug Administration, [5]Institute of Epidemiology and Preventive Medicine, College of Public Health, National Taiwan University, [6]Department of Education and Research, Taipei City Hospital

Objectives: In Taiwan, a non-fluoridation country, the incidence rate (more than 40%) between 3-year-old children to 6-year-old children was a huge challenge to diminish. Since 2004, Taiwan government provided topical fluoride varnish applications for children under 5-year-old. The objective of the present study was to investigate the association between topical fluoride varnish applications provided from the government and the subsequent risk of endodontic treatments among primary molars, using national health insurance research database.

Methods: The current retrospective cohort study recruited participants who were younger than 6 years of age during 2004-2013. Children who received topical fluoride varnish applications more than 4 times without any dental treatments within 2 years after the first time as “pure topical fluoride varnish application group.” After 1:2 matching process, 3,644 children in the “pure fluoride varnish group” and 7,288 children in non-exposed group were selected for further analysis. These 10,932 participants were followed to see if they would receive pulpotomy and pulpectomy in their primary molars until aged 8 or the end of the study (December 31, 2013). Cox proportional hazards models were employed to estimate the effect of having fluoride varnish applications on the risk of endodontic treatments.

Results: 3.98% children from “pure fluoride varnish group” received subsequent pulpotomy or pulpectomy, which was significnantly fewer than 7.23% from children who never received topical fluoride varnish applications ($P<0.0001$). After adjusting for potential confounding factors, the adjusted hazard ratio for endodontic treatments in primary molars for the “pure topical fluoride varnish application group” was 0.51 (95% CI = 0.41–0.64, $P<0.0001$) compared to those who never received topical fluoride varnish applications.

Conclusions: The multivariate Cox proportional hazard regression model analysis revealed that the participants who had received topical fluoride varnish application were associated with lower risk of future endodontic treatments.

S0096

Medical Office-Based Caries Prevention Related Attitudes among Practitioners in Taiwan

S. Dima

Taipei Medical University

Objectives: To assess the knowledge, attitude, and practice regarding early childhood caries (ECC) prevention and implementation of medical office-based caries prevention among pediatricians and dentists in Taiwan.

Methods: Data were collected from currently practicing pediatricians and general and pediatric dentists using self-administered questionnaires.

Results: A total of 301 questionnaires were completed by the pediatricians (n=105), general dentists (n=117), and pediatric dentists (n=79). The pediatric dentists obtained significantly higher knowledge and practice scores than did the general dentists and pediatricians (P<0.0001). The pediatricians' attitude score related to engaging physicians in medical office-based caries prevention was significantly higher than the attitude scores of the general and pediatric dentists (P<0.05). Most pediatricians (58.3%) agreed that they could apply fluoride varnish to prevent ECC in children; however, most dentists disagreed (65.8% of general and 79.7% of pediatric dentists). A Spearman rank correlation analysis indicated a significant positive correlation between knowledge and practice among the general dentists (r_s=0.271, P<0.01) and pediatricians (r_s=0.262, P<0.01). The correlation between knowledge and attitude among the pediatricians was significantly positive (r_s=0.242, P<0.05). Attitude and practice among the pediatricians were significantly positively correlated (r_s=0.271, P<0.01).

Conclusions: Pediatricians with more knowledge were significantly more willing to perform oral health-related practices and possessed a positive attitude toward medical office-based ECC prevention. Although the majority of pediatricians reported willingness to include preventive oral health interventions in children's visits, a lack of oral health knowledge and confidence appeared to pose barriers.

S0098

A Retrospective Study of Metastatic Tumors to the Oral and Maxillofacial Areas

R. Chaisuparat[1], N. Boontanapibul[2], T. Chindanuruks[2], B. Temtanapat[2], P. Suwannarit[2]

[1]Faculty of Dentistry, Chulalongkorn University, [2]Undergraduate student, Faculty of Dentistry, Chulalongkorn University

Objectives: The objective of this study is to retrospective review the patients with diagnosis of metastatic tumors to the oral and maxillofacial areas and to study their demographic, clinical, pathologic features.

Methods: Biopsy reports from the department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University from 1997 to 2016 were reviewed for identification of patients with metastatic tumors to the oral and maxillofacial areas. Information regarding age, gender, lesion location, signs and symptoms, radiographic features, and histologic diagnoses was recorded. The H&E and immunohistochemical slides from all cases were reviewed by pathologist to confirm the original diagnosis. Descriptive data analysis was performed using the Excel version 2013.

Results: Fourteen cases of metastatic tumors were identified and they presented with an average age of 59.43 year with a male to female ratio of 1:1.33. The jaw bone was the most frequently affected location (10 / 14), with the posterior mandible being the most common site (8 / 14). Paresthesia of the lower lip was the most common chief complaint, seen in patients with the lesions at the posterior mandible (6 / 8). The primary malignant site was reported at the time of patient presentation with the oral metastatic lesions in 7 cases, including breast, brain, liver (2), lung and thyroid gland (2), whereas 7 cases suggested the indication of unknown primary cancer. Of those 7 cases, 5 cases were adenocarcinoma.

Conclusions: The findings of this study indicate that the metastatic tumors to the oral and maxillofacial areas are rare. Oral metastatic tumors may be the first indication of an undiscovered cancer at a distant primary site.

S0099

Circulating Endocan Levels as A New Biomarker of Oral Cancer

W. Yang[1], S. Yang[1], M. Chen[2]

[1]Chung Shan Medical University, [2]Changhua Christian Hospital

Objectives: In Taiwan, oral cancer is the fourth most common cancer and the most common malignancy with a poor prognosis. Endocan is secreted by vascular endothelial cells in the liver, lungs, kidneys, and gastrointestinal tract. Endocan expression is associated with tumor prognosis, metastasis, and angiogenesis in many cancers. However, few studies have examined the association of plasma endocan levels with oral squamous cell carcinoma (OSCC) progression.

Methods: The plasma endocan levels of 438 male OSCC patients through a commercial enzyme-linked immunosorbent assay were measured. The Cancer Genome Atlas (TCGA) dataset was also used to analyze the endocan levels in 328 OSCC patients and 33 normal tissues.

Results: Our results revealed that the plasma levels of endocan in OSCC patients were significantly associated with the tumor (T) status but not with the lymph node status, metastasis, and cell differentiation. TCGA bioinformatics database analysis revealed that endocan expression was significantly higher in OSCC patients than in normal individuals ($p<0.05$). In addition, the examination revealed similar results for the endocan expression levels and pathological stage in OSCC.

Conclusions: The plasma endocan is a novel biomarker for predicting the T status in OSCC patients.

S0100

Langerhans Cells in Odontogenic Keratocysts

C. Chang[2], Y. Wu[1], C. Chiang[3,1], H. Chen[3,2]

[1]National Taiwan University, [2]National Taiwan University, [3]National Taiwan University

Objectives: Langerhans cells (LCs) are antigen-presenting cells. This study assessed the LC counts in odontogenic keratocysts (OKCs).

Methods: The LC numbers in the lining epithelia and subepithelial connective tissues were counted at 60-OKC sites without inflammation, 39-OKC sites with mild / moderate inflammation, and 13-OKC sites with severe inflammation from 60-OKC specimens immunostained with anti-S100 antibodies.

Results: The mean LC counts in the lining epithelia and subepithelial connective tissues increased significantly from no inflammation (0.5±0.4 and 0.7±0.6 cell / high-power field or HPF, respectively) through mild / moderate inflammation (5.9±2.7 and 5.0±3.5 cells / HPF, respectively) to severe inflammation OKC sites (14.7±5.3 and 13.3±6.8 cells / HPF, respectively; all $P<0.001$). OKC sites with inflammation had thicker lining epithelia than those without inflammation. Moreover, the mean LC counts in the lining epithelia and subepithelial connective tissues of OKCs were significantly higher in the thicker lining epithelium (>100μm) group (7.7±5.6 and 6.5±5.8 cells / HPF, respectively) than in the thinner lining epithelium (≦100μm) group (1.0±2.0 and 1.4±2.6 cells / HPF, respectively; both $P<0.001$).

Conclusions: A significant association of inflammation grade with the number of LCs in OKCs is found. The paucity of finding LCs in the lining epithelia of OKCs without inflammation indicates the loss of immunosurveillance ability against the OKC lining epithelial cells; this can explain why OKCs have aggressive clinical behavior, a great growth potential, and a high recurrence rate.

S0101

GMI Impairs Cancer Stemness and Chemoresistance in Oral Carcinomas Stem Cells

T. Wang[2], C. Yu[1]

[1]Chung Shan Medical University, [2]Chung Shan Medical University

Objectives: Cancer stem cells (CSCs) have been identified to exert tumor initiating ability, resulting in the relapse, metastasis and chemoresistance of oral squamous cell carcinomas. As such, strategy that target CSCs may be a promising approach for OSCC.

Methods: Oralspheres was applied to isolate oral cancer stem cells (OCSC). Aldehyde dehydrogenase 1 activity and CD44 positivity of OCSC with GMI, an immunomodulatory protein from Ganoderma microsporum, treatment were assessed by flow cytometry analysis. In vitro, in vivo oncogenicity assays, and mechanistic exporation were performed to assess in OCSC with GMI treatment.

Results: In the present study, we showed that GMI, an immunomodulatory protein from Ganoderma microsporum, induced a cytotoxic effect in oral cancer stem cells (OCSCs). Treatment of GMI dose dependently down-regulated the oncogenicity, including ALDH1 activity, CD44 positivity, self-renewal property, invasion and colony formation abilities as well as potentiated chemo-sensitivity in ALDH1 + CD44 + OCSCs. And the tumor suppressive effect of GMI was mediated through the inhibition of IL-6 / Stat3 signaling pathway. Furthermore, tumor growth was reduced in mice bearing xenograft tumors after oral gavage treatment of GMI.

Conclusions: We demonstrated the anti-CSC effect of GMI in oral cancer and GMI may be able to serve as natural Cisplatin adjuvant to prevent cancer recurrence.

S0102

Characterization of a Novel Oral Submucous Fibrosis Model Induced by Areca Nut Extract

Y. Wang
Kaohsiung Medical University

Objectives: Oral submucous fibrosis (OSF) is an oral potentially malignant disorder and areca quid chewing is the main etiological factor. However, the molecular mechanism underlying OSF remains unclear, partly due to the lack of an appropriate animal model. The present study aimed to establish and characterize an animal model of areca nut extract (ANE)- induced OSF.

Methods: Mice were divided into 3 groups: the control group; the bleomycin group; and the ANE20 group, which received 20mg / ml subcutaneous (SC) injection of ANE. OSF was evaluated by histological analyses. Additionally, the expression levels of the fibrotic marker genes were determined by immunohistochemical staining and immunoblotting.

Results: ANE administration significantly increased dermal thickness and collagen deposition compared with the control group. Moreover, ANE induced the expression of the fibrotic marker genes alpha smooth muscle actin (α-SMA) and connective tissue growth factor (CTGF) in the lesions.

Conclusions: The SC injection of ANE successfully induced OSF. This model may facilitate future studies of the mechanism underlying OSF.

S0103

IL-17 Expression in Oral-Candidiasis-Immunosuppressed-Models Treated with Acanthus Ilicifolius Extracts

D. Andriani[1], S. Revianti[2]

[1]Faculty of Dentistry Hang Tuah University, [2]Faculty of Dentistry Hang Tuah University

Objectives: Immunosuppressed conditions are susceptible for fungal invasion. Candida albicans (C.albicans) are the most prevalent species that caused oral candidiasis. IL-17 pathway play role in antifungal immunity. Acanthus ilicifolius (A.ilicifolius)'s leaves chloroform extracts has antifungal agent against C.albicans growth. Nystatin is regularly used for oral candidiasis. The aim of this study was to compare treatment effect of A.ilicifolius's leaves extracts with nystatin on IL-17 expression in oral candidiasis immunosupressed model.

Methods: This study was true experimental with post test only control group design. Sixteen male Ratus Novergicus Wistar strain, aged 12 weeks, average 250g weight and healthy were immunosuppressed with dexamethasone (0,5mg / day) and tetracycline (1mg / day) orally for 7 day, after that induced by C.albicans (ATCC-10231) 6 x 108 on the tongue of rats for 2 weeks (3 times / week). Rats divided into four groups (n=4 / group): no-treatment (G1), nystatin-treatment (G2), A.Ilicifollius (8%)- Treatment-2 (G3), and A.Ilicifollius(16%)- Treatment (G4). The rats was treated for 14 days. After treated the tongue were biopsied and IL-17 expression were examined by immunohistochemistry. The result observed using microscope(400 x magnification) and statistically analyzed (One-way ANOVA, LSD-test, $p<0,05$).

Results: IL-17 expression of G2 (11,5±1,29), G3 (13,7±2,06) and G4 (13,5±2,08) are higher than G1 (3,5±1,29).There was no significant differences between G2 to G3 and G4 ($p>0,05$).

Conclusions: A.ilicifolius extract can increase expression of IL-17 in oral-Candidiasis-immunosupressed-model. A.ilicifolius extract has the same effect compare with nystatin.

S0105

Periodontal Inflammatory Disease is Associated with Risk of Parkinson's Disease

C. Chen[1,2], Y. Wu[3], Y. Chang[4,5]

[1]Chung Shan Medical University, [2]Zuoying Branch of Kaohsiung Armed Forces General Hospital, [3]Tri-Service General Hospital, School of Medicine, National Defense Medical Center, [4]Chung Shan Medical University, [5]Chung Shan Medical University Hospital

Objectives: The cause-effect relation between periodontal inflammatory disease (PID) and Parkinson's disease (PD) remains uncertain. The purpose of our study was to investigate the association between PID and PD.

Methods: We conducted a retrospective matched-cohort study by using Taiwan's National Health Insurance Research Database. We identified 5,396 patients with newly diagnosed PID during 1997 to 2004 and 10792 cases without PID by matching sex, age, index of year, and comorbidity. Cox proportional hard regression was used to evaluate the risk of subsequent PD.

Results: A total 176 (3.26%) and 275 (2.55%) patients were diagnosed with PD in the case and control cohorts, respectively (Figure 1). It shows the Cox regression analysis of risk factors associated with development of PD. More PD development in case-cohort compared with control cohort was noted and the adjusted hazard ratio (HR) was 1.431 (95% CI=1.141-1.794, p=0.002). This study shows subgroups stratified by gender, age, comorbidities, the Charlson Comorbidity Index (CCI) score and urbanization level during a 1-year period. The incidence rate ratio (IRR) of PD was significantly higher among the case cohort than it was among the control cohort, in the following subgroups: male gender, age≥60 years, hypertension, stroke, CCI score 1, and CCI score≥3. Both the patients with and without hyperlipidemia, chronic kidney disease, and traumatic brain injury in the case group were at higher risk of PD than were the control group. Level 1 and level 2 carried greater significant risk than did level 3 in terms of urbanization. However, PID subjects who were male, aged≥70 years, hypertension, no hyperlipidemia, no depression, stroke, with / without chronic kidney disease, traumatic brain injury, CCI score≥3, and the highest urbanization level 1, were associated with significant higher risk of PD after adjusting the HR. The difference between the case and control groups reached statistical significance difference between the case and control group in the 1st year of follow-up ($p<0.05$ with log-rank test) (Figure 2).

Conclusions: Our results show that PID is associated with an increased risk of developing PD. These findings emphasize the importance of early prevention of PD by diminishing PID.

S0106

Association between Human Leucocyte Antigens and Aggressive Periodontitis.

S. Chantarangsu[1], P. Bandhaya[2], K. Torrungruang[3]

[1]Chulalongkorn University, [2]Chiang Mai University, [3]Chulalongkorn University

Objectives: The aim of this study was to evaluate human leukocyte antigen (HLA) associations in patients with aggressive periodontitis (age<45, N=57) in comparison to healthy controls (no periodontitis, age≥50, N=36) and general Thai population (N=650).

Methods: HLA-A, and -B were determined using reverse sequence-specific oligonucleotide probes hybridization technique. Statistical analyses were carried out by comparing each HLA allele frequency among cases, controls and general Thai population using Fisher's exact test and calculated odds ratios (OR) and 95% confidence intervals (CI).

Results: In comparison with the healthy controls, HLA-B*40:01 occurred more frequently in the patients with aggressive periodontitis (21.1% versus 2.8%, OR=9.3, 95%CI 1.2-75.3, P=0.013). In contrast, HLA-A*24:02 occurred less frequently in the patients with aggressive periodontitis (15.8% versus 36.1%, OR=0.3, 95% CI 0.1-0.9, P=0.043). In comparison with general Thai population, HLA-B*40:01 occurred more frequently in the patients with aggressive periodontitis (21.1% versus 10.8%, OR=2.2, 95% CI 1.1-4.6, P=0.029). While HLA-A*24:02 occurred more frequently in the healthy controls than in general Thai population (36.1% versus 20.5%, OR=2.2, 95% CI 1.0-4.7, P=0.035). There was no significant relationship between the other HLA alleles and aggressive periodontitis.

Conclusions: HLA-B*40:01 could be a putative risk allele, whereas HLA-A*24:02 could be a protective allele for aggressive periodontitis in Thais.

S0107

Conventional Periodontal Treatment and MPO Secretion.

D. Hormdee[1,2], A. Kampichai[1], P. Chaiyarit[2]

[1]KhonKaen University, [2]the Research Group of Chronic Inflammatory Oral Diseases and Systemic Diseases Associated with Oral Health

Objectives: This study was undertaken to compare the activity and level of Myeloperoxidase (MPO) from saliva and from gingival crevicular fluid (GCF) in conventional treatment of periodontal disease.

Methods: Saliva and GCF were collected from 24 subjects at before periodontal treatment, 2 weeks and 3 months after treatment:12 with chronic periodontitis (CP) and 12 with gingivitis. In addition, samples at baseline from 20 clinically healthy periodontium were collected. Full mouth plaque index (PI), bleeding on probing (BOP), periodontal pocket depth (PPD) and clinical attachment level (CAL) were also measured and recorded. MPO activity and level were measured by colorimetric method and indirect ELISA.

Results: MPO was constitutively secreted by neutrophil in oral cavity. Increase in MPO activity, and level was seen in patients with chronic periodontitis. Significant difference in MPO was seen in both saliva and GCF of periodontally healthy and gingivitis patients compared with patients with periodontitis. After scaling and root planing, MPO concentration and activity was significant changed in both gingivitis and periodontitis groups.

Conclusions: MPO activity, MPO level and ratio between MPO to total protein from GCF or saliva might be considered as a prognostic biomarker of periodontal inflammation. Conventional treatment of periodontal disease altered the MPO activity, level and ratio of MPO to total protein in inflamed periodontium.

S0108

A Preliminary Study on Periodontal and BMI Status in Filipinos

C. M. Pornillos

University of the East

Objectives: Obesity is a common risk factor for major non-communicable diseases (e.g. diabetes, cardiovascular disease and cancer). Emerging evidence has shown that obesity is linked to periodontal disease. This cross-sectional study aimed to investigate the association of periodontal conditions with the body mass index (BMI) status in a cohort of Filipinos.

Methods: A total of 41 subjects participated in this preliminary study which was approved by the research committee of the *University of the East College of Dentistry*. Demographic data were recorded from each subject. Body weight and height were measured, and BMI was then calculated. The status of underweight (UW), normal weight (NW), overweight (OW) and obesity (O) was determined. Basic periodontal examination (BPE) was undertaken by a single examiner, and periodontal conditions wereclassified accordingly.

Results: Majority of the participants were females (n=27, 66%), and most of the participants were atthe age groups of 18-29 years and 40-49 years. The percentage distribution of BMI scores was 31.7% (UW), 39.1% (NW), 19.5% (OW) and 9.7% (O), respectively. The corresponding distribution of BPE scores (3 / 4) was 53.8% / 15.4% for UW, 18.8% / 62.5% for NW, 25% / 37.5% for OW and 25% / 50% for O. Overall, there was no significant association between BMI and BPE scores (X^2 =7.77; p=0.254).

Conclusions: Within the limitations of the study,the current findings show thatthe individual participants present with varying BMI and BPE status as well as periodontal treatment needs. Further study with a large sample size is warranted to clarify the association of BMI with periodontal conditions and relevant clinical implications.

S0109

The Associations between Psoriasis and Periodontitis

P. CHU[1,2], C. Wang[1], P. Chang[1], C. Liu[2], Y. Kuo[1], Y. Chen[1,2]

[1]National Taiwan University, [2]Naitional Taiwan University Hospital

Objectives: Psoriasis is a chronic, immunologically-mediated, inflammatory skin disease and numerous studies have identified tumor necrosis factor-α (TNF-α), interleukin-17 (IL-17), and interleukin 12 / 23 (IL12 / 23) as particularly major mediators governing the inflammatory cascade in psoriasis. Periodontitis is a bacteria-caused chronic inflammatory disease. The disease severity is the result of the interactions between pathogens and the host. Activation of monocytes by stimulated T lymphocytes initiates the production of large amounts of inflammatory mediators, such as TNF-α and interleukin 1β (IL-1β), which further stimulate the release of mediators, including MMPs, eventually resulting in soft and hard periodontal tissue destruction. In our clinic, we found most psoriasis patients complained of gum swelling and tooth loss. The aim of this study is to explore the possible associations of the clinical periodontal status and psoriasis severity in psoriasis patients.

Methods: 34 psoriasis patients referred from the outpatient clinic of Department of Dermatology in National Taiwan University Hospital and 32 healthy controls were recruited in this study. Periodontal parameters including probing depth, recession, plaque index, gingival index and teeth number were recorded by a periodontist. 0.5ml saliva was collected at the same time for analysis of inflammatory cytokines, including TNF-α, IL1, IL-17, IL12 and IFN-γ. The severity of psoriasis was assessed by Psoriasis Area Severity Index (PASI) and Body Surface Area (BSA).

Results: Patients with psoriasis seemed to have more severe periodontal destructions and less remaining teeth, compared with those in the control subjects. We observed a positive correlation between clinical attachment level (CAL) and BSA involvement or PASI score (p=0.049, p=0.075, respectively). The number of remaining teeth was negatively correlated with BSA involvement (p=0.016). Nevertheless, saliva inflammatory cytokines were not associated with BSA involvement or PASI score in psoriasis patients.

Conclusions: The involvement and severity of psoriasis seemed to associate with the extent of periodontal destruction, suggesting a possible association between psoriasis and periodontitis. Further studies are warranted to clarify the mechanism.

S0111

Chronic Apical Periodontitis Accelerates Inflammatory Response in Hyperlipidemic Rats

S. Chen[1], S. Jiang[1], D. Ma[1,2], S. Xiao[1,3], P. Li[1], X. Huang[1]

[1]School and Hospital of Stomatology, Fujian Medical University, and Stomatological Key Laboratory of Fujian College and University, [2]Department of Stomatology, Xiamen Children's Hospital, [3]Department of Endodontics, Xiamen Stomatological Hospital,

Objectives: This study aimed to investigate the effects of chronic apical periodontitis (CAP) on inflammatory immune responses and development of atherosclerosis in rats with hyperlipidemia.

Methods: Thirty-two male Sprague-Dawley (SD) rats were randomly divided into four groups (n=8). The control group (ND) was fed with regular diet. The ND+CAP group was treated with normal diet and CAP. The HFD group was supplied with high-fat diet. HFD+CAP group was given high-fat diet and CAP. The inflammatory responses of aorta were observed histologically using haematoxylin and sudan IV staining. The mRNA expressions of MCP-1, TLR2, TLR4, NF-κB p65 in aorta at 24th week were measured by quantitative Real-time PCR. Serum IL-2, IL-6, IL-10 and CRP were detected by Elisa.

Results: The ND and ND + CAP groups did not undergo evident aortic pathological damages, while foam cells appeared in the other two groups. Serum IL-6 and IL-2 levels were significantly elevated by individual high-fat diet or CAP stimulation (P<0.05). Real-time PCR showed that TLR-2, TLR-4 and MCP-1 were highly expressed in the two HFD groups (P<0.05). Western blotting showed that NF-κB p65 was expressed more highly in the three experimental groups than that in the ND group (P<0.01).

Conclusions: CAP induced the high expressions of inflammatory factors and mediated inflammatory response. Although CAP elevated the blood lipid level less significantly than high-fat diet did, but it may promote atherosclerosis.

S0112

Effects of Platelet-Rich Plasma on Human Gingival Fibroblast Behaviors

P. A. Nguyen[1], T. A. Pham[2]

[1]University of Medicine and Pharmacy in Ho Chi Minh city, [2]University of Medicine and Pharmacy in Ho Chi Minh city

Objectives: This study focused on the fabrication of platelet-rich plasma (PRP) and evaluated its influences on human gingival fibroblasts' (hGFs) behaviors, including their proliferation and migration.

Methods: PRP was prepared from human peripheral blood of a healthy volunteer and diluted into concentrations of 1%, 2% and 5%. hGFs' proliferation was determined by using cell-number counting with hemocytometer method at day 1, 3, 5 and 7. The migration of hGFs was evaluated with scratch wound healing (SWH) assay, then recorded digital images were analysed by Image-Analysis J 1.51j8 software to compare the remaining artificial wound areas between groups at 0, 24 and 48h.

Results: hGFs that were cultivated in medium with 1%, 2% and 5% PRP were all able to proliferate and migrate. Cell number incubated with 1% PRP increased statistically during first 3 days and peaked at day 5, which has the similar tendency to the proliferation of hGFs in complete medium. At concentration of 2% and 5% PRP, hGFs outgrew and peaked at day 3 which was faster than those in group 1% PRP. Especially in group 5% PRP cells proliferated with significantly higher cell number than those in other groups at day 3. SWH assay showed that hGFs in group 2% and 5% PRP filled almost the artificial scratch and significantly migrated more effectively than group 1% PRP at 24h. The difference between group 2% and 5% PRP with group 1% PRP remained until 48h although no statistical significance was found.

Conclusions: Medium with different concentrations of PRP has distinctive influence on hGFs' behaviors including proliferation and migration. In this study, because of its fast and effective impact on cell's proliferation and migration, perhaps the medium with 5% PRP is the dominant option using to promote hGF's abilities in wound healing.

S0113

Effects of Erythrosine+Nano-Tianium Dioxide-Mediated Photodynamic Therapy On HGF-1 Cells

J. Anantawan[1], T. Damrongrungruang[2], A. Teerakapong[1]

[1]Faculty of Dentistry, Khonkaen University, [2]Faculty of Dentistry, Khon Kaen University

Objectives: To study the effects of erythrosine+Nano-TiO_2 as a photosensitizer on viability and morphology of normal human gingival fibroblast (HGF-1) cells.

Methods: Eleven test groups were studied, namely, Erythrosine (Ery) at 0, 55μM, 110μM, 220μM, 440μM in the presence and or absence of 1% nano TiO_2 + blue light, Nano-TiO_2 alone, and control groups (+ve control=DMEM, -ve control=H_2O_2). Normal human gingival fibroblast (ATCC CRL-2014, HGF-1) were cultured in 96-well plate standard condition (37°C, 5% CO_2, 95 percent humidity, 24hrs) Subsequently, a photosensitizer was applied to experimental groups for 15min. Test groups were irradiated with LED-dental curing-light (BA Optima 10, 420-480nm, 15 J / cm^2) for 1 min,at 1, 6 or 24 hrs, cell viability assays then were performed using PrestoBlue (Invitrogen, Life Technologies GmbH, Darmstadt Germany) and analysis of absorbance were accomplished byVarioskan™ at excitation / emission wavelength 560 / 620nm. Cell morphology of all groups was investigated by SEM (S3000N, Hitashi, Japan).

Results: HGF-1 cell viability were not statistical significance different among all groups at all time point by ANOVA and post hoc test. Minor morphology change were observed between test and control groups by SEM.

Conclusions: Erythrosine with nano-titanium dioxide, a novel PDT photosensitizer, in the range of the present study exerted no toxicity on HGF-1 cell.

S0114

Patients' Satisfaction Assessment of Centro Escolar University's Removable Complete-Denture Rehabilitation

L. N. Sadural[1], P. Lim[2], S. M. Ibarra[1], N. T. Veloso[1], M. B. Gamez[1]

[1]Centro Escolar University-Manila, [2]Centro Escolar University-Manila

Objectives: "Satisfaction" is the ultimate goal of every dental clinician after restoration of completely edentulous mouth of their patient.The study assessed Patients' Satisfaction on removable complete-dentures made by the dental clinicians of Centro Escolar University: its implications on the Success of Complete-Denture Rehabilitation of Prosthodontic Department.

Methods: Descriptive method was used and purposive sampling technique was employed to determine the respondents.Triangulation method was utilized to gather data specifically questionnaire, interview and observation plus documentary analysis.Statistical tools used were percentage, mean, standard deviation, T-test and ANOVA.

Results: Majority of 150 respondents were female (76.66%), aged 51-60 (37.33%),1-5 years of complete edentulism (46.67%), its their second time to have complete denture (38%). Function of Mastication-Retention were rated "Fully Satisfied" (overall mean of 3.60 out of 4.00); Stability were rated "Fully Satisfied" (3.63); Support were rated "Fully Satisfied" (3.66), regarding Esthetics were rated "Fully Satisfied" (3.68), Phonetics were rated "Fully Satisfied" (3.68), also Comfort were rated "Fully Satisfied" (3.74) and Over-all Patient Satisfaction were rated "Fully Satisfied" (3.66). There were no significant differences on the perception of respondents when grouped according to Gender and Number of years of complete edentulism (p=>0.05). Respondents' suggestions were to have a "Recall" procedure after a week / two after final denture delivery,more meticulous checking of procedures lessen the long queue of clinicians who wants to work inside the clinical infirmary,speed up the procedures by lessenning the number of chairside appointments,modernization of facilities and procurement of more modules plus tranfering of ProsthodonticDepartment on the ground floor rather than on 4th floor.

Conclusions: Patient / Respondents were "Fully Satisfied" on the Removable Complete-Denture Rehabilitation of Centro Escolar University's Prosthodontic Department yet it still needs further improvement and enhancement to meet the ultimate success in the restoration of completely edentulous mouth of patient by its dental clinicians.

S0115

Objective Maintenance Method for Maintaining Permanent Function in Patients with Partial Denture Wearing

H. Akiyama, M. Sakamoto

The Nippon Dental University Hospital

Objectives: The purpose of this study was to measure retentive force of various maintenance devices of partial denture by oral cavity management using simple maintenance force measuring device which can easily measure on chair side developed.

Methods: The way of producing simplified maintenance force measuring device was as follows: after applying coating treatment on a point of band removing pliers without a tip, we attached a strain gauge, and then welded the gauge terminal to the handle.

We vertically placed the point with a strain gauge of the simplified maintenance force measuring device to the retaining tooth occlusal surface which is the lower part of the retentive arm in the undercut area of maintenance device attached to the retaining teeth so that we can measure the strain force at the time of withdrawal by closing the handle part.

We calculated the retentive force of the maintenance device using a small digital display (Kyowa Electronic Instruments Co., Ltd. WDS-190AS1) as a conditioner for the sensor.

We measured Periotest values (PT values) of a retaining tooth in the 3 patients who had partial denture by using Periotest M (the Tokyo dental industry), and we also measured the retentive force (RF values) of the maintenance device on a continuous basis using the present measurement device.

Results: We regularly measured the values of PT and RF in patients wearing partial denture from the time when they started wearing it.

When the RF values was statistically significantly decreased, the retentive force was appropriately adjusted so that the RF values would be the same as at the beginning of wearing the denture.

There was no statistically significant change in the PT values when the RF value was significantly decreased.

Conclusions: We made it possible to adjust retentive force of partial denture using objective numerical values.

It was found that good long-term course can be obtained by oral cavity management using RF value and PT value for partial denture wearing patient.

S0116

Fracture Resistance of Restorations in Endodontically-Treated Teeth Caused from Abfraction

S. Sakkayakornmongkol, P. Salimee
Chulalongkorn University

Objectives: The purpose of this study was to evaluate the fracture resistance of different restoration types in endodontically treated teeth with simulated abfraction lesions.

Methods: Thirty-two extracted maxillary first premolars were prepared abfraction lesions on their bucco-cervical surfaces, subsequently restored with resin composite, and endodontically treated. The teeth were randomly divided into 4 groups for different restorations (n=8); resin composite filling in access opening (RF), fiber post with resin composite filling (P / RF), zirconium crown (ZC), and fiber post with zirconium crown (P / ZC). The teeth were placed into acrylic resin blocks with simulated PDL. The specimens were subjected to compressive loading at central fossae, 30° to long axis of the teeth until failure. Two-way ANOVA and Tukey tests were used to analyzed the data (α=0.05).

Results: The results showed that crown groups (ZC and P / ZC) had significantly higher fracture resistance than non-crown groups (RF and P / RF) ($p<0.05$). There was no difference of the fracture resistance in fiber post groups ($p>0.05$). Additionally, there was no interaction between crowns and posts ($p>0.05$).

Conclusions: This study concluded that zirconium crowns significantly increased the fracture resistance in endodontically treated premolars with simulated abfraction lesions. The fiber posts did not affect the fracture resistance, however, the present of post might help to retain the crown to the root which could prevent sudden crown lost.

S0117

Microorganism Anti-Adhesive Efficiency of Sericin Pem Films Coated Titanium Discs

T. Angwarawong[3,2], N. Kaewwichian[1], P. Phukrongthaw[1], O. Angwaravong[4]

[1]Faculty of Dentistry, Khon Kaen University, Khon Kaen,Thailand, [2]Research group of chronic inflammatory oral diseases and systemic disease associated with oral health, Faculty of dentistry, Khon Kaen University, Khon Kaen, Thailand, [3]Faculty of Dentistry, Khon Kaen University, Khon Kaen, Thailand, [4]Faculty of Dentistry, Khon Kaen University, Khon Kaen, Thailand

Objectives: Infection is a complication in dental implant surgery patients. Having biocompatibility, titanium can cause bacterial adhesion and biofilm formation. Biofilm is initial pathogenesis of infection in the area between implant and tissue. Currently, there are many studies on improving titanium properties on anti-microbial activity. Polyelectrolyte multilayer, or PEM, films are one of the technique used to improve titanium surface properties. It has been reported that sericin can promote osseointegration and anti-microbial activities. The aim of this study is to evaluate the inhibitory effect of sericin PEM films coated on titanium on adhesion of *Staphylococcus aureus* and *Candida albicans*.

Methods: The commercially pure titanium grade II (15mm diameter, 3mm thick) were prepared and coated with sericin at concentration of 0.1, 0.5, 1, 5, and 10%w / v by PEM technique. The adhesion of *Candida albicans* and *Staphylococcus aureus* was evaluated by adhesion assay, and cell adhesion morphology was examined by scanning electron microscope (SEM) analysis.

Results: The percentage of *Candida albicans* adhesion on titanium coated with sericin PEM films at concentration of 0.1 (46.74±11.94), 0.5 (56.09±12.75), 1 (51.61±17.92), 5 (47.92±17.95), and 10%w / v (47.64±9.59) were significantly less than those uncoated titanium surface (100.00±00.00). Although the percentage of *Staphylococcus aureus* adhesion on titanium coated with sericin PEM films at concentration of 0.1 (66.05±14.55), 0.5 (90.56±13.55), 1 (88.96±10.64), 5 (80.91±13.67), and 10%w / v (66.52±21.58) were less than the uncoated titanium (100.00±00.00), no statistically significant difference was observed. The result from SEM analysis was corresponded to the adhesion assay.

Conclusions: The titanium coated with sericin at concentration of 0.1, 0.5, 1, 5, and 10%w / v by PEM films technique are effective against of *Candida albicans* adhesion. Moreover, coating dental implant with sericin by PEM films technique can be alternative way to reduce infectious complication in dental implant surgery patients.

S0118

Masticatory Performance with Magnet Retained Mandibular Two Implant Overdentures

Y. Komagamine[1], M. Kanazawa[1], A. Miyayasu[1], V. L. Thuy[1], Y. Omura[1], D. Sato[2,3], S. Kasugai[2], S. Minakuchi[1]

[1]Tokyo Medical and Dental University, [2]Tokyo Medical and Dental University, [3]Showa University

Objectives: The aim of this three-year study was to compare masticatory performance between immediate and conventional loading mandibular two-implant overdentures retained by magnetic attachments.

Methods: The study design was a randomized controlled clinical trial. Nineteen mandibular edentulous patients were randomly allocated into two groups: immediate loading or conventional loading group. Each patient received two implants with magnetic attachments. The immediate loading group were loaded on the same day as implant surgery while the conventional loading group were loaded on three months after implant surgery. Masticatory performance was evaluated using two types of methods. A color-changeable chewing gum was used to evaluate mixing ability and a test gummy jelly was used to evaluate comminution ability. Masticatory performance was recorded at baseline and 1, 3, 6, 12, 24, 36 months after implant surgery. The difference in both of mixing ability and comminution ability between before and after implantation was compared by Wilcoxon signed-rank test. Also, the difference between baseline scores and each time of assessment score for the immediate loading and conventional loading groups were compared using the Mann-Whitney U test.

Results: The data from each of seven patients in the immediate loading and the conventional loading group were analyzed. Comminution ability of the immediate loading group showed significantly better than the conventional loading group at 12 months after implant surgery whereas there was no significant difference in mixing ability between the two groups at any time of assessment. Moreover, each of the group showed significant improvement in mixing ability and comminution ability for three years after implant surgery.

Conclusions: There was hardly significant difference in masticatory performance between immediate and conventional loading mandibular two-implant overdentures retained by magnetic attachments. However, each of the mandibular two-implant overdentures with magnetic attachments showed significant improvement in masticatory performance when compared to complete denture.

S0119

Evaluation of Two Anthropometric Measures in Patients Seeking Removable Dentures

H. Myint

University of Dental Medicine, Mandalay

Objectives: Measurement of jaw relations is an important part of the treatment plan for patients requesting complete dentures. Divine Ratio Proportion (DRP) is introduced in dentistry by Ricketts in 1982. DRP as being equivalent to 1.618:1 has been used anthropometric measures in some prosthodontic studies. Present study aimed to comparatively evaluate two methods to determine the DRP of patients seeking removable denture appliances attending University of Dental Medicine, Mandalay, Myanmar.

Methods: The study included 47 patients (patient who has abnormal facial profile are excluded and all patients who are edentulous are included in study). This study compared divine ratio proportion method for determining rest vertical dimension to conventional methods (swallowing method and lip moistening method) for measuring rest vertical dimension. DRP was obtained with the aid of the “Golden Mean Caliper.” The Paired t Test was used to evaluate the statistical significance between two groups.

Results: Result for DRP is 4.18 and 7.62 for conventional method. There was no significant difference between DRP method and conventional methods (swallowing method and lip moistening method) (P=0.628).

Conclusions: DRP method provides comparable anthropometric measures to that of conventional method in 47patients seeking removable dentures. A larger sample size will provide a better understanding of comparative methods.

S0121

Effect of Iloprost in Wound Healing in Dental Pulp Under Hypoxia

C. N. Limjeerajarus[1], S. Seang[2], P. Pavasant[3]

[1]Faculty of Dentistry, Chulalongkorn university, [2]Faculty of Dentistry, Chulalongkorn university, [3]Faculty of Dentistry, Chulalongkorn university

Objectives: Iloprost is the analogue of prostacyclin (PGI_2) and was used in clinical treatment related to vasculogenesis. The effect of iloprost in human dental pulp cells (HDPCs) to hypoxic conditions is not knowm. This study aimed to investigate the effect of iloprost on angiogenic, osteo / odontogenic and inflammatory gene expression in HDPCs in hypoxic condition in vitro.

Methods: HDPCs were subjected to normoxic and hypoxic (2% O_2) condition for 1 day. Hypoxic conditions was created in an airtight chamber de-oxygenated with the constant infusion with humidified gas mixtures (n=3). The RNA samples were extracted and cDNA was synthesized. The qPCR analysis was performed. The scratch test assay was performed on HDPCs at 0, 24 and 72h to determine wound healing effect of iloprost. The ANOVA statistics was performed at $p<0.05$.

Results: From this study, iloprost up-regulated VEGF expression in normoxia, but did not further up-regulated VEGF in hypoxic condition of HDPCs at 24 hours. The increase of VEGF was down-regulated by the treatment of iloprost. Hypoxia up-regulated BSP and was further up-regulated by iloprost. DMP-1 was down-regulated in hypoxia, while iloprost treatment up-regulated DMP-1 in hypoxia. Hypoxia up-regulated IL-6, but iloprost treatment decreased the effect of hypoxia on IL-6 expression. Iloprost enhanced the wound healing effect in scratch essay at 72h by significant decrease of the wound closure.

Conclusions: Angiogenic and osteo/odontogenic signaling during hypoxic condition play a key role in the formation of reparative dentin. Iloprost improved the dental pulp healing in hypoxic condition by increasing osteo/odontogenic markers and reduced inflammatory gene markers. Iloprost also increased the healing rate of wound healing in scratch essay. The treatment of iloprost might be another therapeutic alternative for patients with dental trauma.

S0122

Construction of Tooth Germ Cell Sheet Applying Magnetic Nanoparticles

W. Koto, Y. Shinohara, K. Kitamura, T. Wachi, S. Makihira, K. Koyano

Kyushu University

Objectives: Regenerating dental enamel still remains difficult due to its complicated developmental process. It has been reported that it is essential to control the reciprocal interaction between dental epithelial cells (DEC) and dental mesenchymal cells (DMC), as in the development of tooth germ. Therefore, we sought to control the cell arrangement by using magnetic nanoparticles (MNP). In this research, we combined the layers of DEC and DMC to construct a combination cell sheet (DEC / DMC sheet) using the magnetic tissue engineering system (Mag-TE) and investigated the expressions of dental specific markers in the cell sheet.

Methods: DEC and DMC were isolated from third molar tooth bud of 6-month-old porcine lower jaw. The DEC / DMC sheet was constructed using the Mag-TE in one dish. The expressions of the differentiation markers and basement membrane markers including amelogenin, enamelin, ameloblastin, RUNX2, collagen type I alpha 2 (COL1α2), dentin sialophosphoprotein, and collagen type IV alpha 1 (COL4α1) in the DEC / DMC sheet were examined by real-time RT-PCR and immunofluorescent staining. Mixtures of a DEC sheet and a DMC sheet made in different dishes, respectively, were used as the controls (Student t-test, $p<0.05$).

Results: The mRNA expressions of amelogenin, enamelin, ameloblastin, RUNX2, and COL4α1 in the DEC / DMC sheet increased as compared with those in the control ($p<0.05$). Immunostaining showed COL4α1 expressed at the border region between the DEC and DMC layers in the DEC/DMC sheet.

Conclusions: *In vitro* studies revealed that the epithelial-mesenchymal intereaction between DEC and DMC enhanced by magnetic force to bind DEC and DMC. It suggests that the microenvironment in the DEC / DMC sheet might be similar to that in the developmental stage of a tooth bud. Therefore, DEC / DMC sheets constructed using a Mag-TE could be developed into a ideal graft for artificially regenerating dental enamel.

S0123

Collagenase and Simvastatin Containing Biphasic Biomaterial for Vital Pulp Therapy

Y. CHANG[1,2], C. Lin[1,2]

[1]Graduate Institute of Clinical Dentistry, School of Dentistry, National Taiwan University,

[2]National Taiwan University Hospital, National Taiwan University

Objectives: The aim was to develop a novel calcium phosphate/calcium sulfate (CPC-CSH) biphasic biomaterial with hyaluronic acid (HA) containing collagenase and simvastatin for vital pulp therapy (VPT).

Methods: Combination of HA with different ratios of CPC-CSH biphasic cements carrying collagenase and simvastatin was tested for setting time, degradation, and drug releasing ability. The hydration products and crystalline phases of the materials were characterized using scanning electron microscopy and energy-dispersive X-ray spectroscopy (SEM-EDS) analysis. In vitro biocompatibility was tested with human dental pulp stem cells (hDPSCs). Moreover, in vivo evaluation was done using a dog animal model by micro-CT evaluation and histological analysis.

Results: The results showed that the developed CPC-CSH cement, which contains 30wt% CSH, exhibited apparent porosity, acceptable handling properties, and setting time for clinical use. The CPC-CSH cement showed a pronounced ability to form amorphous calcium phosphate (ACP) and dicalcium phosphate dehydrate (DCPD) crystals on the surface (SEM-EDS examinations). Results of alarmar blue and LDH revealed that hDPSCs treated with CPC-CSH cement containing collagenase and simvastatin was highly biocompatible. Animal study presented this CPC-CSH biphasic cement could induce calcified tissue with limited pulp irritation.

Conclusions: The results suggest that the CPC-CSH biphasic cement can be used for local delivery of collagenase and simvastatin and exhibits great potential for application in VPT.

S0124

Effect of Cigarretes Types and Smoking Degree on Salivary Acidity

L. Hendarmin

Faculty of Medicine and Health Sciences, UIN Syarif Hidayatullah Jakarta

Objectives: To observe the effect of cigarretes types and degree of smoking by Brinkmann Index on salivary acidity.

Methods: This research is comprised of 110 male participants divided into 78 smokers and 32 non-smokers, as a control group. The smokers group consists of two types, *kretek* (n=31) and non-*kretek* (n=47) cigarettes users. Based on degree of smoking by Brinkmann Index, they were devided into mild-moderate (n=58) and heavy (n=20) smokers. All participants completed an oral health questionnaire and were clinically examined by a dentist. Data on gingival, debris, calculus, and oral hygiene index, as well as salivary flow rate were recorded. Unstimulated saliva were collected, then measured it's acidity level using universal pH indicator.

Results: In this study, we detected that salivary pH of *kretek* smokers was significantly lower compared to non-*kretek* ones (HR=4.58; 95% CI:1.5-13.962; p=0.04). Moreover, *kretek* smokers with heavy degree of smoking significantly had more acid saliva compared to *kretek* smokers with mild-moderate degree of smoking (HR=4.0; 95% CI: 1.05-15.18; p=0.019). Amongst 3 groups of participants; non-smokers, *kretek*, and non-*kretek* smokers; we found that a tendency of *kretek* smokers to have more acidic saliva in comparison with non-smokers and non-*kretek* smokers (JTtest; p=0.025). Related to smoking degree by Brinkmann Index, heavy smokers have lower salivary pH than mild-moderate smokers and non-smokers (JTtest, P<0.005). Multivariate analysis shows that types of cigarettes has more effect to salivary acidity compare to smoking degree of smokers (OR=4.348; 95% CI:1.393-13.571; p=0.01).

Conclusions: Both, type of cigarettes and smoking degree of smokers, proved effecting salivary acidity. However, type of cigarettes plays more roles in decreasing salivary pH. Therefore, smokers should concern what type of cigarettes that they use. Using *kretek* cigarettes significantly lowering salivary pH thus can lead to oral alteration.

S0125

Evaluation Of Salivary Melatonin In Preschool Children With Dental Caries

O. Angwaravong[1], P. Chaiyarit[3,4], P. Pathomthongtaweechai[4], R. Ratanapitak[4], P. Paopramote[4], T. Angwarawong[2,4]

[1]Faculty of Dentistry, Khon Kaen University, Khon Kaen 40002, Thailand, [2]Faculty of Dentistry, Khon Kean University, Thailand, [3]Faculty of Dentistry, Khon Kaen University, Khon Kaen 40002, Thailand, [4]Research group of Chronic Inflammatory Oral Diseases and Systemic Diseases Associated with Oral Health, Khon Kaen University, Khon Kaen 40002, Thailand

Objectives: The information on salivary melatonin in association with dental caries status is very limited. No prior studies have investigated salivary melatonin levels in children with deciduous dentition. The objectives of this study were to assess melatonin concentrations in saliva in children with high and low caries risk of deciduous dentition, and to determine the correlations between salivary melatonin and clinical parameters of dental caries status.

Methods: Saliva samples were collected from preschool children with deciduous teeth (ages 4-6 years). The group was divided into two categories: high caries risk and low caries risk. The high caries risk had a total of 34 students and low caries risk had a total of 31 students. Salivary total protein concentrations (mg / ml) were measured by Bradford protein assay. Salivary melatonin concentrations (pg/ml) were measured by the competitive enzyme-linked immunosorbent assay (ELISA). Normalized salivary melatonin concentrations (pg / mg) between high and low caries risk groups were compared using Mann-Whitney U test.

Results: Normalized salivary melatonin concentrations in 4-6 year-old children of high caries risk group and low caries risk group were 2007.60±1675.75 pg / mg and 2510.84±2033.84 pg / mg respectively. There were no statistically significant differences in the levels of salivary melatonin between the high and low caries-risk groups of the preschool children (Z=-1.077, p=0.281). No significant correlations were demonstrated between salivary melatonin levels and dental caries status in the preschool children.

Conclusions: Our findings on salivary melatonin concentrations in children with deciduous dentition imply that salivary melatonin may not be associated with dental caries in deciduous dentition. Further investigations are needed to evaluate the association between salivary melatonin and dental caries in other dentitions.

S0126

cAMP Signaling Up-Regulates Odonto / Osteogenic Differentiation of Apical Papilla-Derived Stem Cells

J. Zhang[1], C. Zhang[3], C. Chu[2]

[1]faculty of dentistry, [2]the university of Hong Kong, [3]faculty of dentistry

Objectives: This study aims to investigate the underlining interplay of cyclic adenosine monophosphate (cAMP) and transforming growth factor-β1 (TGF-β1) on the odonto / osteogenic differentiation of apical papilla-derived stem cells (SCAPs).

Methods: SCAPs were isolated from human immature third molars. Forskolin was used to activate and H89 was used to inhibit cAMP signaling in SCAPs. The protein levels of TGF-β1 signaling downstream molecule (Smad3) and phosphorylation of Smad3 (p-Smad3) were assayed by western blot analysis. Smad3 inhibitor (SIS3) was used to inhibit the effect of TGF-β1 signaling on the odonto / osteogenic differentiation in SCAPs. The amount of calcium mineral deposition was detected by Alizarin red staining. Additionally, quantitative real-time polymerase chain reaction (RT-PCR) were taken to evaluate cAMP signaling on TGF-β1-mediated odonto/osteogenic differentiation potential of SCAPs.

Results: Protein expression of p-Smad3 decreased in SCAPs stimulated by the Forskolin (Figure 1A); while H89 increased the level of p-Smad3 (Figure 1B). Alizarin red staining showed that TGF-β1 antagonized the up-regulated effect of Forskolin. Blocking TGF-β1 signaling with SIS3 enhanced the mineralized nodule formation of SCAPs (Figure 2). RT-PCR found that in the presence of TGF-β1, SCAPs with Forskolin displayed markedly down-regulation in the expression of odonto / osteogenic marker compared to Forskolin treated only (Forskolin with TGF-β1:0.552±0.243, Forskolin: 1.439±0.105; $p<0.004$). Besides, the expression of odonto / osteogenic marker of Forskolin with SIS3 and Forskolin were 1.874±0.161 and 1.439±0.105, respectively ($p=0.017$).

Conclusions: This study demonstrated cAMP signaling induced the odonto / osteogenic differentiation of SCAPs via inhibition of TGF-β1-Smad3 signaling. The cAMP signaling pathway could be a strategy target for dentine regeneration in clinical dentistry.

S0128

Study the Inhibitory Effect on the Migration of Sulforaphane on Oral Cancer Cells

C. Chen[1], C. Lin[2]

[1]School of Dentistry, Chung Shan Medical University, [2]Institute of Oral Sciences, Chung Shan Medical University

Objectives: Sulforaphane is a compound derived from cruciferous plants, like broccoli, cabbage and cauliflower etc. Recent studies have implicated that sulforaphane exerts antioxidative, anti-inflammatory, anti-angiogenesis and anticancer activities. However, the anticancer effects and related molecular mechanism of sulforaphane in human oral cancer cells have not been reported. Hence, we aim to clarify the molecular mechanism of sulforaphane in oral cancer.

Methods: In this study, we investigated the anti-metastasis effects of sulforaphane on both SCC-9 and SCC-14 oral cancer cells and examined the potential inhibitory mechanisms involved. In addition, to identify the molecular targets of sulforaphane, human proteinase array analysis was performed.

Results: Herein, we found that sulforaphane significantly inhibited the migratory and invasive abilities of both SCC-9 and SCC-14 oral cancer cells with 10μM. Human proteinase array data showed that cathepsin S was reduced after sulforaphane treatment. In addition, significant down-regulation of metastatic ability can be observed in oral cancer cells treated with cathepsin S siRNA and inhibitor of cathepsin S (Z-FL-COCHO). Sulforaphane also exerted an inhibitory effect on phosphorylation of extracellular signal–regulated kinases (ERKs) and p38 MAPK subfamily.

Conclusions: Taken together, our results suggested that sulforaphane may have potential as antitumor agents in human oral cancer.

S0129

Glabridin Induces Apoptosis in Human Oral Cancer Cells

J. Yang[1], S. Yang[2], C. Lin[3]

[1]Chung Shan Medical University Hospital, [2]Chung Shan Medical University, [3]Chung Shan Medical University

Objectives: Oral cancer is the fourth leading cause of cancer death and is associated with increasing morbidity and mortality rates in Taiwan. Glabridin, a flavonoid extracted from licorice, owns a variety of biological properties including anti-cancer activities. Glabridin exhibits anti-tumor functions in that it attenuates the proliferation, migration, invasion, and angiogenesis of human cancer cells. However, the effect of glabridin on oral cancer cells apoptosis and the underlying molecular mechanisms have not been elucidated yet.

Methods: SCC-9 and SAS cells were used to investigate the cell viabilities treated by glabridin through MTT assays. The expressions of apoptosis-related and MAPK pathway proteins have been determined using western blot analysis.

Results: The results showed that glabridin significantly inhibited cell proliferation in human oral cancer cell lines. Furthermore, glabridin induced apoptosis dose-dependently in SCC9 cells through caspases-3, -8, and -9 activations and PARP cleavage. Moreover, glabridin also increase phosphorylation of ERK1/2, p38 MAPK and JNK1 / 2 in dose-dependent manner. The inhibition of p38 MAPK and JNK1 / 2 by specific inhibitors significantly reduced the glabridin-induced activation of the caspase-3, -8 and -9.

Conclusions: Taken together, our findings suggest that glabridin induced SCC9 cell apoptosis through p38 MAPK and JNK1 / 2 pathways and could serve as a potential chemotherapeutic agent for the treatment of oral cancer.

S0130

Cytotoxicity of *Alstonia Scholaris* (L.) R. Br. Leaves Extract on Human Dental Pulp Cells

M. I. Rizal, I. CAHYANITA, F. Sandra
Faculty of Dentistry Trisakti University

Objectives: *Alstonia scholaris* (L.) R.Br. are known to have potential in medicine. Its leaves have been used traditionally as remedies in a wide spectrum of biological activities, including anti-inflammatory, analgesic anti-cancer and anti-bacteria. In dentistry, *A. scholaris* leaves extract has been investigated and suggested as a potential remedy for dental caries. However, to our knowledge the cytotoxity study of A. scholaris leaves extract on dental pulp has not been reported yet. Therefore current study was conducted to investigate the cytotoxicity of *A. Scholaris* leaves extract on dental pulp.

Methods: *A. Scholaris* leaves were collected, maserated and extracted with methanol. Meanwhile, human dental pulps were obtained from freshly extracted partial impacted third molar teeth. Pulps were digested with collagenase type I and cultured in DMEM supplemented with FBS and antibiotic-anti-mycotic agent. *A. scholaris* extract was applied to human dental pulp cell in various concentrations (5000, 1000, 500, 50, 10µg / mL) for 24 hours. MTT assay was performed to quantify viable human dental pulp cells.

Results: Although high concentration of *A. scholaris* extract was applied, mostly viable human dental pulp cells were observed. Meanwhile 0.001% H_2O_2 induced cytotoxicity of human dental pulp cells. The inhibition concentration $(IC)_{50}$ of *A. scholaris* extract was 6,345µg / mL. Interestingly, in comparison with untreated group, *A. scholaris* extract in low concentration could induce growth of human dental pulp cells.

Conclusions: Methanol leaves extract of *A. scholaris* did not induced cytotoxicity in human dental pulp cell. In contrary, the extract in low concentration might induce the growth of human dental pulp cells. Further research should be explored to confirm the growth induction activity of the extract.

S0158

Remineralization Effect of 1500ppm Fluoride Dentifrice Versus Additional Fluoride Tablets.

t. kanoknatheesawat, K. Pongsakornvanich, D. Somsirivatana

Chulalongkorn university

Objectives: To compare the remineralizing effect of fluoride tablets as an adjunct to 1000ppm fluoride dentifrice use and 1500ppm fluoride dentifrice alone on mineral density and depth of proximal artificial enamel caries in high caries risk patients.

Methods: This was a double blind cross over *in situ* study involving twelve healthy, high caries risk, post-orthodontic volunteers. Orthodontic brackets with enamel slabs with artificial enamel caries were fixed on the volunteers' first permanent maxillary molars. The study consisted of three experimental phases with a one week wash out period between each phase. The volunteers were randomly allocated into three fluoride (F^-) product regimens: (1) brushing with 1000ppmF^- dentifrice 2x day with 2 placebo tablets 2x day, (2) brushing with 1000ppmF^- dentifrice 2x day with 2 x 0.25mg fluoride tablets 2x day, and (3) brushing with 1500ppmF^- dentifrice 2x day with 2 placebo tablets 2x day, with a one week 1000ppmF^- toothpaste use washout period between each phase. Following each phase, the lesion mineral density and lesion depth of each specimen were analyzed by microcomputed tomography.

Results: The mean mineral density gain when brushing with 1500ppmF^- dentifrice was the highest compared with using fluoride tablets as an adjunct to 1000ppmF^-dentifrice or 1000ppmF^- dentifrice alone. Moreover, the use of 1500ppmF^- dentifrice showed a higher lesion depth gain compared with the other groups.

Conclusions: These data suggest that using a 1500ppmF^- dentifrice twice a day resulted in the highest remineralization of white spot lesions compared with 1000ppmF^- dentifrice or fluoride tablets as an adjunct to 1000ppmF^- dentifrice.

S0159

Perceived Level of Stress and Emotional Intelligence among Healthcare Students

G. Subramaniam, R. Abdul Kadir, R. AZIZI

Lincoln University College

Objectives: To determine the association between perceived stress (PS) and emotional intelligence (EI) between clinical dental and medical undergraduate students at Lincoln University College.

Methods: This is a cross-sectional study (ethical code: LUC Ethics / FDent / 002 / 2016) involving 154 medical and dental clinical students using a self-administrated questionnaire (validated and pre-tested earlier). Variables included socio-demography, perceived stress (PS), and emotional intelligence (EI). PS domains covered academic stressors (14 items), personal stressors (15 items), and clinical / practical related stressors (11 items). There were five domains on EI namely; self-awareness (7 items), self-regulation (4 items), motivation (3 items), empathy (5 items), and social skills (6 items). Descriptive analysis and tests of association were carried out using SPSS version 22.

Results: A total of 134 (87.0%) students completed the questionnaire. There were more female (77.6%) than male (22.4%) students with the mean age of 23.4 (±1.45) years old. There were more dentistry (52.2%) than medical (47.8%) students. The percentage mean score of PS and EI in both groups were 52.7% and 74.2%, respectively. Mann-Whitney test showed that dental students had significantly (p< 0.001) higher PS (Mean=80.4%) score compared to medical students (Mean=53.4%). However, there was no significant difference in the EI between dental and medical students. Spearman correlation showed no significant correlation between EI and PS.

Conclusions: Dental students are seen to have a higher level of stress compared to their medical counterparts without any significant difference in the level of EI.

S0160

Inhibiting Antimicrobial Activity of Propolis Fluoride in Biofilm Formation

L. J. Marpaung, S. A. Soekanto, A. A. Djais

Universitas Indonesia

Objectives: Silver Diamine Fluoride (SDF) is a liquid that has been proven to be an anti-caries agent. But it leaves a black stain on the surface of the teeth where it was applicated and it also have a metallic taste. Propolis Fluoride is one of the finding to replace SDF as an anti-caries agent without having the same side effect. The aim of this study is to evaluate the antimicrobial activity of Propolis Fluoride in inhibiting *S. mutans* and *E. faecalis* biofilm formation in comparison to SDF. There are three different variants of Propolis Fluoride concentration which are (3,3% Propolis Extract + 2,139% Fluoride), (6,3% Propolis Extract + 2,139% Fluoride), and (10% Propolis Extract + 2,139% Fluoride).

Methods: The suspension of *S. mutans* and *E. faecalis* were cultured, shed into 96-well plate then combined with Propolis Fluoride, incubated in anaerobic environment (20 hour), evaluated using *microplate reader* (570nm) to find the amount of the Optical Density (OD), and statistically analyzed (ANOVA, Tukey's, $p<0.05$).

Results: Propolis Fluoride (10% EP + 2.139% Fluoride) have the same effect in inhibiting biofilm formation of *S. mutans* and *E. faecalis* as SDF 38%. The ANOVA result for the Propolis Fluoride (10% EP + 2.139% Fluoride) is $P=0.08$.

Conclusions: Results from this study showed that Propolis Fluoride was comparable with SDF by inhibiting biofilm formation of *S. mutans* and *E. faecalis*.

S0161

Pomegranate Juice Extract Inhibits Periodontal Pathogens Biofilm in Vitro

O. P. Suhalim[2], D. Nandary[2], A. Vinnie[2], D. C. Radita[2], A. S. Widyarman[1]

1Faculty of Dentistry, Trisakti University, 2Trisakti University

Objectives: To examine the effects of pomegranate (*Punica granatum*) juice extract on the viability of monospecies and multispecies biofilm of *Porphyromonas gingivalis, Aggregatibacter actinomycetemcomitans* and *Treponema denticola* as periodontal pathogens in-vitro.

Methods: Biofilm assay performed using crystal violet. Pomegranate (Fig.1) juice taken as extract by using a juicer and diluted into different concentrations (12.5%, 25%, 50%, 100%). *P.gingivalis ATCC-33277, A.actinomycetemcomitans ATCC-33384* and *T.denticola ATCC-35405* cultured on BHI-broth, 48h, 37°C, anaerob condition. To form biofilm, each bacterium distributed into 96 well-plate ($1x10^7$CFU / mL) and incubated for 48-hours. Subsequently, fruit extract distributed into biofilm containing well-plates and incubated in three incubation periods (1,6,24-hours). BHI-broth used as negative-control and chlorhexidine gluconate (0.2%) used as positive-control. Biofilm mass measured using Microplate-Reader (490nm). Data analysed with one-way ANOVA test and the level of significant were set at $p<0.05$.

Results: Biofilm mass significantly decreased after treated with pomegranate juice in all concentration and all incubation time to monospesies and multispecies biofilm. Optical-density (OD) ±SD of negative control were 1.31±0.11, 1.01±0.17, 1,97±0,16, 1.32±0.12 for *P. gingivalis, A. actinomycetemcomitans, T. denticola* and biofilm multispecies respectively. The best concentration and incubation time to inhibit biofilm *P.gingivalis* at 100% concentration in 1 hour (OD 0.34±0.03), *A.actinomycetemcomitans* at 50% concentration in 1 hour (OD 0.22±0.01), *T.denticola* at 25% concentration in 1 hour (0,87±0,08) and biofilm multispecies at 50% concentration in 1 hour (0.09±0.02). One-way ANOVA test result showed significant difference ($p<0.05$) of biofilm decreasing in all concentration and incubation time.

Conclusions: Pomegranate juice extracts effectively inhibits biofilm monospecies and multispecies biofilm viability of *P. gingivalis, A. actinomycetemcomitans* and *Treponema denticola*. It may be used as alternative therapy in preventing periodontal disease. Further studies are still needed to explore this positive effect.

S0162

New Coating Method Prevents *Enterococcus Faecalis* Biofilms on Medical Devices

M. J. Phoa[2], K. Ho[2], D. Heng[1], Y. Soh[2], L. Wu[3], C. J. Seneviratne[2]

[1]NUS, [2]National University of Singapore, [3]Singapore Institute of Manufacturing Technology

Objectives: *Enterococcus faecalis* is a pathogenic bacterium strongly associated with biofilm-associated oral and systemic infections. Biofilm formation of *E. faecalis* is directly linked to the endodontic treatment failure. The present study examined the therapeutic efficacy of novel plasma activated functional group (PAFG) coatings on the *E. faecalis* biofilms formed on different medical surfaces that simulate clinical applications such as dentures, titanium implants and root canals of teeth.

Methods: *E. faecalis* biofilms were formed by a standard methodology. Medical surfaces used in the study were treated with an atmospheric plasma system under oxygen / argon plasma and PAFG groups were chemically absorbed to the surface using standard methodology. In brief, PAPAFG-COOH and PAFG-CN were coated on acrylic (PMMA) discs, titanium plates and inner surface of sectioned extracted teeth. Controls samples include surfaces that were untouched and surfaces coated with only plasma. Samples were then inoculated with two different strains i.e. laboratory strain *E. faecalis*, ATCC29212 and a clinical *E. faecalis* strain Ef63 with strong biofilm forming ability. Crystal violet (CV) assay was used to determine biofilm formation.

Results: PAFG-COOH (P=0.0280) and PAFG-CN(P=0.0306) coatings significantly reduce the strong biofilm forming *E. faecalis* strain *Ef63*. on PMMA discs. However, the effect on laboratory strain *E. faecalis* ATCC 29212 was not significant (P>0.05). PAFG-COOH (p=0.22) and PAFG-CN (p=0.13) coatings did not significantly reduce E. faecalis-biofilm63-strain) on titanium, although the values suggested a slight inhibitory effect. No visual differences observed among the control, PAFG-COOH and PAFG-CN coatings on extracted teeth.

Conclusions: The anti-biofilm properties of plasma activated functional groups coatings, PAFG-COOH and PAFG-CN depend on the type of material. The present study provides important data for future studies to develop material-specific functional group coatings to prevent bacterial biofilm formation.

S0163

In Vitro Antibacterial Effects of *Eugenia Caryophyllata* (Clove) Oil on Biofilm

s. azman[1], s. mohd nor[1], Z. Zainal Abidin[1], S. Mohd Said[2]

[1]Universiti Kebangsaan Malaysia, [2]Universiti Kebangsaan Malaysia

Objectives: To investigate the antibacterial effects of *Eugenia caryophyllata* (clove) essential oil on *P. gingivalis* and *A. actinomycetemcomitans* grown as single and mixed-species biofilm.

Methods: Clove oil was prepared in various concentrations to determine their minimum inhibitory concentrations (MIC). Anti-adhesion activities of clove oil were determined by co-incubation with the tested bacteria for 12, 24 and 48 hours. Biofilm disruption activities were determined by adding clove oil into preformed *P. gingivalis* and *A. actinomycetemcomitans* mixed-species biofilm. The effects of clove oil on the morphology of *P. gingivalis* and *A. actinomycetemcomitans* grown as biofilm were studied using scanning electron microscopy (SEM).

Results: The MIC were 2.5 and 0.16 mg / mL for *P. gingivalis* and *A. actinomycetemcomitans*, respectively. After 12h of exposure, clove oil showed anti-adhesion activities at concentrations 1.3-5.0 and 0.625-5.0 mg / mL on single species *A. actinomycetemcomitans* and *P. gingivalis* biofilm, respectively; 1.3-5 mg/mL for *A. actinomycetemcomitans* and 0.02-5.0mg / mL for *P. gingivalis* following 24h of exposure, 0.16-5.0mg / mL on *A. actinomycetemcomitans* and 0.3-5.0mg / mL for P. gingivalis following 48h of exposure. Clove oil showed biofilm disruption activity on mixed-species biofilm at concentrations 0.02-5.0mg / mL. SEM analyses, upon treatment with clove oil showed changes on *P. gingivalis* and *A. actinomycetemcomitans* cell surface, and visibly less abundant, with a number of them were disintegrated.

Conclusions: The clove oil showed antibacterial activities against the tested bacteria grown as both single- and mixed-species biofilm. Thus, clove oil has a potential as an anti-plaque agent in the prevention of polymicrobial biofilm-associated periodontal diseases.

S0164

Antibacterial Activity of Chitosan for Future Applications in Caries Prevention

T. Asvaplungprohm, R. Burachathirun, P. Kaewphanao, S. Muangsawad, O. Matangkasombut, P. Thanyasrisung

Chulalongkorn University

Objectives: To develop an anti-caries agent from chitosan, a plentiful natural product in Thailand, we investigate antibacterial activity against *Streptococcus mutans* and biocompatibility of locally produced chitosan.

Methods: Chitosan produced from shrimp shells in Thailand, oligomer (7-9kDa) and polymer (900-1,000kDa), was dissolved in 1% acetic acid and tested against log-phase planktonic cultures of *Streptococcus mutans* UA159. The maximum concentration of acetic acid with no effect on bacterial growth was determined and used as a negative control. Broth dilution assay was used to determine the minimum bactericidal concentration (MBC) of each chitosan against planktonic *S.mutans*. A time-kill assay was performed to examine the levels of antibacterial activity of chitosan at MBC after 1, 3, 5, 30, and 60 minutes of incubation. Furthermore, to assess its biocompatibility on human cells, the effects of chitosan on the viability of primary human gingival fibroblasts was examined by using MTT assay.

Results: The average MBC of chitosan oligomer against planktonic *S. mutans* UA159 was 0.938 mg / ml, while the polymer was only partially effective at the highest concentration tested (1.875 mg / ml). The time-kill assay showed that chitosan oligomer at the MBC was effective in killing 99% of *S. mutans* at only 3 minutes after incubation. Moreover, MTT assay demonstrated that chitosan oligomer at the MBC has no effect on the viability of human gingival fibroblasts.

Conclusions: Chitosan oligomer is effective in killing 99% of *S. mutans* within 3 minutes of incubation and has no toxicity to human gingival fibroblasts. These results suggest that chitosan oligomer is a promising naturally derived agent for caries prevention. Further research on the activity of chitosan against biofilm and in vivo studies are warranted.

S0165

Chitosan Oligomer as a Bactericidal Agent against *Streptococcus Mutans* Biofilm

T. SONGVEJKASEM[1], P. Prakoonsuksapan[1], N. Koedim[1], O. Matangkasombut[2], P. Thanyasrisung[3]

[1]Chulalongkorn University, [2]Chulalongkorn University, [3]Chulalongkorn University

Objectives: Dental biofilm is a major cause of dental caries and bacteria in biofilm are more resistant to many antimicrobial agents. With the goal to develop a novel anti-caries agent from chitosan, a natural product derived from crustacean shells, we aimed to determine the antibacterial activity of shrimp chitosan against *Streptococcus mutans* biofilm.

Methods: Two types of shrimp chitosans, oligomer (7-9kDa) and polymer (900-1,000kDa), were tested against mature biofilm of S. mutans UA159. Log phage culture of S. mutans (at 1% v / v) in brain-heart infusion broth supplemented with 5% sucrose was incubated for 24 hours for biofilm formation. Chitosan stock was dissolved at 30 mg / ml in 1% acetic acid. In subsequent experiments, chitosan solutions were used at the concentrations that keep acetic acid at the levels with no anti-bacterial activity (≤0.125%). We tested the effects on *S. mutans* biofilm of chitosan at 1x to 4x the Minimum Bactericidal Concentrations (MBC for planktonic *S. mutans* was 0.94 mg / ml for oligomer and 1.88 mg / ml for polymer). Crystal violet (CV) assay was performed to quantify biofilm mass. Furthermore, confocal fluorescence microscopic examination of biofilm stained with fluorescent dyes [4', 6-diamidino-2-phenylindole (DAPI) for live cells and Propidium iodide (PI) for dead cells] and the MTT [3- (4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide] assay were used to determine bacterial cell viability.

Results: The results from CV assay revealed that chitosan oligomer at 1 x MBC (0.94mg / ml) to 4xMBC (3.75mg / ml) reduced the amount of mature biofilm of *S. mutans* to a similar extent, but the highest concentration of polymer tested (3.75mg / ml) had no effect. Both confocal fluorescence microscopy and MTT assay showed that 1 x MBC of oligomer could kill most bacteria in the biofilm, whereas polymer showed only a partial bactericidal effect.

Conclusions: Chitosan oligomer could act as an effective bactericidal agent against mature biofilm of *Streptococcus mutans*.

S0166

Anti-Inflammatory Activity of Titanium Surface Immobilized with Antimicrobial Peptide

I. zhou[2,1]

[1]fujian medical university, [2]Affiliated Stomatology Hospital of Fujian Medical University.

Objectives: The inflammatory reaction around implant after implant placement is important not only for the osseointegration but also for the long-term implant survivals. In our study, GL13K, an antimicrobial peptide, was immobilized onto titanium surfaces to improve the property of anti-inflammatory.

Methods: The method of silanization was used to immobilize the GL13K, which was confirmed by X-ray photoelectron spectroscopy, scanning electron microscopy, atomic force microscopy, water contact angle measurement. DAPI fluorescence staining and CCK-8 were used to measure the cell adhesion and cell viability of the RAW 264.7. Cellular morphology, ELISA and qRT-PCR to measure the inflammatory activity of the modified titanium surfaces. The statistical analysis was carried out on different samples using one-way analysis of variance (ANOVA).

Results: The increasing in N and C elements after immobilization proved the successful modification of GL13K. After immobilized of GL13K, the Sa value increasing to 51.52nm from 27.14nm, the water contact angle increasing to 101 degree which is hydrophobicity. The number of the cell were almost the same on different surfaces at 6 h and the OD values were also almost the same on different surfaces at 12h, 24h, 36h, 48h and 72h, which indicate a good cytocompatibility. With or without the stimulating of LPS, the cell pseudopod was less on the GL13K-coated surfaces than on the control one, which means the RAW 264.7 was less activated. The secretion levels of pro-inflammatory cytokines IL-1β, TNF-α, IL-4 measured by the ELISA were down-regulated on 12 and 24 hours. The gene expression of pro-inflammatory cytokines IL-1βand TNF-αwas down-regulated, but the anti-inflammatory cytokines Arg-1 was up-regulated, which confirm a less pro-inflammatory activity.

Conclusions: All results indicate that the GL13K-coated titanium surfaces directed the inflammatory process towards a less pro-inflammatory, which may promoted the process of osseointegration.

S0167

Methylation Marker for Head and Neck Cancer by Bioinformatics Analysis

D. Papasratorn, C. Chinsomboon, T. Sutharoj, T. Jetsadarak, N. Kitkumthorn
Mahidol University

Objectives: Head and Neck cancer (H&N cancer) is one of lethal diseases which increases every year. Particular tissue and disease pathology show unique DNA methylation pattern. Nowadays, numerous methylation microarray data are available on the internet. Therefore, we aim to detect Head and Neck cancer by CpG site-specific methylation from these data.

Methods: Methylation microarray data (GPL8490) in term of H&N cancer were collected. Each series of experiments (GSE) contained samples (GSMs) of normal, precancerous and cancerous tissues. After accumulating data, all CpG sites were selected to calculate their mean of methylation levels by Connection Up- and Down-Regulation Expression Analysis of Microarrays (CU-DREAM) program and thereafter simplified to graphs with R program. Consequently, the CpG site with the highest difference in mean methylation level between normal and cancerous tissue was selected.

In validation step, eighteen tissue samples (nine normal mucosal tissues and nine H&N cancers) were prepared by manual microdissection for cell purification. Briefly, all samples were sliced into six mirror image sections. The first section was stained with H&E and visualized by microscope to confirm the diagnosis and to mark normal epithelial cells in normal tissue and cancerous cells in cancer tissue, respectively. The other sections were labeled with permanent marker and performed microdissection by needles. After DNA extraction and bisulfite modification, pyrosequencing was conducted for measuring methylation level at the selected CpG site.

Results: The cg01009664 at promoter of Thyrotropin Releasing Hormone (TRH) gene was selected. It showed maximum level of difference between normal and cancerous tissues by bioinformatics analysis. Pyrosequencing results showed 7±1.14 % in normal tissue, whereas displayed 58.44±5.68 % in cancer tissue.

Conclusions: The preliminary data showed cg01009664 of TRH might be a potential marker for H&N cancer detection. Larger sample size and other tissue types will be tested in the near future.

S0168

Effect of Transactional Analysis Intervention in Enhancing Undergraduates' Emotional Intelligence

H. y. Seow, M. H. Wu, M. Mohan, N. H. Mamat, H. E. Kutzsche, A. K. pau

International Medical Univeristy

Objectives: Emotional Intelligence (EI) is considered a critical component of healthcare practitioners' ability and job performance. The aim of this research was to compare EI scores of study participants at baseline, 4-week and 6-month follow-up after a psycho-educational training based on Transactional Analysis (TA). Participants' experience and impact of the training were also evaluated.

Methods: Four-weekly 90-minutes psycho-educational training sessions based on EI and TA were designed by two education psychologists. Thirty-four consented undergraduates at one Healthcare University were randomly divided into intervention and control group. The intervention participants were further divided into two groups, each facilitated by a psychologist with a standardized facilitation approach. All participants completed the Wong and Law Emotional Intelligence Scale at baseline, upon completion of the 4-week training and at 6-month follow-up. Paired T-test was carried out to test for differences in EI scores. After receiving training, intervention participants were interviewed in groups, and all interviews were audio-recorded, transcribed and analyzed using a Framework.

Results: The mean EI score at baseline was 72.9 (SD=14.0) for intervention and 82.4 (SD=7.7) for control group, whereas it was 88.5 (SD=11.3) and 86.5 (SD=8.6) respectively at 4-week follow-up. The mean EI score for intervention group at 6-months follow-up was 88.1 (SD=12.4). Paired samples test indicated that the mean difference between baseline and follow-up EI scores for the intervention group (15.6, SD=12.0, p=0.001) was higher than the control group (4.06, SD=5.7, p=0.10). Participants reported that they had improved in all four domains of EI through this training.

Conclusions: The results suggest that EI scores in undergraduates may be enhanced through a psycho-educational training designed from EI and TA, substantiating previously reported findings. The qualitative study suggest that the intervention was acceptable and provided the participants with a positive experience.

S0169

Economic Inequalities in Elderly Oral Health-Related Quality of Life: A Pilot Study

M. Yon, J. Tsoi
The University of Hong Kong

Objectives: To seek and investigate the relationship between oral health-related quality of life (OHRQoL) of the elderly population as measured by the OHIP-14 survey of different countries with respect to dental personnel density and Gross Domestic Product per capita purchasing power parity (GDP-PPP).

Methods: The study was conducted using two electronic databases (PubMed and Google Scholar). Only studies presenting data regarding OHRQoL of the elderly population measured with validated OHIP-14 survey were included. Those studies without a clear indication of age sampling method or OHIP-14 calculations were excluded. Information on the dental personnel data was extracted from the World Health Organization database, whereas GDP-PPP data was access through the World Bank website.

Results: Twelve papers that were found to fit the criteria were included in the analysis. Within the included countries, OHIP-14 scores of the elderly population demonstrated a decreasing trend with an increasing GDP-PPP. Moreover, a correlation could be established between the number of dental personnel and GDP-PPP of the corresponding years (log-log plot, R^2=0.754). A decreasing trend of OHIP-14 scores was observed for an increasing density of dental personnel but they are weakly correlated (R^2=0.390).

Conclusions: Elderly's OHRQoL may be dependent on the economic performance of a country, and generally improves with increasing GDP-PPP. Countries with better economic performance tend to have a higher dental personnel-to-population ratio. More in-depth investigations are required to elucidate such relationships as per population characteristics, type of dental personnel, types of dental services available, public health expenditure and income disparity.

S0170

Chitosan Extracted from Giant-River Prawn Shell Effect on *Streptococcus-Sanguinis* Adhesion

S. Irna[1], Y. Hanifia[1], A. L. Jonarta[2], T. Haniastuti[2]

[1]Universitas Gadjah Mada, [2]Universitas Gadjah Mada

Objectives: *Streptococcus sanguinis* plays a crucial role in pathogenesis of recurrent aphthous stomatitis. The adhesion of the bacteria to buccal epithelial cells is the initial step in the pathogenesis of the disease. Giant river prawn shell contains chitin which can be processed into chitosan. Chitosan has antiadhesion properties through its positively charged polymer chains. The aim of this study was to determine the effect of chitosan extracted from giant river prawn shell on the adhesion of *S. sanguinis* ATCC 10556 to polystyrene plastic surface and human buccal epithelial cells.

Methods: Various concentrations of giant river prawn shell chitosan (0.05%, 0.1%, 0.2%, and 0.4%) were used for both tests. The adhesion of *S. sanguinis* ATCC 10556 to the plastic surface was examined using 96-wells microplate. After the bacteria (1.5×10^8 cells) were incubated with the chitosan for 24 hours, the bacteria were stained with 1% crystal violet. Inhibition percentage of the bacteria was calculated based on optical density (λ=540nm). *S. sanguinis* ATCC 10556 adhesion to buccal epithelial cells was evaluated by adding the chitosan into microtubes containing *S. sanguinis* and buccal epithelial cells suspension. Adhesion index was then counted under a fluorescent microscope.

Results: Results showed that the inhibition percentage of the bacteria was increased, while the adhesion index of the bacteria was decreased in all chitosan concentration. The higher concentration of chitosan had the greater effectivity in inhibiting *S. sanguinis* adhesion. One-way ANOVA showed significant differences among groups ($p<0.05$), indicating that chitosan affected *S. sanguinis* adhesion ability. LSD test showed significant differences between the concentrations, emphasizing that 0.4% chitosan had the greater effectivity in inhibiting the bacterial adhesion.

Conclusions: In conclusion, giant river prawn shell chitosan inhibits *S. sanguinis* ATCC 10556 to polystyrene plastic surface and human buccal epithelial cells. 0.4% giant river prawn shell chitosan has the greater effect in inhibiting the bacterial adhesion.

S0171

Ant Nest Plant Extract Reduces *Streptococcus-Mutans* and *Porphyromonas-Gingivalis* Biofilm Viability

S. h. Lay[2], E. E. Tjakra[2], i. p. wendhita[2], F. Indrawan[2], C. T. Binartha[2], A. S. Widyarman[1]

[1]Faculty of Dentistry, Trisakti University, [2]Trisakti university

Objectives: Ant nest plant (*Myrmecodia pendans*) contain chemical agents such as flavonoid and tanin which are known to have antibacterial properties. Thus the research investigates the effect of ant nest plant extract against *Streptococcus mutans* and *Porphyromonas gingivalis* biofilm in vitro.

Methods: Extract of ant nest plant was obtained with maceration technique. Extract diluted with DMSO 10% and further diluted with BHI broth, formed extract with a concentration 50%, 25%, 12.5% and 6.25%. *S.mutans* ATCC-3198 and *P.gingivalis* ATCC-3327 inoculated in BHI broth for 24-hours. Biofilm assay: each bacterial suspension (1 x 10^7CFU / mL) distributed in 96-well-flatbottom microplate for 48-hours, 37°C, anaerobic atmosphere to form biofilm. Subsequently, ant nest plant extract added into biofilm containing well and inhibition effect observed after 1h, 3h, 6h and 24h. Biofilm without extract used as negative control and chlorhe x idine (0.2%) used as positive control. Biofilm mass counted from extraction of remaining crystal violet using ELISA-reader with a wavelength of 600nm. Data result analyzed with one-way ANOVA test and continued with Post-Hoc LSD test.

Results: Result shows significant reduction of biofilm after being treated with ant nest plant extract. Best incubation time to inhibit S.mutans and P.gingivalis biofilm viability were 1 hour with 50% extract concentration with optical density (OD)±SD= 0,338±0,065 and 0,096±0,038. However, all concentration and incubation time reduced biofilm viability significantly compared to negative control with OD= 3.941±0.051 and 3.231±0.716 for *S.mutans* and *P.gingivalis* individually. One way Anova and Post-Hoc LSD test result showed significant difference in reduction of biofilm (p<0,05) in all concentration and incubation times.

Conclusions: These results showed the inhibitory activity of ant nest extract against biofilm of *S. mutans* and *P. gingivalis* as an active antibiofilm agent which may be use to prevent dental caries and periodontal disease. Further studies are needed to improve this result.

S0172

Efficacy of Disinfectants on Microbial Contaminated Toothbrushes

A. Tiara[2], A. S. Widyarman[1]

[1]Faculty of Dentistry, Trisakti University, [2]Trisakti University

Objectives: Aim of study is to evaluate the effect of toothbrush soaking in mouthwash solution against the total number of bacterium, *Streptococcus mutans* and *Fusobacterium* in toothbrush.

Methods: 18 toothbrushes obtained from healthy subject, female, aged 19-23 years-old. For one-month, toothbrush soaked in disinfectant-solution (25mL) for 20-minutes after brushing with group1-Listerine® mouthwash and group2-sterile tap-water. Real-Time PCR method used to evaluatenumber of microorganisms on eachtoothbrush. Toothbrushcollected in tube containing medium-broth, vortexed for 20 second and incubated in Brain Heart Infusion (BHI)-broth and BHI-agar at 37°C for 72-hours. After incubation, CFUnumber in agar werecounted and bacterial cell in BHI-broth harvested for DNA extraction. DNA extracted using QiaAmp DNA-extraction's kit. Total number of DNA target identified using Real-Time PCR followed by SYBR-Green reagents and 16S rRNA-gene specific primers for *S.mutans* and *Fusobacterium*. Primers for *S.mutans*: forward5'-AGCCATGCGCAATCAACAGGTT-3', reverse: 3'-CGCAACGCGAACATCTTGATCAG-5', and Fusobacterium: forward5'-CGCAGAAGGTGAAAGTCCTGTAT-3', reverse: 3'-TGGTCCTCACTGATTCACACAGA-5'.Paired sample T-test used for statistical analysis and level of significant was set at $p<0.05$.This study has obtained permission from ethics-committee (no: 319 / KE / FKG / 8 / 2016).

Results: Shown there were significant difference of total bacterium numbers, *S. mutans* and *fusobacterium* in toothbrush after soaking with mouthwash solution. Average scores (Log-CFU / mL± SD) of total bacterium (2.66±0.39), *S.mutans* (1.21±0.18) andfusobacterium (10.35±6.02) on toothbrush in group 1 were significantly decreased compared to average scores of total bacterium (5.19±0.41), *S.mutans* (2.71±1.59) and fusobacterium (18.96±4.26) in group 2 (Fig. 1).Statistical evaluation brought statistically significant difference of total bacterium numbers, *S.mutans* and *Fusobacterium* between group 1 and group 2 ($p<0.05$).

Conclusions: Soaking toothbrush in mouthrinsesolution reduces total number of bacterium, *S.mutans* and *Fusobacterium*. Result proposesamethod to clean toothbrushes to prevent bacterial contamination. Future worksneeded to explore this effect.

S0173

Angular Cheilitis Related to Candida and HIV / AIDS Infection, Surabaya, Indonesia

M. A. Mayangsari

Faculty of Dental Medicine, Universitas Airlangga

Objectives: to know the AC related to Candida infection, low Cluster of Differentiation 4 ($CD4^+$) T lymphocyte counts, and high Viral Load in HIV / AIDS patients at Unit Perawatan Intermediet Penyakit Infeksi (UPIPI) RSUD Dr. Soetomo Surabaya.

Methods: This was an analytical observational research with cross-sectional and total sampling method. The samples consisted of 88 patients at UPIPI RSUD Dr. Soetomo Surabaya accordance with the criteria and agreed to participate by filled the informed consent. Diagnose of AC based on clinical appearance examined by oral medicine specialist. Diagnose of HIV / AIDS based on Rapid Test, ELISA Test, and Western Blot Test. $CD4^+$ counts and Viral Load obtained from patient's medical record. Diagnose of Candida infection based on direct and indirect mycology test.

Results: There were 31 AC cases (25.83%) from 120 cases. AC was found to be significantly correlated with candida infection $p=0.012$ ($p<0.05$), decrease $CD4^+$ counts <200 cells / mm^3 $p=0.023$ ($P<0.05$), and high viral load >100.000 copy $p=0.033$ ($P<0.05$).

Conclusions: AC related to Candida infection, low $CD4^+$ and high viral load in HIV / AIDS patients.

S0174

Xerostomia Related to HIV / AIDS and Anti-Retroviral Therapy at Surabaya, Indonesia

M. P. Mensana

Faculty of Dental Medicine, Universitas Airlangga

Objectives: this study to know xerostomia related to Antiretroviral Therapy (ART), low Cluster of Differentiation 4 ($CD4^+$) T lymphocyte counts, and high Viral Load (VL) in HIV / AIDS patients at Unit Perawatan Intermediet Penyakit Infeksi (UPIPI) RSUD Dr. Soetomo Surabaya.

Methods: This was an analytical observational research with cross-sectional and total sampling method. The samples consisted of 88 patients at UPIPI RSUD Dr. Soetomo Surabaya accordance with the criteria and agreed to participate by filled the informed consent. Diagnose of xerostomia based on unstimulated saliva flow test (<0.1ml / min) with sialometry. Diagnose of HIV / AIDS based on Rapid Test, ELISA Test, and Western Blot Test. $CD4^+$ counts, VL, ART history obtained from patient's medical record.

Results: There were 65 patients (73,86%) with xerostomia (unstimulated saliva flow <0.1ml / min). Xerostomia was found to be significantly correlated with the use of ART for long period p= 0.043 (P<0.05), decrease $CD4^+$ counts <200 cells / mm^3 p=0.022 (P<0.05), and high VL >100.000 copy p=0.031 (P<0.005).

Conclusions: Xerostomia related to the use of ART for long period, low $CD4^+$ and high viral load in HIV / AIDS patients.

S0175

Star Pine Purified Resin as Antibacterial Pit and Fissure Sealant

E. P. Millano, H. V. Flores, A. Luzano, A. M. Santos, S. M. Bernabe, S. Wong
Centro Escolar University-Malolos

Objectives: The study aim to determine the effectiveness of Star pine tree resin as an antibacterial pit and fissure sealant.

Methods: Experimental method was utilized to obtain the purified resin from the Star pine tree bark. Physical and chemical properties and antibacterial properties of the purified resin were undertaken. Penetration of the purified resin on five extracted tooth specimen before and after thermal cycling test was determined by SEM analysis. The resin was tested on the sample of cultured bacteria for its antibacterial property. Zone of inhibition for antibacterial property were recorded and documented.

Results: Star pine purified resin inhibited the growth of *S. aureus* with an AI of 1.8. SEM analysis before and after thermal cycling test revealed no changes in the penetration of purified resin to enamel rods and created microtags. It has a dark brown color, no distinct taste and has sweet odor.

Conclusions: Star pine purified resin has antibacterial property and it can be used as alternative pit and fissure sealant in the prevention / interception of caries formation.

S0176

Effect of Olive (*Olea Europaea*) Oil Pulling on Plaque Control

A. T. Enriquez, R. Gallego, Z. Magnaye, A. Malinao, R. Lajara

Centro Escolar University

Objectives: Introduction: Oil pulling therapy is currently gaining popularity among netizens. This is a procedure that involves swishing oil in the mouth for oral and systemic health benefits. The research seeks to determine if olive oil, a popular oil used in human diet, can be effective in controlling plaque formation. Objective: To determine the effect of oil pulling with olive oil on plaque control

Methods: Methodology: The study involved both in vitro and in vivo. Agar plates were used to determine antibacterial property against *Staphylococcus aureus* and *Escherichia coli*. A zone of inhibition test was carried out. For the in vivo study, 30 patients were selected using purposive sampling. Oil pulling was included in their oral hygiene routine. The study period was 14 days. Plaque index of the subjects were assessed before oil pulling and at baseline days 1, 3, 6, 10 and 14. The data was analyzed using paired t test.

Results: Olive oil exhibits a pale yellow color, and pungent taste and smell. Olive oil did not inhibit growth of both *S. aureus* and *E. coli* on agar plates. Before oil pulling, the plaque index score was 1.463. It then reduced to 1.458, 1.436, 1.316, 1.282, and 1.220 respectively. A statistically significant decrease in the plaque index was noticed from day 6 and the scores continued to decrease during the period of study.

Conclusions: Oil pulling using olive oil can be an adjuvant procedure in plaque control.

S0177

Platelet-Rich Plasma Altered Proliferation and Migration by HPDL Stem Cells

T. Q. Kieu, T. A. Pham

University of Medicine and Pharmacy Ho Chi Minh city

Objectives: Platelet-rich plasma (PRP) which is rich in growth factors and cytokines providing a biological environment for tissue regeneration. Growth factors released by activated platelets at the site of injury is considered to contribute in periodontal regeneration via regulating cellular activity. This study aimed to evaluate low dose standardized PRP on proliferation and migration of human periodontal ligament stem cells (hPDLSC).

Methods: A total of 25.5ml peripheral blood from each healthy volunteer was collected to obtain activated PRP by standardized protocol. PRP was then fabricated and prepared in ready-to-use states into 1%, 2% and 5% v / v in serum free media. Primary hPDLSC was isolated and characterized from healthy permanent teeth. Cells were incubated with 1%, 2% and 5% PRP following cellular proliferation assay for 1, 3, 5, 7 days and colony forming unit (CFU) assay for 2 weeks. Wound healing assay (scratch test) was conducted to verify the cellular migration activity under 1, 2 and 5% PRP treatment at 0, 24 and 48h.

Results: PRP at 2% enhanced significantly CFU by 2 weeks showing the role of PRP in hPDLSC stemness boosting. At day 3 of proliferation, PRP increased cell number significantly in dose dependent manner. In detail, 5% PRP accelerated cell proliferation by 3 and 1.5 fold change in comparison to serum free and FBS media group, respectively. From day 5, cell number in PRP groups reduced until day 7, there was a reverse in cell number in experimental vs. control groups. Wound healing assay did demonstrate the significant difference between all PRP groups and the controls at any time point.

Conclusions: Our data revealed the promotion of hPDLSC proliferative response as well as migration activity in the presence of appropriate concentration of the PRP. It elicits that 2–5% PRP could be beneficial for periodontium cells regeneration and be considered a potential approach in periodontal therapy.

S0178

Effectivity of Wire Grass (*Eleusine Indica*) Extract as an Anti-Inflammatory Agent

N. Manalese, M. San Pablo, R. Dela Cruz, M. Dela Cruz

Centro Escolar University

Objectives: The aim of this work was to investigate the anti-inflammatory property of Wire grass extract.

Methods: Experimental method was used to determine the anti-inflammatory property of the Wire grass extract. About 200grams of whole plant were macerated to obtain 300ml of Wire grass extract. The toxicity of the extract was determined by swabbing Wire grass extract in the mucous membrane of the mice. For the paw edema test, five laboratory mice were fasted for eighteen hours prior to oral administration of the extract at different concentrations (25%, 50%, 75%). Carageenan (0.01% at 5mL) was used to induce edema. Paw volumes were measured using phletysmometer prior to introduction of extract, after one hour of injecting carrageenan, and at hourly interval for three hours thereafter.

Results: There is no redness, swelling on the mucous membrane of mice for the first 24 hours. Paw edema test with 75% concentration of the extract has the highest subsation in paw edema when measured in plethysmometer (before injecting 0.01% carrageenan (0.010), after one hour (0.013), after two hours (0.010), after three hours (0.005)) which revealed that it has an anti-inflammatory effect.

Conclusions: Wire grass extract has anti-inflammatory property. This property of the plant may contribute to the value in traditional medicine and in dental practice.

S0179

3D Accuracy of Digital Impressions for Implant-Supported Full-Arch Fixed Prostheses

J. Tan, J. J. Tan, S. Ng, Y. Keh, K. Tan
National University of Singapore

Objectives: This study compared the three-dimensional (3D) accuracy of conventional implant impressions (CONV) with digital implant impressions, obtained using an intraoral scanner (IOS) and a dental lab scanner (DLS), for the restoration of implant-supported full-arch fixed complete dental prostheses.

Methods: A full-arch master model (MM) with six implants (Straumann, Bone Level) at teeth positions #17, #15, #12, #22, #25, #27 was used to simulate an edentulous maxilla with implants. Five CONV stone models were obtained with splinted direct implant impression copings and polyether impressions (n=5). Scanbodies were attached onto the master model and five IOS scans were obtained with the 3M True Definition Scanner (TD) (n=5). For DLS, laboratory scanbodies were then attached onto each stone model and scanned using the Ceramill Map400 (CM) (n=5). A coordinate measuring machine (CMM) established a local coordinate system from three SiN reference spheres and measured the 3D coordinates of geometrical target features on implants (MM), analogues (CONV) and virtual scanbodies (DLS, IOS). 3D linear global distortion (dR) and percentage 3D linear global distortion (%dR) was calculated for each test group for five inter-implant reference distances.

Results: For the five reference distances, mean dR (SD) ranged from 8.0 (7.2) to 29.1 (20.5)μm for CONV, 3.7 (58.7) to 19.4 (47.7)μm for DLS; and -256.4 (32.3) to -680.6 (78.1)μm for IOS. One-way ANOVA showed that there was significant difference for the mean dR and mean %dR for all reference distances (P<.000). For all reference distances, Tukey's HSD post-hoc test determined that IOS was significantly different from both CONV and DLS, for both mean dR and mean %dR (P<.001).

Conclusions: Conventional impressions showed the best precision, followed by intraoral scanners and finally dental lab scanners. For trueness, mean dR for the intraoral scanner was significantly more negative than conventional impression and dental lab scanner, while the latter two were not significantly different from one another. Conventional implant impressions techniques still remain the gold standard and intraoral scanners do not appear ready to be used clinically for the restoration of a completely edentulous jaw with implant-supported full arch fixed dental prostheses.

S0180

TGF-β1 Stimulates Cyclooxygenase- 2 Expression and PGE_2 Production of Pulp Cells

R. Cheng[1], P. Lin[2], M. Chang[3], J. Jeng[2]

[1]Taipei Medical University, [2]National Taiwan University, [3]Chang Gung University of Science and Technology

Objectives: TGF-β1 is an important growth factor that may influence odontoblast differentiation and matrix deposition in the reactionary/reparative dentinogenesis to dental caries or other insult. TGF-β1 exerts its effects through various signaling pathways, such as Smads and MAPKs. Cyclooxygenase-2 (COX-2) is a membrane-associated enzyme that produces prostaglandins through stimulation at the site of inflammation. Prostaglandin E_2 (PGE_2) is suggested as an inflammatory mediator of pulpal injury, which leads to inflammatory signs such as tissue swelling, redness and pain. PGE_2 may activate EP1, EP2, EP3 and EP4 receptors with potential different effects. The purposes of this study were to investigate the relationships between TGF-β1, COX-2 and PGE_2 in dental pulp cells and the differential signal transduction pathways of TGF-β1 that mediate COX-2 stimulation and PGE_2 production.

Methods: Pulp cells were exposed to TGF-β1 with / without SB431542 (an ALK5 / Smad inhibitor) and U0126 (a ME / ERK inhibitor). MTT assay was used to estimate cell viability. ELISA was used for measurement of PGE_2 levels. RT-PCR and western blot were used to determined COX-2 mRNA and protein, respectively. Statistical analysis was performed by ANOVA and post-hoc test ($p<0.05$).

Results: Exposure to TGF-β1 (1-10 ng / ml) increased the COX-2 level of cultured pulp cells. Exposure to TGF-β1 (0.1-10ng / mL) significantly increased PGE_2 level in dental pulp cells. Under the pretreatment of SB431542, the stimulatory effect of TGF-β1 on COX-2 level of pulp cells was inhibited. Similarly, U0126 also partly inhibited the TGF-β1-induced COX-2 expression.

Conclusions: TGF-β1 increased the COX-2 and PGE_2 level of cultured pulp cells. This effect was associated with ALK5 / Smad2 / 3 and MEK / ERK pathways. These events are important in the early inflammation, repair and regeneration of dental pulp in response to injury via PGE_2 production and EP receptors signaling.

S0181

Salivary Biomarkers and Periodontal Status in Obesity and Diabetes Mellitus

L. Chiam, X. Lim , Y. Yow , S. Khoo, S. Shyam , S. Pulikkotil
International Medical University

Objectives: In this pilot study, we aim to introduce a non-invasive approach using salivary insulin (sINS) and adiponectin (sADP) and comparing their levels among obese (BMI: >27.5kg / $m^{2,}$), non-obese and non-insulin dependent type-2 diabetes mellitus (T2DM) and healthy control subjects. We would also like to study the association of these salivary biomarkers with periodontal status in each of these conditions. This ultimately provide an insight of the use of salivary-biomarkers in predicting metabolic-syndrome and periodontal condition in high-risk population.

Methods: 77 random saliva samples were obtained from obese (n=26), non-obese and non-insulin dependent T2DM (HbA1c: 6-9%, n=25) and healthy control subjects (n=26). 20 diabetic subjects had HbA1c level above the recommended level of excellent glycemic control (6.5%). The samples were analyzed for sINS and sADP using ELISA. Periodontal status was assessed using Basic Periodontal Examination (BPE). Data was analysed using SPSS. The statistical significance level was set at $p<0.05$.

Results: A trend was observed, where the average levels of sINS were highest in diabetic subjects, followed by obese subjects and then healthy subjects. The opposite held true regarding sADP levels, where diabetic subjects recorded the lowest levels, followed by obese subjects and then healthy subjects. BPE scores were significantly correlated with sADP ($r=0.408$, $p=0.043$) and sINS ($r=-0.417$, $p=0.038$) only in diabetic subjects. The concentration of sADP were negatively correlated to sINS ($r=-0.328$; $p=0.004$).

Conclusions: Findings from this study indicates that the changes in the expression of sINS and sADP begin with increase in adiposity and continue further in impaired insulin sensitivity, with or without the former. The inflammatory changes such as the deterioration of periodontal status that accompany poor glycemic control are associated with elevated sADP. Lower levels of sINS seen with poorer BPE scores and high levels of SADP may indicate beta-cell failure in producing insulin. This study suggests that sINS and sADP are potential biomarkers to study metabolic derangement and prognosticating periodontal condition in obesity and T2DM.

S0033

Association between Bubble Tea Additives and Dental Caries among Schoolchildren

Y. Lee[1,2], P. Lin[1,3], L. Chi[1,4], Y. Chang[5,6], S. Lee[1,2]

[1]National Yang-Ming University , [2]Taipei Veterans General Hospital, [3]Shin Kong Wu Ho-Su Memorial Hospital, [4]Taipei City Hospital, [5]Taipei Medical University, [6]Ministry of Health and Welfare

Objectives: According to the report from Taiwan's government in 2015, more than 60% population drank a cup of bubble tea once or more weekly. On the other hand, the dental caries prevalence among children aged 5 to 6 years was 79.32%, showing the inferior oral health status. Although literatures showed that sugary drinks can play a major role in the development of dental caries, the evidence that between bubble tea drinking and dental caries is scanty. This study investigated the association between different bubble tea additives (BTA) and dental caries among schoolchildren.

Methods: This cross-sectional study was conducted from June to December in 2016. Children (n=1,856) of the 2nd to 3rd grades from multi-level stratified selected elementary schools were recruited for completion of self-administered questionnaire (BTA preference) by their parents or caregivers and receiving standard oral examination by trained dentists. Association between BTA and the status of dental caries was statistically analyzed using 0.05 as the significance level.

Results: Among the 1,856 schoolchildren, the caries prevalence of deciduous and permanent teeth were 82.70% and 40.84% respectively. 62.61% children were recognized with BTA preference and lower dental caries prevalence of deciduous teeth (81.84%) was noted than that of schoolchildren who regularly drank without BTA (90.09%, p=0.029). "Tapioca ball" (40.00%) and "pudding" (16.75%) were the most favorite BTA, but no statistically significant differences in terms of dental caries prevalence among children having different BTA preferences.

Conclusions: Children with BTA preference showed a lower caries prevalence of deciduous teeth than that of their peers drank without BTA. The direction of the causal relationship, if existed, needs further investigation.

S0038

Dental Plaque PH in Predicting Caries Relapse after General Anesthesia

A. C. Kalhan[1], Y. Lin[2], T. A. Kalhan[1], Y. Lin[2], C. Chou[2], C. Hsu[1]

[1]National University of Singapore, [2]Kaohsiung Chang Gung Memorial Hospital

Objectives: Numerous caries risk assessment (CRA) tools have been proposed in literature, with few validated in preschool children. Past caries experience, the best predictor thus far in literature, may not be a reliable indicator after clinical intervention. This longitudinal study was aimed to investigate the role of plaque pH in predicting future caries incidence after oral rehabilitation under general anesthesia (GA) among preschool children.

Methods: Ethical approval was obtained from the Institutional Review Board of Kaohsiung Chang Gung Memorial Hospital, Taiwan (IRB no: 102-3921A32). Caries detection, plaque pH measurements, questionnaire survey and CRA, using Cariogram, were performed, among pre-schoolers indicated for GA, by two trained examiners, at baseline (n=92), and at 6-month (6M; n=83), 12-month (12M; n=79), and 24-month (24M; n=66) recall visits after GA. “Plaque pH”, the main independent variable, was recoded as a categorical variable at 6M and 12M recall into “low-pH” and “control” groups. Caries increment (Δdmft) at recall visits was the main study outcome. Univariable and multivariable logistic regression analysis were performed to investigate the association of plaque pH and caries increment at different recall visits. For each model, receiver-operating characteristic (ROC) curve was plotted to evaluate its predictive accuracy.

Results: High post-GA caries recurrence rates were observed, with 54.2% (6M), 79.7% (12M) and 90.9% (24M) of children developing new caries lesions at follow-up visits, despite routine preventive and educational measures. Individuals with low resting plaque pH at 6M and 12M recall visits, were shown to be at higher risk of 1-year caries incidence at 12M and 24M visits, respectively, compared to control group (both $p<0.05$). Moreover, plaque pH demonstrated superior predictive accuracy, compared to past caries experience and Cariogram.

Conclusions: Resting plaque pH may be a useful risk predictor for future caries development in high-risk children undergoing oral rehabilitation under general anesthesia.

S0064

Development of Collagen-Chitosan Hydrogels for Periodontal Bony Defect Regeneration

K. Teng

National Yang-Ming University

Objectives: Periodontitis often causes irregular alveolar bony defects that are difficult to compact particulate graft materials, resulting in poor treatment prognosis. The major purpose of this study was to develop an injectable thermosensitive collagen-chitosan composite hydrogel which could be applied to bony defects and polymerized in situ. This study was further investigated the characteristics of hydrogel which was composed of different ratios of type I collagen and chitosan, to obtain the optimum conditions of hydrogel for bony defect regeneration.

Methods: Collagen and chitosan were mixed in different ratios that collagen to chitosan were 10:0 (Col), 9:1 (Ch-1), 8:2 (Ch-2) and 5:5 (Ch-5). Fourier transform infrared spectroscopy (FTIR) was used to analyze the hydrogel composition. Various physical properties of hydrogels including mechanical properties, resistance to enzymatic degradation and swelling property were investigated. The morphology of hydrogels was observed using a scanning electron microscopy (SEM). The cytotoxicity was analyzed according to the method of ISO10993-5. In addition, the osteoblastic proliferation was examined with the alamarBlue reagents. Furthermore, osteoblastic mineralization was analyzed with Von Kossa staining.

Results: The FTIR results showed no significant difference of hydrogels compositions compared to the compositions of pure collagen and pure chitosan. The SEM images showed nanoscale collagen fibrils interspersed with chitosan matrix. For mechanical properties, the hydrogel containing chitosan revealed higher young's modulus than the pure collagen one. In enzymatic degradation, Ch-5 showed higher enzymatic resistance than the other counter parts. Swelling ratio results showed that the scaffolds could bind more water as the chitosan composition increased. In cytotoxicity test, no significant toxicity was found among groups. However, Col and Ch-1 showed more osteoblastic proliferation than Ch-2 and Ch-5 counter groups. For mineralization, Ch-5 showed the lowest mineralization properties among groups.

Conclusions: Col and Ch-1 hydrogels showed higher osteoblastic proliferation and favorable mineralization properties, but Ch-1 revealed higher young's modulus than the Col group.

S0072

pH-Responsive Protein Corona for Caries Risk Assessment

G. Tan[2], C. Hsu[1], Y. Zhang[3]

[1]National University of Singapore, [2]National University of Singapore, [3]National University of Singapore

Objectives: Plaque pH is a critical biophysical driver of dental caries. A pH sensor to map Stephan Curve and identify high caries-risk individuals for targeted caries prevention is clinically needed, but effective options are limited. Here, we report on a fluorescent, pH-responsive, protein corona candidate sensor that is highly-sensitive, broad-ranged and reliable in detecting real-time biofilm-pH for caries-risk assessment.

Methods: Protein corona was synthesized by coating silica nanoparticles (SiO_2-NPs) with fetal bovine serum that has been pre-loaded with Oregon Green (OG) and Methylene Blue (MB). Corona formation and stability were characterized by transmission electron microscopy and bicinchoninic acid protein assay. Ratiometric emissions of OG (522nm) and MB (699nm) were plotted as a function of pH. Sensor specificity was tested in multiple biofilm ions (NaF, $CaCl_2$, $MgCl_2$ and NaCl) and human saliva. The method was validated against a conventional pH-electrode. Stephan Curve of differential concentrations (0, 0.05, 0.2 and 0.5OD) of planktonic *Streptococcus Mutans* (SM), in 1% glucose, was measured, and the area under the curve (AUC, below pH5.5) was computed.

Results: Spherical monodispersed SiO_2-NPs with average diameter of 25nm had uniform protein corona layer of about 15nm. Protein loading was 328.7±5.1μg protein / mg NP. 85-91% of protein corona remained adsorbed after dispersion in pH 4.0-8.0 for 30 mins at 37°C, indicating good corona stability. Sensor response was highly-sensitive with 13.4 fold-increase in ratio-change over a broad pH range of 3.0-8.0, enabling precise measurement of Stephan Curve. Sensor specificity was accurate within 0.18pH units. Measurement was comparable with conventional pH-electrode to within 5.3% deviation. Notably, medium (0.2OD) and high (0.5OD) bacterial concentrations could only be distinguished by AUC ($p<0.05$), but not by minimum pH, demonstrating greater diagnostic utility compared to end-point measurement.

Conclusions: The pH-responsive protein corona offers new prospects for clinical caries-risk assessment by enabling high-quality biofilm-pH detection.

S0082

NAMPT is an Essential Catabolic Regulator of RA-Mediated Periodontitis

S. Lee, H. You, E. Kook, J. Ryu

chonnam university

Objectives: Recent study has indicated a potential association between periodontitis (PD) and rheumatoid arthritis (RA). We undertook this study to verify whether RA induces PD-like phenotypes using experimental RA mouse model and to explore the role of nicotinamine phosphoribosyltransferase (NAMPT) on periodontal inflammation during RA pathogenesis.

Methods: PD pathogenesis was determined in Collagen-induced arthritis (CIA), an experimental RA mouse model and evaluated by H&E staining and micro-compute tomography (mCT). Primary cultured periodontal ligament cells (PDL) originated from human were treated with FK-866 for intracellular NAMPT inhibition and anti-NAMPT antibody for extracellular NAMPT inhibition or were infected with adenovirus for NAMPT overexpression. Expression patterns of adipokines and cytokines were determined by immunostaining, western blotting and RT-PCR.

Results: NAMPT expression was markedly upregulated in the periodontal ligament (PDL) tissues in RA mouse models, and in human PDL cells stimulated by the proinflammatory cytokines, IL1b and TNF-a. When NAMPT was overexpressed with the *Nampt*-synthesizing adenovirus vector (Ad-*Nampt*), the PDL cells exhibited an increased expression of cytokines (IL6), chemokines (IL8 and CCL5), inflammatory mediators (COX-2), and matrix-degrading enzymes (MMP1 and MMP3). Inhibition of NAMPT by the intracellular NAMPT (iNAMPT) inhibitor, FK866, or by the sirtuin inhibitor, nicotinamide, in PDL cells, led to inhibition of the IL1b or Ad-*Nampt*-induced upregulation of catabolic factors, whereas treatment with recombinant NAMPT protein or blockade of extracellular NAMPT (eNAMPT) with blocking antibody did not. Moreover, NAMPT inhibition by the intraperitoneal or intragingival injection of FK866 in CIA mice inhibited periodontal tissue damage, under conditions of RA.

Conclusions: Our findings verified the co-occurrence of RA and periodontitis using experimental mouse models of RA, suggesting that iNAMPT in PDL cells plays a pivotal role in the pathogenesis of RA-mediated periodontitis by regulating the expression levels of catabolic genes, such as IL6, IL8, CCL5, COX-2, MMP1, and MMP3.

S0097

Taste Thresholds, Sweet Preference and Caries in 12-Year-Old Thai Children

N. Wiphassawong[2], J. Paphangkorakit[1], R. Noisombut[3], P. Phajongviriyatorn[2]

[1]Khon Kaen University, [2]Khon Kaen University, [3]Khon Kaen University

Objectives: To determine taste detection threshold, sweet recognition threshold, sweet preference and their association with dental caries in 12-year-old children in Khon Kaen Province, Thailand.

Methods: 122 children (68 boys, 54 girls) from 4 schools in Khon Kaen Province were recruited using a simple random technique. Taste detection and sweet recognition thresholds were determined by two-alternative forced choice technique whereas sweet preference was determined by rank-ordering technique. Dental caries was examined visually under natural light with mouth mirrors and explorers. Statistical analysis was done with Mann Whitney test and Spearman rank correlation test.

Results: Mean taste detection threshold (0.008221±0.007533 M) was significantly less than mean sweet recognition threshold (0.025905±0.029291 M) ($p<0.01$; Wilcoxon Signed ranks) and both thresholds were significantly correlated ($p=0.033$, $R=0.198$; Spearman rank correlation). No significant difference in taste detection and sweet recognition thresholds was found between boys and girls ($p=0.923$ and 0.475 respectively; Mann Whitney). Boys tended to have higher level of sweet preference than girls (medians=0.29M and 0.14M respectively). No correlation was found between taste detection threshold, sweet recognition threshold, sweet preference and DMFT (both with and without white spot lesions).

Conclusions Taste and sweet taste sensitivity were correlated but they were not correlated with sweet preference in our sample, suggesting the importance of environmental effect on sweet perception. In addition, dental caries was not predicted by either taste sensitivity or sweet preference.

S0104

Association between Periodontitis and Psoriatic Arthritis in Taiwanese Population

C. F. Tseng[2], Y. Chang[1]

[1]Chung Shan Medical University, [2]Chung Shan Medical University

Objectives: Psoriatic arthritis (PsA) has been defined as an inflammatory arthritis associated with psoriasis characterized by inflammation of the dermis and epidermis with predominantly skin and joint manifestations. The aim of this nationwide population-based retrospective cohort study was to assess the risk of periodontitis in patients with PsA.

Methods: Patients with newly diagnosed psoriatic disease from 2003 to 2012 were identified from Taiwanese National Health Insurance Research Database. The 1:4 ratio propensity score matched controls were selected from no PsA participations. The subsequent risk of periodontitis was evaluated in exposure group and comparison group. Multiple Cox proportional hazard models were used for the estimation.

Results: A total of 552 PsA patients were identified. The adjusted hazard ratio (aHRs) of periodontitis was 1.74 (1.22-2.48) in PsA group. The cumulative incidence proportion of periodontitis was higher in PsA group (log rank p=0.0072). In the stratified follow up duration analysis, the risk of periodontitis was significantly higher by 1.19 and 1.86 fold during the first 11 months and the subsequent 12 months, respectively, in the PsA cohort compared with the comparison cohort.

Conclusions: The increased risk of periodontitis was observed among Taiwanese patients with PsA.

S0110

NAMPT Enzyme Activity Regulates Catabolic Gene Expression in Gingival Fibroblasts during Periodontitis

K. Park, G. Lee, W. Song, J. Ryu
Chonnam university

Objectives: Periodontal disease is one of the most prevalent chronic disorders worldwide. It is accompanied by inflammation of the gingiva and destruction of periodontal tissues and leads to alveolar bone loss. Here, we focused on the role of adipokines, locally expressed by periodontal tissues, in the regulation of catabolic gene expression leading to periodontal inflammation.

Methods: PD pathogenesis was determined in periodontal mouse model, an experimental mouse model and evaluated by H&E staining and IHC. Primary cultured human gingival fibroblast (HGF) originated from human were treated with FK-866 for intracellular NAMPT inhibition and anti-NAMPT antibody for extracellular NAMPT inhibition or were infected with adenovirus for NAMPT overexpression. Expression patterns of adipokines and cytokines were determined by western blotting and RT-PCR.

Results: The expression of the nicotinamide phosphoribosyltransferase (NAMPT) adipokine was dramatically increased in inflamed human and mouse gingival tissues. NAMPT expression was also increased in lipopolysaccharide- and proinflammatory cytokine-stimulated primary cultured human gingival fibroblasts (GF). Adenovirus-mediated NAMPT (Ad-*Nampt*) overexpression upregulated the expression and activity of COX-2, MMP1, and MMP3 in human GF. Upregulation of IL-1b- or Ad-*Nampt*-induced catabolic factors was significantly abrogated by the intracellular NAMPT (iNAMPT) inhibitor, FK866, or by the sirtuin (SIRT) inhibitor, nicotinamide (NIC), whereas recombinant NAMPT protein or extracellular NAMPT (eNAMPT) inhibition using a blocking antibody did not alter NAMPT target gene expression levels. Moreover, intragingival Ad-Nampt injection mediated periodontitis-like phenotypes, including alveolar bone loss, in mice. SIRT2 among SIRT family members was positively associated with NAMPT actions in human GF. Furthermore, in vivo inhibition of the NAMPT-NAD^+-SIRT axis by NIC injection in mice ameliorated the periodontal inflammation and alveolar bone erosion caused by intragingival injection of Ad-*Nampt*.

Conclusions: Our findings indicate that NAMPT is highly upregulated in human GF and its enzymatic activity acts as a crucial mediator of periodontal inflammation and alveolar bone destruction via regulation of COX-2, MMP1, and MMP3 levels.

S0120

The Effect of Metal Framework Design on Maxillary Implant Overdenture: Strain Analysis

W. Tsai[1], T. Yang[2], T. Wang[3], L. Lin[4]

[1]National Taiwan University , [2]National Taiwan University , [3]National Taiwan University , [4]National Taiwan University

Objectives: The aim of this study was to investigate the ideal denture design on maxillary implant overdenture (IOD) regarding palatal coverage areas and metal framework types

Methods: An edentulous maxilla model and complete dentures were fabricated with polymethyl methacrylate (PMMA) resin. Four implants (3.75 x 10mm, Nobel Biocare) were embedded at bilateral canine, and first molar areas connected with Locator (Zest Anchors) attachments. Four biaxial strain gauges (strain gauge; KFG-020120-C1, Kyowa) were attached to the midline palatal, midline buccal, the top of the attachment, and left tuberosity on each denture to measure the bending strains on these areas. The experiment included two parts. First, from the area between incisive papilla to fovea palatine, the areas of palatal coverage on IOD were fabricated and divided into 100%, 75%, 50% and 25%. Part two was to investigate the effect of different metal framework design on the denture strain of IOD under the condition of 25% palatal coverage. Control group was IOD with fully PMMA resin (25% palatal coverage). Testing groups were Co-Cr alloy metal framework embedded including U-shaped palatal plate only, palatal plate with and without covering the top of attachments. A vertical static load of 100N was applied to the denture on one biting plate cross bilateral posterior occlusion rims for 20 times in each condition. Comparisons of the bending strains were made by an analysis of variance ($P<0.05$).

Results: As the decrease of the IOD palatal coverage area from 100%, 75%, 50% to 25%, the values of strain increased under loading. Furthermore, the values of strain increased significantly and dramatically in 25% palatal coverage area comparing to the other groups. Additionally, under the 25% palatal coverage of IOD, metal framework embedded decreased the strain on denture in all test groups, compare to the control group. Moreover, the most effective metal framework design was the one which covered the top of attachment.

Conclusions: Within the limitation of the study, the denture strain increased while the extension of IOD palatal coverage decreased. Moreover, in the decrease of palatal coverage, the metal-framework design with the covering over the top of the attachments decreased the strain on denture under loading.

S0127

EphrinB2 Signaling Regulates Osteogenic / Odontogenic Differentiation of Dental Pulp Stem Cells

J. Xu[1], B. C. Heng[2], C. Zhang[2]

[1]The University of Hong Kong, [2]University of Hong Kong

Objectives Because previous studies demonstrated conclusively that EphrinB2 signaling play crucial roles in the osteogenic differentiation of osteoblasts, mesenchymal stem cells and periodontal ligament fibroblasts; this study therefore investigated the role of this signaling pathway in the osteogenesis / odontogenesis of DPSCs.

Methods: The endogenous expression levels of EphrinB2 and its cognate receptors EphB2 and EphB4 in DPSCs were analyzed by qRT-PCR and Western blotting after 7, 14 and 21 days of osteo / odontogenic induction culture. Subsequently, we investigated whether supplementation of recombinant EphrinB2-Fc within the induction milieu can enhance the osteo / odontogenic differentiation of DPSCs. The underlying molecular mechanisms were also investigated.

Results: Endogenous gene and protein expression levels of EphrinB2, EphB2 and EphB4 were upregulated in induced versus uninduced DPSCs, over 21 days of osteo / odontogenic induction. Preliminary investigation of a concentration range (0, 0.5, 1 and 2 μg / ml) of recombinant EphrinB2-Fc showed that 0.5 μg / ml was optimal for enhancing the osteo / odontogenic differentiation of DPSCs over an induction duration of 14 days. Subsequently, more comprehensive qRT-PCR analysis with 0.5 μg / ml EphrinB2-Fc revealed significant upregulation of several key osteogenic marker genes in treated versus untreated DPSCs after 21 days of osteo/odontogenic induction. By 7 days of induction, DPSCs treated with 0.5 μg / ml EphrinB2-Fc exhibited significantly more calcium mineralization (Alizarin red S staining) and alkaline phosphatase activity than the untreated control.

Conclusions: EphrinB2 signaling plays a key role in the osteo / odontogenic differentiation of DPSCs.

S0131

The Hepatoprotective Effect of Carrot Juice in Mice Induced by Paracetamol

C. D. Nanik

Hang Tuah University

Objectives: The aim of this research was to investigate the hepatoprotective effect of carrot juice against paracetamol induced hepatic damaged in mice.

Methods: The samples (n=35) were randomly divided into five group samples: the negative control group (aquades), the positive control group (parasetamol and sterillized saline) and the three different dose of carrot juice groups (5,10,20 ml / kgBW). Samples were treated based on five groups samples for the next 6 days. At the sixth day, samples were given paracetamol 400mg / kgBW to induced hepatotoxicity. After 18 hours of fasting, the day after (seventh day), samples were killed and their blood were laboratorically tested for SGOT and SGPT marker. The result of SGOT dan SGPT marker of mice by five different groups samples then statistically analyzed (Kruskal-wallis Test, $p<0.05$).

Results: The result showed that the carrot juice had the hepatoprotective effect against paracetamol induced hepatic damaged in mice. Pretreatment with carrot juice at dose of 20ml / kgBW prevented paracetamol induced rise in SGOT and SGPT better than 5ml/kgBW and 10ml / kgBW doses.

Conclusions: The higher dose of carrot juice had the better potency against the hepatotoxicity.

S0182

Different Strategies of Riboflavin Treatments on Enhancing Dentin Bonding

Y. Chen[1], S. Chuang[1], J. Lin[2]

[1]Institute of Oral medicine, National Cheng Kung University, [2]Institution of chemical engineering, National Cheng Kung University, Taiwan

Objectives: The effects of a photoreactive agent riboflavin (RF) on increasing collagen cross-linking and dentin bonding have been reported. The purpose of this study was to investigate the effects of RF, used in different concentrations and treating protocols, on improving resin-dentin adhesion.

Methods: Riboflavin-5-phsphate was used as the dentin collagen crosslinker. The effects of RF concentration (0.05%, 0.1%, 0.5% and 1%) and blue light activation time (30 and 60s) on crosslinking collagen were examined by SDS-page electrophoresis. To assess the chemical interaction between RF and dentin collagen, flat human dentin was treated with 5 protocols: control, phosphoric acid etching; BE0.05 and BE0.1, 0.05% or 0.1% RF were applied before acid-etching, and photo-irradiated; AE0.05 and AE0.1, 0.05% or 0.1% RF were applied after acid-etching, and photo-irradiated. The dentin was examined by Raman spectroscopy, and the ratio of amide III / amide I peaks was obtained. Microtensile bond strength (μTBS) test was also performed, and the nanoleakage on resin-dentin interfaces was examined under SEM.

Results: In SDS page electrophoresis test, 0.05% RF and 0.1% RF showed increased density of γ chain (300kDa) and decreases in β chain (260kDa) and α chains (130kDa), which indicated that both concentration induced cross-linking of bovine collagen. Both BE and AE groups rose amide III/ amide I ratio in Raman spectrum, which evidenced that RF treatments both before or after etching could make dentin collagen crosslinking. Both BE and AE group increased μTBS compared to control group, while BE groups showed the highest μTBS and less silver infiltration than others. Besides, 0.05% RF groups had higher μTBS than 0.1% RF groups.

Conclusions: Riboflavin treatment whether before or after etching procedure could increase dentin collagen crosslinking and thus to improve the dentin bond strength. 0.05% RF treatment before etching showed the highest μTBS.

S0183

Influences of MUC1 on NF-kB Activation by *Fusobacterium Nucleatum*

Y. KAO, C. Wu

National Yang-Ming University

Objectives: MUC1 serves as a part of epithelial barrier, contributing to the clearance of *Helicobacter pylori* and inhibiting NF-κB mediated inflammatory responses. However, the role of MUC1 in the barrier function of oral epithelium is still unclear. It is hypothesized that oral microorganisms stimulate the expression of MUC1, which regulates the NF-κB signaling in oral epithelial cells.

Methods: Expression of MUC1 in immortalized normal oral keratinocytes (NOK) was determined by PCR and Western blot analyses. Changes in the level of MUC1 in NOK, which were stimulated by heat-inactivated oral bacteria including *Streptococcus salivarius* (Ssal), *S. sanguinus* (Ssang) or *F. nucleatum* (Fn), were also determined. MUC1 in NOK cells was knocked down by siRNA. Translocation of NF-κB stimulated by Fn was observed by immunofluorescent staining.

Results: Expression of the α- and β-subunits of MUC1 in NOK cells was confirmed by the Western blot analyses. PCR using primer sets that differentiated transcript variants revealed the expression of MUC1 REP / SEC isoforms. Fn increased the expression of MUC1. In contrast, MUC1 was reduced by Ssang or Ssal, the amounts of which was 10 folds to NOK; however, when the numbers of streptococci were increased, the levels of MUC1 proteins were comparable to the control cells. Nuclear translocation of NF-κB was stimulated by Fn that was 100 folds to the cell number, and was more significant in MUC1 knock-down cells.

Conclusions: Oral bacteria affected epithelial MUC1 expression in a strain dependent manner. MUC1 was a negative regulation of NF-κB activation in Fn-stimulated cells.

S0184

Osteoclastogenesis by Human Cementoblasts is Stimulated By IL-1β

N. C. Huynh[2,3], V. Everts[1], P. Pavasant[2], R. Ampornaramveth[2]

[1]Academic Center for Dentistry Amsterdam, [2]Faculty of Dentistry, Chulalongkorn University,
[3]Faculty of Odonto-Stomatology, University of Medicine and Pharmacy Ho Chi Minh city, Viet Nam

Objectives: Injury of the periodontium followed by inflammatory response often leads to root resorption. Resorption is accomplished by osteoclasts and their generation may depend on an interaction with the cells in direct contact with the root, the cementoblasts. Our study aimed to investigate the role of human cementoblasts in the formation of osteoclasts and the effect of IL-1β hereupon.

Methods: Extracted teeth from healthy volunteers were subjected to sequential digestion by type I collagenase and trypsin. The effect of enzymatic digestion on the presence of cells on the root surface was analyzed by histology. Gene expression of primary human cementoblasts (pHCB) was compared with a human cementoblast cell line (HCEM). The pHCBs were analyzed for their expression of IL-1 receptors as well as of RANKL and OPG. In a co-culture system consisting of osteoclast precursors (blood monocytes) and pHCBs, the formation of osteoclasts and their resorptive activity was assessed by osteo-assay and ivory slices.

Results: The cells obtained after a 120 min enzyme digestion expressed the highest level of bone sialoprotein; similar to that of HCEM. This fraction of isolated cells also shared a similar expression pattern of IL1 receptors (IL-R1 and IL-R2). Treatment with IL-1β potently upregulated RANKL expression but not of OPG. pHCBs were shown to induce the formation of functional osteoclasts. This capacity was significantly stimulated by pre-treating the pHCBs with IL-1β prior to their co-culture with human blood monocytes.

Conclusions: Our study demonstrated that cementoblasts have the capacity to induce osteoclastogenesis; a capacity strongly promoted by IL-1β. These results may explain why osteoclasts can be formed next to the root of teeth.

S0185

Influence of Risedronate Hydrogel towards Alkaline Phosphatase during Relapse Movement

T. R. Utari[1], P. S. Pudyani[2], W. Asmara[3], I. D. Ana[4]

[1]Universitas Muhammadiyah Yogyakarta, [2]Universitas Gadjah Mada, [3]Universitas Gadjah Mada, [4]Universitas Gadjah Mada

Objectives: The aim of this study was to investigate the effect of intrasulcular application of Bisphosphonate Risedronate with gelatin hydrogel as a carrier towards the changes of alkaline phosphatase (ALP) levels in gingival crevicular fluid during relapse movement.

Methods: Lower incisors of guinea pigs (n=75) were moved distally using an orthodontic appliance (open coil spring) to reached ±3mm length. Gelatin hydrogel was fabricated to result a semisolid controlled released manner of Bisphosphonate Risedronate. There were devided into 3 groups: Bis-CR000 (0mmol / L or without risedronate) as control, Bis-CR250 (250mmol / L) and Bis-CR500 (500mmol / L), then applied intrasulcular into the mesial subperiosteum area (n=25 each group). After stabilization for 14 days, open coil spring was removed and the tooth will move back to its original position (relapse). Alkaline phosphatase (ALP) was measured on day 0, 3, 7, 14, and 21. ANOVA were used to determine differences of the ALP levels among day intervals and groups.

Results: On the day 0, 3 and 7, there were no significant differences in ALP levels among groups, but a significant difference was indicated of the ALP levels in gingival crevicular fluid on day 14 and 21 ($p < 0.05$) where groups Bis-CR250 and Bis-CR500 are higher than group Bis-CR000. Bis-CR500 gives more effect to increase the ALP levels (p-value 0.009) than other groups.

Conclusions: Significant differences in ALP levels on days 14 and 21 indicate the effect of bisphosphonate risedronate hydrogel increasing osteoblast proliferation and maturation because mature osteoblasts will secrete alkaline phosphatase. Increasing the number of osteoblasts that play a role in the process of new bone formation is expected to improve the stability of teeth after being moved and prevent relapse movement.

S0186

The Prevalence of Three-Rooted Mandibular Molars in a Vietnamese Subpopulation

H. Huynh, H. T. Hoang

University of Medicine and Pharmacy in HoChiMinh city

Objectives: The aim of this study was to determine the incidence of permanent three-rooted mandibular molars and to evaluate their root canals morphology.

Methods: 580 Vietnamese patients' conebeam computed tomography (CBCT) images were examined. The number of roots and root canals of the first and second mandibular molars were evaluated. Root canal configuration was classified according to Vertucci's classification by two examiners and statistical analysis was performed.The incidence of 3-rooted first and second mandibular molars were recorded and analyzed.

Results: A total of 807 mandibular first molars and 936 mandibular second molars were evaluated. The overall incidence of patients with 3-rooted mandibular first and second molars was 20.04% and 1.78%, respectively. There was a significantly greater incidence of three-rooted mandibular first molar on the right side than on the left, but gender did not show a significant relationship with this variant occurrence in mandibular first molars. Both gender and position did not show a significant relationship with this variant occurrence in second molars. The bilateral incidence of 3-rooted mandibular first and second molars was 54.17% and 22.22%, respectively.

Conclusions: Clinicians should be aware of the high incidence of radix entomolaris in mandibular first molars and the possible occurrence in mandibular second molars in Vietnamese population. CBCT is a useful tool for determining root and root canal morphology.

S0187

Semi-Purified Extract of Guyabano (Annona Muricata) Leaves as Oral Sedatives

J. C. Cordero, K. Magat, S. Wong, J. Galang, A. Palmos, R. Ortega

Centro Escolar University-Malolos

Objectives: The thrust of the study is to determine the Guyabano leaves extract can be used as oral sedatives.

Methods: Experimental method was utilized. The physical and chemical characteristics of the extract was determined. Three rats per group were used for the experiment. Group 1 (Diazepam) positive control group, Group 2 (Guyabano extract) experimental group and Group 3 (Saline) as Negative control group were used. Biological test was evaluated through open-filed test, tail suspension test and righting reflex.

Results: Positive result in the test for flavanoids. The results further revealed that the higher the concentration of dose for group 1 and group 2 , the faster time the test animal become stationary, less mobile and more calm. Group 3 has no effect on the three biologic test upon administration of Normal Saline solution.

Conclusions: Guyabano leaves extract has flavanoids and can be used as an oral sedative

S0188

Effects of Ultrasonic Debridement on Oral Hygiene Status

A. Takenouchi[1,2], T. Matsukubo[1], M. Sakurai / Matsukubo[1], H. Arai[1], E. Otani[1], A. Fushimi[1], Y. Kakegawa[1]

[1]Taiyo School of Dental Hygiene, [2]Tokyo Medical and Dental University

Objectives: To compare the effects of mechanical tooth cleaning (MTC) and ultrasonic debridement (UD) on the oral hygiene status of healthy young people.

Methods: This study was a randomised-controlled and single-blind trial. The protocol of this study was approved by the Ethical Committee of the Japan Dental Hygienists' Association (vote number: 3). Thirty-seven participants (mean age: 20.3±0.62) were divided into one of three groups after pre-examination; A: received MTC; B: received MTC + UD using a universal insert (UDUI); C: received MTC + UD using a probe-shaped insert (UDPI). All participants abstained from any forms of oral hygiene for 24 hours after receiving the allocated interventions and received the examination after that. A masked examiner assessed the Quigley-Hein plaque index (PII) and Silness and Loe gingival index (GI) before the interventions and after 24 hours of non-brushing. A Wilcoxon-signed rank test was used to compare the intra-group differences. The inter-group differences were compared using the Kruskal-Wallis test and the Wilcoxon rank-sum test.

Results: A significant increase in the PII was found in group A ($p<0.001$), and the change in PII of group A significantly differed from that of group B (A: 0.311±0.26; B: −0.01±0.33; C: 0.13±0.27; $p<0.05$). A significant decrease in the GI was found in group B and C ($p<0.05$), also the change in GI of group C significantly differed from that of group A and B (A: −0.04±0.25; B: −0.13±0.17; C: −0.33±0.2; $p<0.05$).

Conclusions: Only MTC was insufficient to improve oral hygiene status for 24 hours of non-brushing. UD was more effective to prevent plaque formation and to improve gingival status regardless of the type of inserts. Furthermore, UDPI was more effective to improve the gingival status than UDUI.

S0189

Salivary Proteomics Unravels Immune-Inflammatory Paradigm during Pregnancy and Postpartum Period

P. Prajod[1], Y. S. Chong[2], Q. Lin[3], T. K. Lim[3], M. L. Wong[1], V. Lopez[4], H. G. He[4], C. J. Seneviratne[1]

[1]National University of Singapore, [2]Yong Loo Lin School of Medicine, National University Hospital, [3]Faculty of Science, National University of Singapore, [4]Yong Loo Lin School of Medicine, National University of Singapore

Objectives: Current scientific literature suggests that bacterial components or bacteria-induced inflammation from periodontal infections may impact pregnancy outcomes. However, the exact contributory role of periodontal infections in causing adverse pregnancy outcomes has not been fully elucidated. Salivary proteome profiles represent the interactions of oral microbiome and host tissues in the oral milieu. Hence, in the present study, we examined the changes in salivary proteome across pregnancy and post-partum period in order to understand the importance of functional proteins in this altered physiologic state.

Methods: Saliva samples were collected from a cohort of 24 Chinese pregnant women during each trimester and the postpartum period. Extracted salivary proteins from each group were pooled to minimize the biological variations. iTRAQ-tagging combined with LC-MS / MS analysis was used to generate salivary proteome profiles in each trimester and postpartum period. Thereafter, correlation analysis was performed on the salivary proteome and the oral microbiome of the patients, which was reported in IADR 2017, San Francisco.

Results: Differential protein expression was observed across pregnancy with significant upregulation in the neutrophil derived inflammatory protein in the first and second trimesters as compared to the postpartum phase. Interestingly, the inflammatory responses depreciated during the third trimester with the upregulation of leukocyte inhibitor elastase proteins ($p<0.001$) which inhibits microbial clearance. In addition, the proteins associated with immune responses were also significantly downregulated in the third trimester as compared to both second trimester and postpartum phase. The depreciated immune-inflammatory status during the third trimester correlates with the pathogen rich oral microbiome of the third trimester.

Conclusions: The immunomodulatory changes in saliva suggests the influence of immune response on oral microbiome during pregnancy, which may lead to adverse pregnancy outcomes. These findings provide a foundation to decipher the oral-systemic links during pregnancy.

S0190

Oral Candidiasis and Oral Hairy Leukoplakia Predictor-Prognostic HIV / AIDS Infection, Surabaya

A. P. Nugraha

Faculty of Dental Medicine, Universitas Airlangga

Objectives: to evaluate if OC / OHL should be considered clinical predictors of immune and virologic failure on HIV / AIDS patients in Indonesian adult

Methods: 88 patients at UPIPI RSUD Dr. Soetomo Surabaya accordance the criteria. Diagnose of OHL based on clinical appearance. Diagnose of Candida infection based on direct and indirect mycology test. All of them under-took oral examination, serum $CD4^+$ count and viral load (VL) were compared between groups. Sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV) and relative risk (RR) were obtained in order to assess the accuracy of using OC and OHL as predictors of immune and virologic failure.

Results: 65 OC cases (54.17%) and 15 OHL cases (12.5%) from 120 cases. OHL and OC was found to be significantly correlated with candida infection $p=0.012$ ($p<0.05$), decrease $CD4^+$ counts <200 cells / mm^3 $p=0.023$ ($P<0.05$), and high viral load >100.000 copy $p=0.033$ ($p<0.05$). Patients with OC and OHL have mean $CD4^+$ count lower and mean VL higher ($p<0.001$). OC had high PPV for immune failure and a moderated PPV for virologic failure. OHL had low PPVs for both measures.

Conclusions: The presence of OHL / OC in HIV-infected patients provides important prognostic information, and can be used as a cost-effective tool for screening patients in therapeutic interventions in resource-limited settings.

S0191

Deterioration of Periodontal Conditions Reflects Individual Susceptibility to Systemic Comorbidities?

D. Zhao[1], K. Yiu[2], Z. Zhen[2], G. Pelekos[1], L. Jin[1]

[1]The University of Hong Kong, [2]The University of Hong Kong

Objectives: Periodontal disease profoundly affects oral and general health. This retrospective follow-up study investigated the association of periodontal conditions with the overall profile of systemic comorbidities in a cohort of dental hospital attendees.

Methods: 870 folders from the Prince Philip Dental Hospital were randomly checked among 17,400 cases registered from 1996 to 1998. 72 cases fulfilled the inclusion criteria: **i)** aged≥18 yrs, **ii)** ≥ 1 tooth present, and **iii)** records of Community Periodontal Index (CPI), Calculus Index (CI), and Orthopantomography (OPG) at baseline and ≥5-year follow-up. 20 cases were excluded due to the absence of dataset at the Clinical Medical System of Hong Kong till December 1, 2016. Seven highly common chronic diseases / conditions including diabetes mellitus (DM), hypertension, dyslipidemia, cardiovascular disease (CVD), stroke, cancer and chronic obstructive pulmonary disease (COPD) were documented. The dental dataset consisted of remaining teeth, CPI and CI (as well as full-mouth alveolar bone level (BL) measured on OPG).

Results: 52 cases (mean 49.2±15.2 yrs, ranged 20-78 yrs) were followed up for an average of 10.5±3.8 yrs (5-19 yrs), with 31 (59.6%) females and 21 (40.4%) males. The subjects with an increased CPI score (63.5%) exhibited significantly greater prevalences of hypertension and at least one of the 7 comorbidities than those with an unchanged or decreased CPI score (36.5%) (p<0.05). In addition, those with an elevated CI score showed a significantly higher percentage of subjects with various forms of cancers than the counterparts (p<0.05). After adjusting age, gender and other common comorbidities at baseline, the association of decreased number of remaining teeth with CVD remained to be statistically significant (OR: 1.53, p<0.05).

Conclusions: This preliminary study shows that subjects with deteriorative periodontal conditions may increase their susceptibility to systemic comorbidities. A co-management scheme could enhance healthcare for better oral and general health.

S0192

Effect of Obesity on Serum Cytokines Following Non-Surgical Periodontal Therapy

A. Ab Malek[1], F. Abdul Razak[2], R. Vaithilingam[1], R. Saub[3], S. Safii[1], N. Baharuddin[1]

[1]Faculty of Dentistry, University of Malaya, [2]Faculty of Dentistry, University of Malaya, [3]Faculty of Dentistry, University of Malaya

Objectives: To determine and compare changes in clinical parameters (visible plaque index; VPI, gingival bleeding index; GBI, probing pocket depth; PPD, clinical attachment loss; CAL) and serum levels of cytokines (resistin, interleukin-17;IL-17, interleukin-6; IL-6, and tumour necrosis factor-alpha; TNF-α) in obese and non-obese participants with chronic periodontitis (CP) following non-surgical periodontal therapy (NSPT); and to assess correlations between changes in serum cytokines levels and clinical parameters following NSPT.

Methods: A total of 27 obese (test) and 30 non-obese (control) participants; diagnosed with CP participated in this prospective, before and after clinical trials. Convenience sampling method was used. Obese was defined as individuals with body mass index (BMI)>30kg / m^2. This study involved questionnaires, measurements of clinical parameters and collecting blood samples at baseline and 12 weeks post-NSPT. Laboratory analysis of serum levels of cytokines was carried out using enzyme-linked immune-sorbant assay (ELISA) technique.

Results: Mean age of participants was 46 to 47 years. VPI and GBI showed significant differences following NSPT between obese and non-obese participants (*P<0.001*) after adjusting for gender, ethnicity and smoking. Following NSPT, serum levels of IL-6 and TNF-α showed significant differences after adjusting for gender, ethnicity, smoking, changes of VPI and GBI (*P<0.001*), with obesity as potential influencing factor. Obese participants exhibited higher changes in IL-6 and TNF-α at 12 weeks post-NSPT compared to non-obese. Fair, inverse correlations were observed between GBI and IL-17 (*P<0.05*); and between CAL and IL-6 (*P<0.05*).

Conclusions: Among CP participants, changes in VPI, GBI, serum levels of IL-6 and TNF-α were higher in obese compared to non-obese participants following NSPT. Obesity plays a potential influencing factor for CP in this study. Fair, inverse correlations were observed between serum levels of IL-17 and IL-6 with clinical parameters.

S0193

Complete Denture Quality as Oral Impacts Predictor: Cohort Follow-Up Study

N. Limpuangthip[1], T. Somkotra[2], M. Arksornnukit[1]

[1]Chulalongkorn University, [2]Chulalongkorn University

Objectives: To investigate the association between complete denture quality and oral impacts in a cohort of totally edentulous patients before and after having complete denture.

Methods: A cohort study was conducted in 112 totally edentulous patients who received complete denture treatment during 2012-2013. Oral Impacts on Daily Performances (OIDP) index comprising of physical, psychological, and social domains was used to assess the presence of oral impacts. It was determined before (prior treatment and first recheck) and after completed treatment (final recheck). In 2016-2017, a cohort of 67 complete denture wearers (participation rate=60%) were reassessed for denture quality and presence of oral impacts. Complete denture quality comprising retention and stability was categorized as acceptable or unacceptable according to the CU-modified Kapur criteria. After adjusting for covariates using logistic regression, the associations between oral impacts and denture quality, as well as oral impact score before completed treatment were determined.

Results: About 85% of cohort members in 2012-2013 reported oral impacts prior treatment, predominantly physical domain. At first recheck, presence of oral impacts was 73% but dramatically reduced to 6.3% at final recheck with nearly zero OIDP score. In 2016-2017, presence of oral impacts was about 40% of remaining cohort members, predominantly physical domain, but OIDP score was half of 2012-2013. After covariates adjustment, the presence of oral impacts was significantly associated only with unacceptable denture quality but not OIDP score before completed treatment.

Conclusions: Complete denture can improve quality of life in totally edentulous people. However, oral impacts can be emerged after a period of denture usage due to unacceptable denture retention and stability, regardless of presence and intensity of oral impacts before completed treatment. Thus, a regular complete denture assessment is essential to ensure optimal overall health and maintain well-being in edentulous people.

S0194

Iloprost Induces Revascularization in Dental Pulp Tissue in 3D-Organ Culture

S. Seang[2], P. Pavasant[3], C. N. Limjeerajarus[1]

[1]Faculty of Dentistry, Chulalongkorn university, [2]Chulalongkorn University, [3]Chulalongkorn University

Objectives: Angiogenesis is the key determinant in regenerative procedure for dental pulp tissue survival. Iloprost, a prostacyclin analog has the capacity to promote pro-angiogenic factors. The aim of this study was to investigate the induction potency of iloprost on promoting dental pulp revascularization by using human tooth slice 3D-organ culture.

Methods: Two-mm tooth slices (2-slices / teeth) were prepared from the human third molars and were culture with or without iloprost (10^{-6} mol / L) for 1 and 3 (n=3). The Protein Kinase A (PKA) inhibitor (20nM) was used to confirm the signaling of iloprost. The cell viability was evaluated by live-cell confocal microscopy. The expression of collagen-1 (COL1), vascular endothelial growth factor (VEGF), and Von Willebrand factor (vWF) was analyzed by immunohistochemistry and immunofluorescent staining. Microvessel density and VEGF expression was quantified by determining the number of vWF- / VEGF-positive staining in 3-random microscopic fields.

Results: The pulp tissue in the 3D tooth slice model could be maintained in cell culture. Treatment with iloprost increased microvessel density shown by a significantly higher number of vWF-positive blood vessels at day 1 and 3 as compared to controls. A significant increase in VEGF expression was observed in the tooth slices cultured with iloprost at day 1 and 3. Furthermore, iloprost stimulated extracellular deposition of collagen as confirmed by Masson's Trichrome and COL1-immunofluorescent staining. The increased effect of iloprost was abolished by the PKA inhibitor.

Conclusions: The tooth slice model is a valuable model to investigate the regeneration of dental pulp. Iloprost treatment enhanced microvessel density, and promoted VEGF and COL1 expression after 1 and 3 days. In conclusion, iloprost induced angiogenesis, collagen synthesis in 3D organ culture. This study indicated the clinical value of iloprost in the therapeutic induction of neovascularization in tooth vital pulp therapy.

S0195

Streptococcus Mutans GtfB Enhances *Candida Albicans* Cariogenic Potential in Mixed-Biofilms

K. Ellepola[1], Y. Liu[2], H. Koo[2], C. J. Seneviratne[1]

[1]National University of Singapore, [2]Biofilm Research Labs, Levy Center for Oral Health,

Objectives: *Streptococcus mutans* is the main etiological agent associated with dental caries. Previously we demonstrated that *S. mutans* (Sm) forms synergistic mixed-species biofilms with fungal pathogen *Candida albicans* (Ca) (Ellepola K, IADR Presentation, San Francisco, 2017). However, the mechanisms involved in this bacterial-fungal interaction remain largely uncharacterized. In the present study, we examined the role of *S. mutans*-derived glucosyltransferase B (GtfB) in mediating the synergism of the Sm-Ca mixed-species biofilm.

Methods: *C. albicans* biofilms were formed using Sm and Sm-Ca cell-free supernatants. Biofilms were quantified using XTT assay, CFU counting and visualized using confocal microscopy. *C. albicans* growth kinetics was evaluated using optical density measurements. The sugar levels in the biofilm supernatants were analysed using qualitative and quantitative tests. Biofilm microenvironment pH was measured using micro-electrodes. Sm-Ca protein expression in mixed-species biofilm was evaluated using quantitative proteomics (iTRAQ) followed by gene-ontology analysis (Cytoscape-v2.8.3).

Results: *C. albicans* showed reduced biofilm formation in Sm and Sm-Ca cell-free supernatants. In contrast, growth assays showed a drastic increase in *C. albicans* growth in Sm supernatant compared to Sm-Ca supernatant. Surprisingly, introducing GtfB into the medium, significantly increased the *C. albicans* growth ($P<0.05$). This may be due to role of GtfB in catabolizing sucrose into glucose and fructose monosaccharides which can be rapidly utilized by *C. albicans*. Quantitative proteomics showed proteins associated with glucose metabolism are significantly upregulated in mixed-species biofilms ($P<0.05$). Subsequent gene-ontology studies showed pathways related to glucose metabolism are significantly affected ($P<0.05$). The rapid utilization of glucose and fructose by *C. albicans* lowered pH by 0.2-0.3 pH units in the mixed-species biofilm microenvironment.

Conclusions: Our data demonstrate that a bacterial exoenzyme (GtfB) could be a key mediator in the synergistic interaction between *S. mutans* and *C. albicans* mixed-species biofilm and establishes a new supportive role for *C. albicans* in aggravating dental caries.

S0196

Acemannan Induced Osseous Healing of Calvarial Defect in Skeletally-Mature Rats

D. D. Godoy[1], W. Banlunara[2], P. Sangvanich[3], R. Pauwels[4], S. Jaroenporn[3], P. Thunyakitpisal[5]

[1]Chulalongkorn University, [2]Chulalongkorn University, [3]Chulalongkorn University, [4]Chulalongkorn University, [5]Chulalongkorn University

Objectives: The aim of this study was to investigate the effect of acemannan, a polysaccharide extracted from *Aloe vera* plant, on calvarial defect healing in skeletally-mature rats.

Methods: Acemannan was extracted from the inner leaf gel of *Aloe vera* plant and was processed to freeze-dried sponges corresponding to the following treatment groups: 1 mg (A1), 2 mg (A2), 4 mg (A4), and 8 mg (A8). Thirty-five, six-month old, Sprague-Dawley rats were randomly divided into five groups (n=7). A 7mm diameter mid-parietal calvarial defect was generated using a trephine bur. The defect was treated with the different concentrations of acemannan sponges, or was left as blood clot control. The rats were sacrificed after four weeks, and the calvarial specimens were obtained and fixed for micro-computed tomography (microCT) scanning and evaluation of three morphometric parameters: bone surface (BS), bone volume (BV), and tissue mineral density (TMD). The calvarial specimens were further processed for histopathological analysis to observe inflammatory cellular infiltration, tissue response, and bony matrix organization. MicroCT data were analyzed using SPSS ver. 17. One-way ANOVA was used to compare between groups, followed by Dunnett *post hoc* test.

Results: All animals recovered uneventfully from the surgery. MicroCT evaluation revealed a significant increase in BS and BV in the A1 and A2 groups compared with the blood clot control group ($p<0.05$). A significant increase in TMD was observed in the A4 and A8 groups compared with the blood clot control group ($p<0.05$). Histopathologically, neither the control nor any acemannan-treated group demonstrated inflammation. Furthermore, all groups had good contact between the old and new bone. The acemannan-treated groups had more fibroblast-rich fibrous tissue and more well-organized bony matrix compared with the control group.

Conclusions: Acemannan is an effective agent for bone regeneration, demonstrating biocompatibility and enhancing bone surface, bone volume, and bone density in skeletally-mature rats.

S0197

Rambutan-Honey for Diabetic-Wounds Treatment: stimulate NIH-3T3-Fibroblasts Proliferation and Inhibit MDA-Formation

E. Y. Rachman[1], B. Bachtiar[2], D. Suniarti[2], A. B. Sutjiatmo[3], T. Mozef[4]

[1]Faculty of Medicine Universitas Jenderal Ahmad Yani Cimahi Indonesia, [2]Faculty of Dentistry Universitas Indonesia, [3]Faculty of Pharmacy, Universitas Jenderal Achmad Yani Cimahi Indonesia, [4]Research Centre for Chemistry, Indonesian Institute of Science (LIPI)

Objectives: Diabetic-wounds are slower to heal that involved fibroblasts proliferation and free-radicals.Honey provides comparatively rapid wound healing. It's has an antioxidant, anti-inflammatory, antibacterial, and debridement effects.However, the mechanisms in treating oral-mucous diabetic-wounds have poorly understood. *The objectives* of this research are to investigate flavonoid compound in rambutan-honey pharmaceutical grade (RHPG) stimulate NIH-3T3-fibroblasts proliferation, inhibit MDA-formation, and accelerate oral-mucous diabetic-rats wound closure.

Methods: The research methods were experimental laboratory. In vitro samples (n=5x10^3 / gp) divided into negative control (NC), RHPG 31.25µg / mL (dö1); 62.5µg / mL (dö2); 125µg / mL (dö3); 250µg / mL (dö4). In vivo samples (n=12 / gp) divided into negative control (NC); positive control (PC) 4±2mm diabetic-wounds; 1mL RHPG diabetic-wounds (RHPG). Oral-mucous diabetic-wounds closure were observed day 0, 3, 7, 14. NIH-3T3-fibroblasts proliferation determined by MTS-assay, free-radicals (MDA) by TBARs-assay,and statistically analyzed (ANOVA, Tukeys, p<0.05).

Results: The results were found that 31.25µg / mL RHPG promote NIH-3T3-fibroblasts proliferation significantly (p=0.028) with cell proliferation (%) mean 97±9.2 (dö1), 96.01±7.4 (dö2), 87.00±16.3 (dö3), 83.09±5.5 (dö4) respectively, inhibit MDA-cell cultures (p=0.035) with mean 0.0029±8 (dö1), 0.0066±12 (dö2), 0.0058±5 (dö3), 0.0064±5.84 (dö4) µMol / mL respectively, inhibit MDA diabetic-wounds day 14 (p=0.026) with mean 0.0066±0.0016 (NC), 0.0133±0.007 (PC), 0.0047±0.00µMol / mg (RHPG) respectively, and accelerate diabetics-wounds closure significantly day 7 (p=0.026) with mean 3.35±0.2 (NC), 3.69±0.3 (PC), 2.91±0.3mm (RHPG) and day 14 (p=0.035) with mean 0.00±0.00 (NC), 3.14±0.5 (PC), 0.01±0.00mm (RHPG) respectively. Flavonoid in RHPG markedly promote fibroblasts proliferation, inhibit MDA formation,and accelerate diabetic-wounds healing.

Conclusions: The Conclusion were rambutan-honey flavonoid potentially managing diabetic-wounds, promoting fibroblast proliferation, prevent stress oxidative, and accelerating oral diabetic-wounds closure. Thus our finding provides clear evidences that rambutan-honey topical have potential as a natural treatment for human diabetic-wounds.

S0198

Dental Students' Awareness, Preparedness and Barriers towards Managing Tobacco-using Patients

C. Y. Liu, C.Y. Ho, D. Duangthip, C. H. Chu

Faculty of Dentistry, The University of Hong Kong

Objectives: To evaluate Hong Kong dental students' awareness, preparedness and barriers towards managing tobacco-using patient.

Methods: A validated fifty-two-item closed-ended questionnaire was administered to dental students who were in their clinical years in 2017. The questionnaire consisted of five sections: awareness towards practicing TCC, confidence, knowledge and clinical practices when managing tobacco-using patients, and perceived barriers during counseling.

Results: All 206 invited students had participated in this study. Most (93%) agreed dentists should deliver TCC, and 85% of students felt confident explaining the negative impacts of tobacco use on oral health. However, only around a quarter (27%) of students were well-prepared to help patients in tobacco cessation. Most (85%) had attempted TCC, but less than a half (43%) had succeeded in reducing patients' cigarettes consumption. While 60% of students agreed Nicotine Replacement Therapy (NRT) was helpful, only 28% understood its mechanism of action and merely 16% felt knowledgeable enough to introduce NRT to their patients. 81% students felt their patients lacked the motivation to quit smoking, and 62% of students felt they did not have sufficient skills at this stage of their training.

Conclusions: Most students had positive attitudes towards dental professional's role to promote tobacco cessation. However, only a minority of students were well-prepared to manage tobacco-using patients. The main barriers were found to be patients' apathy, students' incompetency and inadequate familiarity with NRT. Greater emphasis should be given in teaching of TCC techniques to improve the confidence of dental students when managing tobacco-using patients.

S0199

The Potential of Clinical Streptococcus Salivarius in Inhibition of Enterococcal Faecalis by Cross-Streak and Agar Well Diffusion Method

Yohanes Bosko Ardy W.

Faculty of Dentistry, Universitas Indonesia

Objectives: To analyze and compare the growth inhibition of *Enterococcus faecalis* by *Streptococcus salivarius* isolated from dorsal of tongue and saliva for potential probiotic agent in dental treatment.

Methods: *Streptococcus salivarius* was isolated from dorsal of tongue and saliva, cutured in medium agar and confirmed by PCR. The selected colonies were then cultured in medium LB broth. The bacteriocin-like inhibitory substance (BLIS) were then isolated and confirmed by SDS-Page. Bacteriocin test using cross-streak was performed by exposing the *Streptococcus salivarius* to *Enterococcal faecalis* ATCC 29212 in the same medium (BHI Agar). Furthermore, to examine the potential inhibtion of BLIS isolated from *Streptococcus salivarius*, agar well diffusion method is performed by administered BLIS from different concentration into the well surrounding *Enterococcal faecalis*. The diameter of the inhibition area were then measured and compared.

Results: The result from the cross-streak method showed the inhibition potency of *Streptococcus salivarius* against *Enterococcal faecalis*. Furthermore, BLIS extracted from *Streptococcus salivarius* also showed the inhibtion potency. Additionally, *Streptococcus salivarius* isolated from dorsal of the tongue showed higher inhibition potency than from saliva.

Conclusions: The source of the *Streptococcus salivarius* determine the inhibiton potency against *Enterococcal faecalis*. In addition, clinical *Streptococcus salivarius* derived from dorsal of the tongue were the most potent inhibition agent compare to *S. salivarius* derived from saliva and *S. salivarius* ATCC 13419 for the protection against *Enterococcal faecalis*.

S0200

Distribution of Gingival Smile Types and the Difference in Perception of Smile Aesthetics between Dentists and Laypeople

H. Y. C. Goh, S.Y. Haw, J. N. Leong, J. Ren, J. H. Fu

Faculty of Dentistry, National University of Singapore, Singapore

Objectives: This study aimed to investigate the **(1)** distribution of gingival smile types and its relationship between lip length, lip mobility, gender, and age; and **(2)** difference in perception of smile aesthetics between dentists and laypeople on amount of gingival exposure and presence of symmetrical or asymmetrical interdental papilla fill in the aesthetic zone.

Materials and Methodology: Photographs of 408 subjects were taken at rest and smiling. Subsequently, the subjects and 51 dentists were shown 10 photographs with different gingival discrepancies and a video clip of a dynamic smile. They rated the photographs on a 4 point scale and selected video time frames of the most and least attractive smiles.

Results: In this subject population, 25.4% had low, 53.1% had average, and 21.4% had high gingival smile types. There were significant relationships between smile type, and lip mobility and age ($p=0.00$). There were no significant relationships between smile type, and gender ($p=0.161$) and lip length ($p=0.129$). There was a significant difference in perception of smile aesthetics between dentists and laypeople ($p<0.05$) for low smile lines, smiles with 3-4mm gingival exposure, and symmetrical and asymmetrical deficient papilla fill. Overall, the most attractive smile had 0-1mm gingival exposure, while 4mm was considered to be the least attractive.

Conclusions: The average smile type was most prevalent. Significant differences in perception between laypeople and dentists for most variations in gingival architecture exist. Dentists and laypeople found the most attractive smile to show 0-1mm of gingiva with complete papilla fill.

S0201

Aloe vera inhibited among bacteria from generalized chronic periodontitis patients

Nguyen Le Thu Thao

Ho Chi Minh City University of Medicine and Pharmacy

Objectives: During the last decade, extracts from Aloe vera against periodontopathic bacteria have been documented due to its antibiotic and anti-inflammatory effects. This study aimed to investigate the inhibitiory activities of Aloe vera gel against bacteria isolated from generalized chronic periodontitis patients.

Methods: Aloe vera gel was prepared by mixing 100 grams aloe vera extract in one liter of 2% dimethyl sulfoxide (DMSO). Bacteria were collected from the deepest periodontal pockets of 10 patients with generalized chronic periodontitis and then cultured onto three blood agar flasks for each sample. A sterile filter paper was impregnated with either **(1)** Aloe vera gel (AV) or **(2)** 2% chlorhexidine gel (CHX) or **(3)** sterile distilled water (W) then placed on culture flasks following by aerobic incubation (for 48h) and anaerobic condition (for 72h). After incubation, the diameter of growth inhibitiory zones around the filter paper were measured and analysised.

Results: In W group, all plates did not appear the zones of the growth inhibition. Under aerobic conditions, mean of inhibitiory zone diameter of CHX and AV group were 11.20±0.573mm and 11.40± 1.258mm, respectively.

Under anaerobic conditions, mean of inhibitiory zone diameter of CHX and AV group were 10.50± 0.601mm and 10.30±0.559mm, respectively.

Conclusions: TThe antibacterial activity of Aloe vera was almost equivalent to Chlorhexidine on the collected bacteria from generalized chronic periodontitis patients under both aerobic and anaerobic conditions.

Keywords: Aloe vera, Chlorhexidine, generalized chronic periodontitis

S0202

Effect of Roughness and Surface Morphology on Hydroxyapatite Coating of Titanium Alloy

N. L. Aminuddin[1], N. A. B. Maswar[1], M. G. Kutty[2]

[1]Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia, [2]Department of Restorative Dentistry, Faculty of Dentistry, University of Malaya, Kuala Lumpur, Malaysia.

Introduction: Implant is a component that interfaces with bone to support dental prosthesis. Modification of implant surface has been proposed for enhancing osseointegration.

Objective: The aim of this study was to assess the effect of surface roughness and morphology of titanium alloy (Ti6Al4V) on hydroxyapatite (HA) coating using simulated body fluid (SBF).

Methods: Twelve samples of Ti6Al4V were equally divided into 3 groups according to the following surface treatment (i) gritted, (ii) sandblasted, and (iii) sandblasted followed by acid etching. Then, each sample was immersed in a simulated body fluid (SBF) and was taken out on 3rd, 5th and 7th days of coating respectively. Analysis of the surface characteristics was performed using a Profilometer (Alicona), Scanning Electron Microscope (SEM) and Energy Dispersive X-ray Spectrometer (EDX).

Results: Sandblasting created grooves on the sample's surface. Meanwhile, acid etching removed contaminants, therefore, producing clean, even and rough surface with higher surface roughness. Average value of surface roughness (Sa) obtained for sandblasted and acid etched samples were 1.6±0.3μm and 2.3±0.3μm respectively. The morphology of the SBF coated samples were similar for all the surfaces. Analysis of Ca / P of the coating gave a ratio of 1.70 for sandblasted sample after immersion in SBF for 7 days. Theoretically, HA has a Ca / P ratio of 1.67.

Conclusion: The value indicated that the SBF coating on sandblasted samples gave the best coating of HA. Therefore, this study was able to establish that the best surface for coating of HA via SBF method is the sandblasted surface.

S0203

Knowledge, Attitudes, and Practices (KAP) of Philippine Basketball Association (PBA) Players on Mouthguard Use in Preventing Traumatic Dental Injuries (TDI)

Beatriz April Alcantara1

[1]University of Phinippines

Objectives: To determine the KAP among PBA players on mouthguards as a preventive measure against TDI.

Methods: A cross-sectional descriptive study design utilizing self-administered questionnaires was used. From a total enumeration of a total population of 201 players, 170 participated in the study.

Results: 91.67% are knowledgeable on mouthguard use in preventing TDI, most commonly because of medical professionals.

Only 34.55% have experienced using mouthguards, mostly because of advice by a dentist or physician (42.19%) and for protection (43.75%). The most common reasons for not wearing mouthguards were having never thought about it (44.04%) and discomfort (43.12%).

66.86% have experienced TDI, 52.34% of which during both training and official games. Soft tissue lacerations were the most frequent type of injury (84.96%). Although, injuries confined to the teeth (n=104) outnumbered soft tissue lacerations (n=96).

While only 38.41% have a positive attitude towards the PBA requiring mouthguard use, 79.63% have a positive attitude towards promoting mouthguard use among PBA players, preferably by a dental professional (66.67%) or an athletic trainer (46.51%).

Conclusion: There is a moderate risk for TDI among PBA players. PBA players are knowledgeable on mouthguards in preventing TDIs; however, majority have not used mouthguards. Most common reasons for wearing mouthguards are recommendation by a dental or medical professional and protection. Most common reasons for not wearing mouthguards are not having thought about it and discomfort. While most of the players do not agree with the PBA requiring mouthguard use, majority are willing to be educated on mouthguard use.

P01

陶瓷射出成型製程之氧化鋯牙科植體的表面處理研究
Surface Treatments of Dental Zirconia Implants by Ceramic-Injection-Molding

劉益銓 (Liu YC)[1]，**謝蓉珮** (Hsieh JP)[1]，**莊淑芬** (Chuang SF)[1]，**張土火** (Chang TH)[2]
[1]成功大學，[2]全球安聯

鈦金屬植體在齒周牙齦處顯露金屬陰影問題影響美觀，而氧化鋯植體正可提供另一種植體材料的選擇。研究顯示氧化鋯可達到優異的骨整合，而其表面處理的方式影響骨細胞親和性與早期骨整合。本研究目的為比較利用陶瓷射出成型技術（CIM）之氧化鋯生醫陶瓷，藉由不同的表面處理製程比較其表面粗糙度、親疏水性和機械強度之影響。CIM 製作與氧化鋯牙根同樣製程之平面試片，依實驗組別分為4組處理：控制組、噴砂表處、電漿表處、噴砂搭配電漿表處。各組分別以多功能掃描探針顯微鏡（AFM）量測表面粗度、並利用液滴接觸法評估牙根與試片表面靜態接觸角、接著進行牙根的強度檢測。AFM 結果顯示，氧化鋯牙根中段（0.105μm）、下段（0.153μm）、試片（0.060μm）呈相似的表面形貌。牙根的表面水接觸角為60-70°，未處理的試片為53.9°，只噴砂表處試片呈疏水性為70°，但經電漿表處組其接觸角降低為6-10°，顯示親水性大幅提高。經噴砂搭配電漿表處組比控制組有略高的機械強度，但無統計差異。由結果可知，CIM 製程的氧化鋯牙根，可藉由表處參數改變其親疏水性，且電漿顯著提高親水性。此外經噴砂搭配電漿處理的氧化鋯牙根具不錯的機械強度。

P02

老化對牙科樹脂奈米陶瓷的光學性質之影響

Effect of Ageing Time on Optical Properties on Dental Resin Nanoceramics

劉佳祈 (Liu J Q)[1]

[1]中山醫學大學口腔科學研究所

比牙科傳統樹脂，樹脂奈米陶瓷具有硬度較高，耐磨耗、抗破裂和強度高的特性，但樹脂易吸水性可能會導致樹脂劣化及變色。本研究的目的是，利用老化試驗評價老化時間對樹脂奈米陶瓷的諸光學性質的影響。實驗使用兩種市售樹脂奈米陶瓷材料（Lava Ultimate 與 VITA ENAMIC），試片尺寸為6 x 6 x 10mm^3，各材料試片數為5片。使用冷熱循環機將試片反覆交替放入5度C和55度C的水中進行20000次的冷熱循環測試。之後對冷熱循環前、後的各組試片進行測定光學性質（L*, a* 和 b*），並計算半透明度參數（TP）、對比度（CR）、蛋白光（OP）和色差（ΔE00）。結果顯示經冷熱循環20000次後，VITA ENAMIC的 TP 和 OP 值均顯著增加（P<0.05），而 CR 值顯著降低（P<0.05）；在 Lava Ultimate 方面，CR值有顯著增加（P<0.05）；Lava Ultimate 和 VITA ENAMIC 的ΔE00分別上升到2.02和1.66，變色皆明顯（P<0.05）。實驗證明經20000次的老化試驗，對 Lava Ultimate 及 VITA ENAMIC 材料的各項光學性質有顯著的影響，但材料的光學性質變化值仍在可接受的閥值內。

P03

下巴顏面麻木常為系統性癌症轉移之警訊
Numb Chin Syndrome often Signals a Systemic Malignancy

盧心玉 (Lu S Y)[1]
[1]高雄長庚醫院

Background / purpose. Numb chin syndrome (NCS) is a critical sign of systemic malignancy; however it remains largely unknown by dentists and clinicians.

The aim of this study was to investigate NCS that is more often associated with cancer metastasis than with benign diseases.

Methods: Sixteen patients with NCS were diagnosed and treated. The oral and radiographic manifestations were assessed.

Results: Four (25%) of 16 patients with NCS were affected by nonmalignant diseases (19% by medication-related osteonecrosis of jaw and 6% by osteopetrosis); yet 12 (75%) patients were caused by malignant metastasis, either in the mandible (62%) or intracranial invasion (13%). NCS was unilateral in 13 cases and bilateral in 3 cases. Mandibular pain and masticatory weakness often dominated the clinical features in NCS associated with cancer metastasis. In two patients, NCS preceded the discovery of unknown malignancy (breast cancer and leukemia). In the nine others, NCS heralded malignancy relapse and progression. Metastatic breast cancer in 4 (36%) cases accounted for the most common malignancy. Other metastatic diseases included 2 multiple myelomas, and one each of leukemia, prostate cancer, colon cancer, lung cancer, maxillary sinus adenoid cystic carcinoma and adrenal gland neuroblastoma. Radiographic examinations showed obvious mandibular metastasis with compression of the inferior alveolar nerve or mental nerve in nine patients, and leptomeningeal seeding or intracranial metastasis to the trigeminal nerve root at the skull base in two patients.

Conclusion: NCS without trauma or obvious odontogenic causes often signals a metastatic disease. It may be the first manifestation of an undiscovered malignancy.

P04

萎縮性舌炎：病例報告
Atrophic Glossitis: A Case Report

吳翊竹 (Wu Y C)[1]，**蔣孟玲** (Chiang M L)[2]
台北長庚醫院牙科部[1]，台北長庚醫院口腔病理暨診斷科[2]

臨床常見的舌頭疼痛病因包含舌炎、感染、營養缺乏或是口腔灼熱症，其中萎縮性舌炎是舌頭呈現紅腫平滑的一種臨床組織變化，致病的原因需要經過一連串的測試及分析才能確診，其中營養缺乏如維生素B12、鐵是常見的原因。此篇病例報告呈現一位69歲患有胃食道逆流及胃瘜肉的女性病患，因舌頭疼痛四個月而來就診，臨床觀察發現舌背前三分之一紅腫及舌乳突喪失，臨床診斷為萎縮性舌炎。我們予以抽血檢查，報告顯示血漿中鐵、鋅及維生素B12及血紅素及紅血球容積數值皆偏低，Homocysteine偏高．並且測出胃壁細胞自體抗體，因此診斷這個病例為消化道失血及胃部營養吸收不良致貧血及萎縮性舌炎，於是給予耐絲菌素口服懸液、口服鐵鋅補充劑及持續性維生素B12注射液等序列藥物治療三星期後症狀完全消失，同時轉診至腸胃科，檢查發現胃竇及胃體黏膜有紅色糜爛潰瘍，胃賁門有一直徑5.0公分，十二指腸有一直徑1.0公分的瘜肉，切片檢查結果為糜爛性黏膜合併多發性腺體增生。病人血中驗出壁細胞自體抗體，影響壁細胞分泌與維生素B12吸收相關的為內在因子之分泌以及血紅素生成，並且造成慢性胃炎，及口腔中的舌乳突喪失及紅腫等萎縮性舌炎症狀。因腸胃疾病造成之貧血及營養吸收不良導致之萎縮性舌炎，可以在臨床檢查配合血液檢查及跨科合作下幫助確切診斷，並且針對誘發因素如鐵、鋅離子及維生素B12缺乏給予治療。

P05

鉺雅鉻雷射處理植體周圍炎合併同時補骨術

Peri-Implantitis Management by Er: YAG Laser with Simultaneous Bone Repair: A Case Report

林泰誠 (Lin T C)[1,2]，**余承佳** (Yu C C)[3]，**丁信智** (Ding S J)[3]，**陳俊呈** (Chen C C)[1,2]

[1]中山醫學大學牙醫學系，[2]中山醫學大學附設醫院口腔醫學部，[3]中山醫學大學口腔科學研究所

近年，植體周圍炎的盛行率逐漸增加中，而如何清除附著於植體表面的牙菌斑及細菌附屬產物至為關鍵。

現行的治療包括機械性清創，化學性殺菌劑以及全身性投與抗生素等方式。雖然目前尚未有明確標準化治療植體周圍炎，一般認為能夠清創植體表面且盡量不傷害表面為主要準則。本研究探討利用鉺雅鉻雷射 Er: YAG Laser（2940nm）治療植體周圍炎的可能性，此案例的患者為植體周圍囊袋 6mm，有出血並且合併骨缺損的植體周圍炎，在手術翻瓣後，使用 Er: YAG Laser 在植體表面進行1分鐘照射殺菌，並且去除周邊發炎性肉芽組織（30mJ / pulse，20Hz，有水冷卻），填入骨粉後利用不噴水非接觸照射（30mJ / pulse，20Hz，無水冷卻）促進血塊凝集並期待其生物刺激效應，術後半年以及一年後進行臨床再評估。結果囊袋深度降低至 2mm，沒有出血且放射線檢查顯示植體周圍有良好骨生成。本案例顯示 Er: YAG Laser 在適當能量輸出下能夠去除植體周圍炎周邊炎性肉芽組織，且清創植體表面不會明顯破壞其表面，在臨床上可能是機械性清創方法中良好的治療方式。

P06

經由置入扭矩和共振頻率分析探討植體穩定度

Investigation of Implant Stability through Insertion Torque and Resonance Frequency Analysis

傅柏松 (Fu PS)[1]，**洪純正** (Hung CC)[1] **吳逸民** (Wu YM)[1]

[1]高雄醫學大學附設醫院牙科部

Objective: Implant stability is crucial for successful osseointegration. The purposes of this study were to investigate implant stability through insertion torque and resonance frequency analysis at implant placement and to examine the effect of gender, bone density, implant length, and implant diameter on implant stability.

Materials and Methods: Twelve patients who needed implant replacement were enrolled in this study. A total of 20 implants were installed to support single-tooth crowns. The maximal insertion torque (IT) and resonance frequency analysis (RFA) values were recorded for each implant at surgery. Gender, implant position, bone density, and implant length as well as diameter were also registered.

Results: The mean maximal IT was 44.5±2.5 Ncm. The mean RFA was 77.45±5.61 implant stability quotient (ISQ). Generally, male subjects showed higher IT and ISQ values, but no significant difference was detected. Implant position had a significant effect on IT, with higher values measured from the mandible. Correlation analysis revealed high positive correlations between IT/bone density, and ISQ / implant diameter (r=.827 and .763, respectively). Moderate positive correlations between IT / implant diameter, IT / ISQ, and ISQ/bone density (r=.628, .0605, and .571, respectively) were observed. Weak correlation existed between ISQ/implant length (r=.452). In addition, very weak correlation (r=.273) between IT / implant length was found.

Conclusion: The results suggest that implant diameter had more impact than length on IT / ISQ. Bone density played a considerable role in IT / ISQ determination.

P07

可吸收鈣基骨取代物於齒槽骨保存術暨植體置入：病例報告

A Case Report of Ridge Preservation and Implantation with Bioresorbable Calciumbased Bone Substitute

廖官瑄 (Liao K H)[1]，**何坤炎** (Ho K Y)[1,2]，**吳逸民** (Wu Y M)[1,2]，**周郁翔** (Chou Y H)[1]，**胡愷芳** (Hu K F)[1,3]，**黃炯霖** (Huang C L)[1]，**楊子萱** (Yang T H)[1]，**陳怡惠** (Chen I H)[1]

[1]高雄醫學大學附設中和紀念醫院牙周病科，[2]高雄醫學大學口腔醫學院牙醫學系，[3]高雄市立大同醫院牙科部

觀察「甦骨粒」，一種由磷酸鈣與硫酸鈣所組成的可吸收鈣基骨取代物，於齒槽骨保存術暨後續植體置入的臨床使用效果評估。病患59歲男性，患有局部重度牙周炎。而右下第一大臼齒因三級根叉侵犯與嚴重骨缺損，建議拔除。由於病人選擇以牙科植體來修復，故建議病人在拔牙時一併進行齒槽骨保存術，手術中合併使用可吸收鈣基骨取代物以及高濃度生長因子（Concentrated Growth Factors）。術後兩周拆線，並於六個月後置入植體。植體置入後四個月進行 贋 復體製作。病患在一年後，植體聯接體周圍都穩定無發炎反應，X光攝影檢查，骨質沒有不正常吸收現象。可吸收鈣基骨取代物用於齒槽骨保存術與其他種類骨移植材料在臨床操作以及使用效果並無明顯差異。而植體置入時與後續追蹤的骨頭植體接觸百分比，頰側與舌側 ISQ 數值都在74以上。本病例報告採用「甦骨粒」可吸收鈣基骨取代物來進行齒槽骨保存術，對於不想使用動物材料或人類的異體移植物，不失是一種安全穩當的方法。

P08

使用血管再生術來治療根尖未成熟併有根尖周圍炎之恆牙：病例報告

Revascularization of Immature Permanent Tooth with Apical Periodontitis: Two Case Reports

謝宗祐 (Hsieh T Y)[1]，**劉振聲** (Liu C S)[1]，**李欲禎** (Lee Y C)[1]，**王俊欽** (Wang C C)[1]

[1]屏東基督教醫院

臨床上牙髓壞死（pulp necrosis）之牙根發育未成熟恆牙（immature permanent tooth）的根管治療對醫師來說是極大的挑戰。根尖成形術（apexification）是傳統治療此類牙齒的方式，但薄弱的齒質（thin dentinal wall）讓此類牙齒有較高的牙齒斷裂風險（tooth fracture risk）；近年來血管再生術（revascularization）廣泛被提出運用在此類治療上，此治療不僅能讓齒壁增厚，而且能增加牙根長度。本篇提出兩個使用血管再生術治療牙根發育未成熟的恆牙的成功案例。案例一為一位12歲男孩，右下第一小臼齒因深度齲齒造成牙髓壞死併有根尖周圍炎；案例二為一位10歲女孩，左下第二小臼齒因齒外齒（dens evaginatus）斷裂造成牙髓壞死併有根尖周圍炎，在使用血管再生術治療後19個月及11個月追蹤觀察發現根尖病變癒合、根尖孔（apical foramen）縮小且牙根管壁增厚。本報告欲討論血管再生術與根尖成形術之治療時間、臨床結果與預後的差異。本篇使用血管再生術治療的兩個案例皆有良好的結果，可作為醫師臨床上治療此類患者的參考。

P09

不銹鋼矯正環套對裂齒症牙齒咬合力量傳導的改變

Strain Analysis of Occlusal Force Distribution on Cracked Tooth Using SSB

陳 錦 (Chen G)[1]，謝永祿 (Hsieh YL)[2]
[1]口腔醫學部，[2]國軍臺中總醫院

Cracked tooth syndrome (CTS) may occur if heavy occlusal force are applied. Many studies confirmed if a tooth with CTS is not properly treated, infected pulpal disease may occur. At the early stage of CTS, stainless steel orthodontic band (SSB) were recommended not only to avoid tooth damage, but also to protect the tooth from heavily occlusal force. The aim of this study is to investigate an ideal protective treatment for CTS using the strain analysis of occlusal force distribution on cracked tooth using SSB protection. A total of 25 premolars were collected and fractured with a surgical chisel along the central groove. The occlusal force set in vertical and horizontal direction were tested/measured with a NI Compack Daq system that connected with the strain gauge sensors before and after protection with SSB. The recorded data were statistically analysed. The results showed the strain value of experiments samples with SSB decreased to 28.7% under vertical force, and 15.40% under horizontal force. However, there are no significant statistical differences. It is reasonable to estimate that the occlusal force on lingual side are much heavier than the buccal side in both vertical and horizontal direction. Therefore, SSB slightly works on decreasing the overall occlusal force during mastication.

Keywords: cracked tooth syndrome, occlusal force, stainless steel band, strain gauge, sensor

P10

利用健保資料庫分析牙科樹脂填補修復與兒童注意力不足過動症之關係研究

Association between Dental Composite Resin Restoration and Attention Deficit Hyperactivity Disorder (ADHD) In Children. A Nested Case-Control Study from Taiwan National Health Insurance Database.

胡潔仁 (Hu C J)[1]，**黃景揚**(Huang C Y)[2]，**張育超** (Chang Y C)[1]

[1]中山醫學大學牙醫研究所，[2]中山醫學大學附設醫院醫研部

齲齒是台灣兒童口腔內最常見的疾病，近年來治療以使用複合樹脂材料填補為主。但複合樹脂材料已證實會釋放出雙酚A（bisphenol A），而且有研究指出雙酚A與兒童注意力不足過動症（ADHD）有關，但目前仍鮮少有研究討論牙科樹脂和兒童過動症之間的關係。因此本研究使用台灣健保資料庫，選出1998-2005年出生，並在2000-2008年有接受過齲齒填補治療後一年以上被診斷出 ADHD 的兒童做分析，以1:2比例選出同樣條件、未被診斷出 ADHD 的兒童做對照組，持續追蹤到2013年。結果顯示接受樹脂填補治療的患者被診斷出 ADHD 的風險顯著較高 odds ratio=1.183（95% CI=1.092-1.282）。進一步分析樹脂填補次數中位數為8次，填補8次以下被診斷出 ADHD 的 odds ratio 為1.166（95% CI=1.068-1.273）；填補8次以上被診斷出 ADHD 的 odds ratio 為1.206（95% CI=1.099-1.324）。結果中顯示接受樹脂填補治療後得到 ADHD 之風險比未填補樹脂高，其中帶有劑量效應，填補次數越多被診斷出 ADHD 風險越高。

P11

具骨整合機制的新型富鈣磷植體研究

A Novel Developed Calcium-Rich Phosphate Implants with Bone Integration Capability through Dissolution and Early Bone Apposition

洪純正 (Hung C C)[1,2]，陳建志 (Chen J C)[3]，柯嘉泠 (Ko C L)[1,4]，吳蕙妤 (Wu H Y)[2,4]，陳文正(Chen W C)[4]

[1]College of Dental Medicine, KMU, [2]Department of Prosthodontics, KMUH, [3]Department of Orthopaedics, KMUH, [4]Department of Fiber and Composite Materials, FCU

The study aimed to investigate the osseointegrative responses of implant surfaces formed by sandblasting and acid-etching (SLA) and further secondary anchored with tetracalcium phosphate (TTCP) in vivo. The implant stability quotient (ISQ) scales in the postoperative implants were recorded and were photographed by x-ray. The samples within femurs in rabbits were utilized to histologically examine the bone-to-implant contact (BIC) and the surface topography was examined by a microscopic system to analyze the BIC conditions. The study protocol in clinical was also approved by the Institutional Review Board (IRB) of Kaohsiung Medical University Hospital (KMUHIRB-F(II)-20160092) and the study is still ongoing.

Our present results showed that the CaP dental implant(Anker II) significantly improved the early osteointegration of the BIC at 1-month implantation (78.96%) , and good bone tissue integration was observed (1-6 months) within femurs in rabbits. Initial clinical view after 3 month implantation of CaP implant, the X-ray imags also showed good bone coverage over the implant margins. This also means the healing time can be shortened, and new bone around the implants can be regenerated at an earlier stage. This study shows the potential clinical benefits of the constructed geometry of the TTCP additive on Ti for implant surfaces in bone level solutions.

P12

組織調理材添加四級胺鹽化幾丁聚醣之抗黴菌效果

Antifungal Effect of Tissue Conditioners Containing Poly (Acryloyloxyethyltrimethyl Ammonium Chloride)- Grafted Chitosan on Candida Albicans Growth in Vitro

李欣霖 (Lee H L)[1]，**陳國裕** (Chen K Y)[2]，**莊傳宗** (Chuang C C)[1,4]，**王宜斌** (Wang Y B)[1,4]，**傅鍔** (Earl F)[1,3,4]，**邱賢忠** (Chiu H C)[1,4]

[1]三軍總醫院牙科部，[2]雲林科技大學化材系，[3]台北新店慈濟牙科部，[4]國防醫學院牙醫學系

臨床上配戴活動假牙的病人常會產生義齒口腔炎，其主因為念珠菌感染。幾丁聚醣為自然界豐富的天然高分子，臨床上很多研究已證實其有相當好的抗黴菌效果，且將幾丁聚醣四級胺鹽化將使得改質後的幾丁聚醣帶有更多正電荷進而具有更好的抗黴菌效果。本實驗將不同重量百分比（5.0, 7.5, 及 10.0 wt%）的幾丁聚醣或四級胺鹽化幾丁聚醣加入組織調理材，並將材料加入白色念珠菌培養液中共培養，等到一、二、七天後，抽取各組其中0.1毫升的容易進行抹盤且計算菌落數，使用 one-way ANOVA 及 post hoc Fisher's LSD multiple comparison test 進行統計。

結果顯示幾丁聚醣或四級胺鹽化幾丁聚醣皆具有抗黴菌能力（$P<0.05$），尤其是四級胺鹽化幾丁聚醣具有相當顯著的抗黴菌效果。將四級胺鹽化的幾丁聚醣加入組織調理材可以有效治療因白色念珠菌所引起的義齒口腔炎。

P13

呼吸、咬合與顳顎關節的三角關係：從解剖學、生理學、口腔醫學 文獻回顧

The Relationship among Occlusion, Temporomandibular Joint and Breathing: A Literature Review from Anatomical, Physiological and Oral Medicine Aspect.

林宛萱 (Lin WH)[1,2]，**陳廣興** (GS Chen)[1,2]，**李忠興** (CH Li)[1,2]
[1]齒顎矯正科暨兒童牙科，[2]國防醫學院牙醫學系

The underlying etiology of temporomandibular joint (TMJ) disorders is usually complicated, thus making TMJ disorders difficult to resolve. The most common cause of TMJ disorders is an occlusal problem cause by a change of occlusion equilibrium. Traditionally, classification of TMJ disorders is based on an examination of the symptomatic soft and hard tissues surrounding the TMJ. However, this approach leaves the root cause of TMJ discomfort undiscovered. Current available treatment options for patients in the clinical settings with TMJ disorders include medication, relaxation exercises, or occlusal splint therapy.

These treatments are all focused on resolving noted symptoms and the last option of utilizing an occlusal splint is sometimes ineffective and may lead to a reduction in patient quality of life. A few literatures has mentioned about patients with breathing disorders also has TMJ disorders. This review will look at the current literature related to TMJ disorders from anatomical, physiological, and oral medical aspects and hoping to find the connection between breathing disorder and TMJ disorders with a clinical symptoms of occlusal problem.

P14

電腦層析技術應用於牙科放射線影像
Computed tomography Using in dental radiography

沈嬿文[1,2] (Shen Y W)，**廖哲暐**[1] (Liao C W)，**傅立志**[1,2] (Fuh L J)，**許瑞廷**[1] (Hsu J T)，**黃恆立**[1] (Huang H L)，**郭志暐**[3,4] (Kuo C W)，**王瑞騰**[3] (Wang R T)

[1]中國醫藥大學，[2]中國醫藥大學附設醫院，[3]中山科學研究院，[4]聯合大學

現有的市售錐狀射束電腦斷層掃描（Cone beam computed tomography, CBCT）可以產生三維影像，對於醫師用於診斷來說的確是一大助益，但目前的 CBCT 造價高，且解析度不足影響對牙根斷裂等病灶的判讀。本研究提出一新式掃描方式，將數位感光片置於口內欲照射部位，X光球管在外部以數位感光片為圓心，做圓弧形擺動進行拍攝，既可以產生三維影像又可具有高解析度，並兼顧放射線劑量。傳統的電腦斷層掃描（Computed Tomography）其掃描角度皆可大於180度，但在本研究中X光球管擺動範圍大於180度時就會產生無效的照射，所以就採用電腦層析（Computed Tomosynthesis）的掃描方式，X光球管在外部做 ±40°~60° 之間的弧形掃描，以取得多張2維影像，再藉由演算法重組成三維影像。本研究亦自行打造的原型機中進行概念驗證，並拍攝標準假體，去驗證影像演算法的正確性，未來也會對於硬體方面做校正，使重組後影像更為完美。

P15

下頜髁狀突斷裂患者之全口活動義齒重建：案例報告

Complete Denture Rehabilitation of a Patient with Fractured Mandibular Condyle: A Case Report

王光傑 (Wang K C)[1]

[1]埔基財團法人埔里基督教醫院

下頜髁狀突骨折為下頜骨骨折最為常見的型態，約佔29%，其處置方式視個案可採手術或非手術治療。此類骨折癒後可能對患者之口腔機能造成影響，如咀嚼時的疼痛，下顎運動障礙，咬合關係錯亂，張口量減少等。本報告案例為一七十七歲女士，因交通意外致左側下頜髁狀突斷裂，原活動義齒損壞，支台齒全脫落，並顏面挫傷。經本院他科治療後轉至口腔外科，環口片影像發現左側髁狀突斷裂且位移，與家屬討論後決採非手術治療。牙科贋復部份：患者張口時向患側偏斜並帶疼痛，開口量不足，上下頜無牙脊不平行，經評估建議製作上下顎全口活動義齒，以復健並恢復口腔功能。治療過程於蠟堤調整時發現患者並無存在穩定咬合，OVD降低，但仍儘量依循 **1.** 可重複出現之咬合，**2.** 足夠之開口量，**3.** 美觀等原則進行咬合關係取得。義齒製作完成後已進行兩年之追蹤，患者於一般進食上並無問題，惟無法咬較硬的食物。結論：下頜髁狀突骨折為牙科常見之骨折，其多樣的併發症對牙科贋復帶來一定挑戰，而治療後的義齒調整亦當被重視，以期儘量取得令患者滿意的治療成果。

P16

學思達教學法於口腔胚胎與組織學之應用
A New Method of Teaching Oral Embryology and Histology

余權航 (Yu CH)[1]

[1]中山醫學大學口腔醫學院牙醫學系，[2]中山醫學大學附設醫院口腔醫學部

學思達教學法為中山女高國文科張輝誠老師所創立，目的在培養學生自學、思考、表達的能力。有別於傳統上課老師單方面講述，學思達教學法提供特別製作的學思達講義讓學生自學、課堂以小組討論形式進行、並上台回答講義上學思達式提問來達到教學的目的。學思達教學法有兩個主要的關鍵：製作以問題為導向的學思達教學講義與老師對課堂主持的能力。本篇報告將分享口腔胚胎與組織學的學思達講義製作理念與內容。筆者將自製的學思達講義與學思達牙醫學教育理念的文章、影片存放於網路空間，可免費觀看與下載。整理如下：學思達於口腔胚胎與組織學之應用，文章與演講講義：http://goo.gl/23uBXp；演講影片：http://podcast.csmu.edu.tw/podcast/show_episode/882；學思達口腔胚胎與組織學沐課網站與講義：http://moocs.csmu.edu.tw/course/166/intro（或掃描上方 QR code）；其它學思達牙醫學講義：http://goo.gl/23uBXp；臉書社團：學思達牙醫學教育。

P17

將虛擬實境融入臨床牙醫學的教學計畫

Teaching Plan Incorporating Virtual Reality into Clinical Dentistry

黃振勳 (Huang JS)[1,2]，謝明錡 (Hsieh MC)[1]，謝達斌 (Hseih DB)[1,2]，莊淑芬 (Chuang SF)1,2，戴晟昆 (Tai CK)[2]

[1]Institute of Oral Medicine, Cheng Kung University, [2]Department of Stomatology, Cheng Kung University Hospital

Abstract: Alongside developments in image technology and computer operations, virtual reality (VR) is being adopted gradually more frequently in medical education. This paper presents a teaching plan incorporating VR technology for use in in dental education.

Development of the proposed teaching plan: First, a full-mouth VR model was created using panoramic view of mouth including the dentitions and presented in a lecture. Links to several diagnosis and examination results were provided to the students for reference, including demographic data, chief complaints, relevant history, clinical symptoms, as well as results of dental X-rays, periodontal probing, and tooth mobility examinations.

Results: After the class, the students scored the VRincorporated teaching plan a mean rating of 4.37 in 5 levels Likert evaluation items.

Conclusion: In summary, the VR-incorporated teaching plan for clinical dentistry presented in this paper can enhance student learning interests and outcomes by offering a vivid 3D environment and real-time interaction.

P18

大氣噴射式電漿對生物膜滅活之影響

The Effects of Atmospheric Pressure Plasma Jet Inactivation of Biofilms

王品儒 (Wang P R)[1]，**張喆鈞** (Chang C C)[1]，**傅軍皓** (Fu C H)[1]，**王明誠** (Wang M C)[1]
[1]中原大學生物醫學工程系

自然界當中細菌主要以生物膜菌體的形態存在，而懸浮菌體形成生物膜後對於環境的耐受性會相對提高，導致難以滅除，因此需要新的滅菌方式。低溫大氣電漿近年來廣泛的運用於生物醫學方面，主要優勢為對細菌無專一性以及對人體無熱效應或是電刺激。本研究利用自行製作之電源供應器與電漿反應器，藉由電源供應器所提供之 10.6kV 工作電壓下與 102.4kHz 工作頻率下激發電漿，其消耗功率為 24.29W 做為滅菌研究。並進行生物膜滅活之定量實驗，同時利用雷射共焦掃描顯微鏡分析電漿的可侵入生物膜厚度為 36.2μm，從場發射掃描式電子顯微鏡結果發現，細菌經過電漿處理過後，在表面形貌產生極大變化。作用於人體並不會產生出任何電刺激或灼熱感等不適感，在細菌實驗方面，對於形成生物膜後的大腸桿菌具有一定程度上的滅活效果。

P19

Bioactive Materials Crystallization Mechanisms in Dentinal Tubules and Lateral Canals

Chun-Pei Lin, Yen-Yi Chen, Chun-Pin Lin, Ph.D.

Abstract: Materials for occluding lateral canal and dentinal tubules may block the pathway of bacterial infection into root canal system to improve the success rate of root canal therapy. Bioactive materials, gelatin-templated calcium mesoporous silicate (GCMS), DP-Bioglass , monocalcium phosphate monohydrate (MCPM) and β-tricalcium phosphate (β-TCP), showed potential in occluding dentinal tubule in our previous study and some literature. Therefore, the aim of this study is to analyze the crystallization mechanism of GCMS, MCPM / β-TCP and DP-Bioglass in dentinal tubules and lateral canals.

Different pH values of MCPM / β-TCP mixture were applied on transwell dentin disc model for observing precipitation by scanning electron microscopy (SEM) and energy dispersive x-ray spectroscopy (EDS). Besides, the time factor and the effect of modification of inner surface of dentinal tubules by hyaluronidase and sodium hypochlorite were also evaluated. Furthermore, bioactive materials including GCMS, MCPM / β-TCP and DP-Bioglass were applied in root canal system of human tooth and observed by Micro-CT and SEM.

results: The results revealed that the mole ratio of 1:1 MCPM / β-TCP and pH value 3.5-4, can form crystal in dentinal tubules and the depth reached as deep as 70μm. The longer placed time of MCPM / β-TCP, the better occlusion density and length was observed. Moreover, hyaluronidase and sodium hypochlorite can modify dentinal tubules and improve the depth of bioactive material precipitation in dentinal tubules. The effect of modification was stronger in MCPM / β-TCP group than in GCMS group. In human tooth in vitro study, crystallization of GCMS, MCPM / β-TCP and DP-Bioglass were observed in the apical third of dentinal tubules and lateral canals.

conclusions: In conclusions, bioactive materials as GCMS, MCPM / β-TCP and DP-Bioglass could crystallize in dentinal tubules and lateral canals in human tooth in vitro. Further in vivo investigations may be carried out to confirm the crystallization mechanisms of these bioactive materials.

Keywords: calcium phosphate biomaterial; MCPM / β-TCP; lateral canals; Glycosaminoglycan ;

P20

Effects of Drilling Protocols in Soft Bone on Primary Stability Parameters

C. LIN[1], T. Wang[1], T. Yang[1], L. Lin[1]

[1]School of Dentistry, National Taiwan University, Taipei, TAIWAN

Objectives: This study's aim was to investigate the effects of drilling protocols on the different implant primary stability parameters: insertion torque (IT), resonance frequency (ISQ), periotest value (PTV), micromotiom (MM), and reverse torque (RT) in low-density artificial bone block.

Methods: Polyurethane foam and cellular sawbone test blocks (30mm x 15mm x 19mm) were used (10-pcf, density: 0.16g / cc) to simulate the soft quality bone. A self-tapping tapered implant, Nobelbiocare MKIV (4.0mm x 10mm), was used. Implant site preparation was performed according to manufacturer's protocol of soft-bone. In this standard drilling protocol (SDF), 2.4 / 2.8 twist step drill was used as the final drill before implant placement. In another undersized drilling protocol (UDF), 1.9 / 2.5 twist step drill was used as the final drill. Eight implants were tested for both SDP and UDP. IT, ISQ, PTV, MM, and RT were recorded for each implant. IT was recorded during implant placement, and then ISQ was measured. A 5-mm healing abutment was connected to the implant for measuring PTV and MM. MM was measured (1mm above implant platform) with micro-miniature LVDT when a lateral force was applied to the top of healing abutment by a Dynamic Loading Machine. At last, RT was measured. Mann-Whitney U test was performed for statistical analysis.

Results: (Table 1), IT was increased with UDP preparation but not statistically significant. UDP significantly increased ISQ and decreased PTV and MM. No obvious change was noted in RT with UDP.

Conclusions: The data suggest that undersized preparation may improve implant stability indicated by the decreased micromotion under loading. However, parallel changes could be observed with ISQ and periotest value, but not insertion torque and removal torque.

Table:

Table1.

	IT(Ncm)	ISQ	PTV	MM(μm)	RT(Ncm)
SDP	12.8±1.3	52.0±1.7	5.4±1.1	63.4±11.7	9.0±0.7
UDP	14.1±2.9	53.8±0.7	3.9±0.5	45.0±4.5	9.0±1.4
M-W U test	P=0.279	P=0.015	P=0.010	P<0.001	P=0.279

Table Footer: (No Image Selected)

Keywords: Primary stability, drilling protocol, insertion torque, resonance frequency, periotest value.

Support Funding Agency / Grant Number- Abstracts: MOST 105-2314-B-002-078-

Financial Interest Disclosure: None

Awards:

Group Author Abstracts- Abstract:

Session Chair Volunteers- Abstracts: Not Interested

Special Scheduling Needs- Abstracts:

Student Status- Abstracts: No

P21

Vital Pulp Therapy Outcome of Immature Teeth with Central Cusp

Chun Chieh Kao

The purpose of this study was to retrospectively assess the treatment outcomes of vital pulp therapy (VPT), including pulp capping, partial pulpotomy, full pulpotomy and partial pulpectomy, of immature permanent teeth with central cusp.

ASA class 1 health subjects with at least one immature permanent tooth, which had central cusp fractured and received VPT or apexifcation with at least 6 month follow-up period at the National Taiwan University Hospital, were included. The treated teeth were examined clinically and radiographically by blinded evaluators.

A total of 48 subjects, aged 7.3 to 46.3 y / o (13.2±7.5 y / o), with 56 teeth were included All teeth were premolars with the mean of follow-up period of 29.4±4.3M. VPT (31 / 56, 55.4%) and apexification (25 / 56, 44.6%) had clinical (no clinical symptom and sign) and radiographic (no lesion or lesion decreased in size) success rates of 100% (31 / 31), and 92% (23 / 25) respectively and no significant difference between two treatments ($P>0.05$). VPT presented significantly higher incidences of apical closure (100%), increase of canal wall thickness (96.8%), and root length (77.4%) compared to apexification groups (apical closure: 68%, wall thickness: 52%, root length: 48% ($P<0.05$). Most of the teeth with periapical pathosis (32 / 51, 62.7%) had remaining pulp tissue. 26 teeth of them received VPT, and other 6 teeth received apexification.

Both VPT and apexification presented high clinical and radiographic success rates in immature permanent teeth with central cusp in this retrospective study. However, VPT had better outcome to promote continues growth of root in comparison to apexification.

P22

Increased Expression of Glutaminasein Osteobliasts Promotes Macrophage Recruitment in Periapical Leisions

Hui Chien

Introduction: Recently, we have demonstrated that tissue hypoxia stimulates the progression of periapical lesions by upregulating glycolysis-dependent apoptosis of osteoblasts. Other facets of hypoxia-induced metabolic reprogramming in disease pathogenesis require further investigation. In the study, we examined the connection between hypoxia-augmented glutamine catebolism in osteoblasts and development of periapical lesions.

Methods: Primary human osteoblasts were cultured under hypoxia. Expression of glutaminase 1 (GLS1) was examined by Western blot. Production of glutamate was measured by colorimetric assay. Knockdown of GLS1 was performed with siRNA technology. CCL2 secretion and chemotaxis of J774 macrophages were examined by enzyme-linked immunosobent assay and Transwell migration assay, respectively. In a rat model of induced periapical lesions, the relations between disease progression and osteoblastic expression of GLS1 / macrophage recruitment were studied.

Results: Hypoxia enhanced GLS1 expression and subsequent glutamate production in osteoblasts. Glutamate induced chemoattraction of macrophages by osteoblasts through upregulation of CCL2 synthesis. Hypoxia promoted CCL2 secretion and macrophage recruitment through augmentation of glutaminolysis. Knockdown of GLS1 abolished hypoxia-induced effects. In rat periapical lesions, progressive bone resorption significantly related to elevated GLS1 expression in osteoblasts and increased macrophage recruitment.

Conclusions: In addition to the rise in glycolytic activity, enhanced glutamine catabolism in osteoblasts is also related to the progression of periapical lesions. GLS1 may be a potential therapeutic target in the management of periapical lesions.

Keywords: hypoxia; glutaminolysis; glutamate; CCL2; inflammation; bone resorption

P23

Investigating the Differentiation Role of miR-218 for Dentin Regeneration

K. Chang[4], R. Chen[1], F. Chang[3], M. Chen[1,2]

[1]Graduate Institute of Clinical Dentistry, School of Dentistrt, National Taiwan University, Boston, Massachusetts, UNITED STATES, [2]Esthetic Dentistry, National Taiwan University, Taipei, Massachusetts, TAIWAN, [3]Graduate Institute of Biochemistry and Molecular Biology, College of Medicine, National Taiwan University, Taipei TAIWAN, [4]Graduate Institute of Clinical Dentistry, School of Dentistry National Taiwan University, Taipei, TAIWAN

Objectives: Adult stem cells have shown great potential for regenerative medicine. However, it remains unclear on the epigenetic mechanisms controlling cell fate decisions. The purpose of this study is to investigate the differentiation role of microRNA-218 (miR-218) on human dental pulp stem cells (DPSCs). With the help of a multifunctional lipid-based nanocarrier: GCC-Fe_3O_4, we hope to develop a feasible cell therapy for dentin regeneration in the future.

Methods: Human DPSCs were obtained from impacted wisdom teeth of healthy patients under the permission of National Taiwna University Hospital institutional review board (IRB). Cytotoxicity and transfection efficiency of GCC-Fe_3O_4 nanocarriers were evaluated, After transfecting miR-218 and miR-218 inhibitor into DPSCs under regular culturing medium and induction medium for 24h, 3-(4, 5-dimethylthiazol-2-yl)-2, 5-diphenyltetrazolium bromide (MTT) assay and ALizarin red S (ARS) staining were performed after 1, 4, 9 days respectively to investigate cell proliferation rates as well as mineralization potentials.

Results: GCC-Fe_3O_4 nanocarriers were sized 130nm with a stable distribution over time. Such nanocarriers were biocompatible and serum endurable with over 90% transfection efficiency under regular culture condition. The results of ARS staining and optical density quantification indicated that miR-218 had a negative regulation on dentinogenesis of DPSCs after induction. As we further inhibited with the inhibitory miRNA, the mineralization ability increased significantly. This result may related to the MAPK pathway.

Conclusions: We identified miR-218 as a negative regulator on dentinogenesis of DPSCs. By inhibited such miRNA faciliated the mineralization effects. Meanwhile, the novel GCC-Fe_3O_4 nanocarrier with great biocompatibility and high efficiency is suitable for gene manipulation in biomedical studies and further clinical applications. Together, with the appropriate stimulation and regulation, we hope to apply this regeneration therapy clinically in the near future. (No table selected)

Table Footer: (No Tables) (No Image Selected)

Keywords: Dental pulp stem cells, MicroRNA, Nanocarriers, Dentin Regeneration, Cell therapy.

Support Funding Agency / Grant Number- Abstracts: National Taiwan University Hospital (NTUH)

Financial Interest Disclosure: NONE

Awards: AADR Grant-AADR Bloc Travel Grant

IADR Group / Network Award-IADR BEHSR Lois Cohen International Travel Award

IADR Group / Network Award-IADR Pulp Biology & Regeneration Group Young Investigator Prize for Innovation

IADR Group / Network Award-IADR Arthur R. Frechette Research Award in Prosthodontics

IADR Group / Network Award-IADR Pulp Biology & Regeneration Group Awards

P24

Imaging-Based Assessment of Masseter Volume and Implications on Oral Functions

C. Lin[1], K. Chuang[1], C. Wu[2], S. Wu[3], D. Cheng[4], W. Lo[5,1]

[1]Department of Dentistry, National Yang-Ming University, Taipei, TAIWAN, [2]Institute of Oral Biology, National Yang-Ming University, Taipei, TAIWAN, [3]Division of Family Dentistry, Department of Stomatology, Taipei Veterans General Hospital, Taipei, TAIWAN, [4]Division of Prosthodontics, Department of Stomatolog, Taipei Veterans General Hospital, Taipei, TAIWAN, [5]Division of Oral and Maxillofacial Surgery, Department of Stomatology, Taipei Veterans General Hospital, Taipei, TAIWAN

Objectives: Previous studies have reported the association between age, masticatory performance, and saliva flow rate in healthy subjects. The role of masseter volume in these links has not yet been elucidated. The study aimed to (a) develop a novel assessment of masseter muscle volume (MMV), based on T1-weighted magnetic resonance imaging (MRI), and (b) investigate the association between MMV and the oral functions.

Methods: Sixty healthy subjects (38 females / min.-max. age=20-74 years) were recruited for a T1-weighted functional magnetic resonance imaging (fMRI) scan and the follow assessment of oral functions: **(a)** the mixing ability of mastication (MA), assessed by color-changeable chewing gum, and **(b)** unstimulated (uSFR) and **(c)** stimulated saliva flow rate (sSFR). MMV was assessed by manually delineating the border of the left masseter (Figure 1).

Results: Across all subjects, males showed a higher MMV than females (Mann-Whitney U Test, $p<0.001$). MMV was not associated with age. In contrast, increased age was associated with decreased MA (Spearman's rho=-0.43, $p<0.001$), uSFR (rho=-0.39, $p<0.05$) and sSFR (rho=-0.49, $p<0.05$). sSFR, but not uSFG, was positively correlated with MA (rho=0.44, $p<0.05$) and MMV (rho=0.37, $p<0.05$) (Figure 1).

Conclusions: Our novel evidence revealed that assessing the T1 MRI image, which is regularly acquired in brain imaging, is a valid approach to quantify masseter muscle volume. The muscle volume is associated with both mixing ability and saliva flow rate, which is critical for food intake. The findings highlight the importance of imaging-based assessment of muscle volume in geriatric dentistry.

P25

Nicotine Effect on the Expression of γ-Synuclein in Oral Squamous Cell Carcinoma

Chia-Chen Hsu[1], Ting-Ting Chao[3], Yi- Shing Shieh[2]

[1]Graduate Institute of Medical Sciences, National Defense Medical Center, Taipei, Taiwan,
[2]Dental Department, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan,
[3]Medical Research Center, Cardinal Tien Hospital, School of Medicine, New Taipei City, Taiwan

Nicotine promoted cancer cell progression by nicotinic acetylcholine receptors (nAChRs). The γ-Synuclein (SNCG) gene is a member of the synuclein family of small proteins. Our study in oral squamous cell carcinoma (OSCC) indicates the upregulation of SNCG gene involved in cancer progression and epigenetic regulation may participate in the SNCG expression. Therefore, this study aim to test the hypothesis that nicotine promote OSCC tumor malignance through nAChR to regulate SNCG expression by epigenetic regulation.

To examine nicotine effect on the expression of SNCG and potential microRNA involved in regulating SNCG. Time- and dose-dependent treatment of nicotine in OSCC cell will be performed. Then mRNA and protein expression of SNCG will be examined. miR-15a expression in nicotine treated OSCC cells will be examined by quantitative real-time RT-PCR (qRT-PCR).

To validate α7-nAchR participate in mediating nicotine effect in regulating SNCG expression, we will perform loss of function experiment for α7-nAchR by using α7-nAChR shRNA and antagonists and examine SNCG expression and miR-15a change under nicotine treatment. These experiments will clarify the role of α7-nAchR in the regulation of SNCG expression under nicotine treatment and its potential mechanisms in OSCC.

P26

Different Impact from Betel Nut, Alcohol and Cigarette Risk Factors for Salivary Gland Tumor

Tsung-I Li[1], Ching-Huang Lai[2], Yi-Shing Shieh[1]

[1]Department of Dentistry, Tri-Service General Hospital, National Defense Medical Center, Taipei, Taiwan, ROC, [2]Department of Public Health, National Defense Medical Center Taipei, Taiwan, ROC

Objectives: Salivary gland tumor (SGT) is a rare disease with a largely unknown etiology. The risks of betel nut chewing, alcohol drinking, and cigarette smoking in oral cancer have been well documented but not in SGT. We aimed to investigate the independent and combined effects of betel nut chewing, cigarette smoking and alcohol consumption on the incidence of SGT.

Research Design and Methods: We conducted a case-control study of totally 1845 patients aged 35-65 years, including 239 patients with pathologcally proven SGT and 1606 controls from the health examination clinics of the same hospital during 2005-2014 to examine the association of these three risk factors to SGT in Taiwan. Odds ratios (OR) and their 95% confidence interval (CI) for the association of risk factors to SGT were analyzed.

Results: After adjusting for covariates, ORs for cigarette smoking, alcohol drinking, and betel nut chewing were 2.50, 1.27 and 3.38, respectively for SGT. The significantly increased risks for SGT was observed only in cigarette smoking. The significantly elevated risks of cigarette smoking were also found for subgroups of SGT (OR=5.24, 2.41, 2.63, and 2.04 in minor, major, benigh and malignant SGT, respectively). However, combined exposure to any 2 of 3 substances didn't elevate the risks.

Conclusions: Our study is the first evidence to show the independent and combined impact from betel nut chewing with cigarette smoking and alcohol drinking on the SGT, and support the concept that cigarette smoking may associated with SGT carcinogenesis.

Keywords: Salivary Gland Tumor; Alcohol Drinking; Cigarette Smoking; Betel Nut Chewing

P27

Riboflavin Treatment as a Collagen Crosslinker in Dentin Bonding

Yu Hsuan Chen

Objectives: Bond failure of dental restoration might be caused by dentin collagen degradation. Riboflavin has been reported as a photoreactive collagen cross-linker to improve the stability of dentin collagen. However, there are still concerns about the generation of active oxygen species to endanger the adhesive layer. The purpose of this study was to verify the effect of oxygen generated during photochemical reaction of riboflavin on adhesive layer, and to find the optimal treating strategy of riboflavin.

Methods: Riboflavin of 0, 0.05% and 0.1% was separately activated by blue light (0s, 30s and 60s), and the generated reactive oxygen species were quantified with the Singlet Oxygen Sensor Green (SOSG) test. Riboflavin of different concentrations was also applied on dentin disks and activated, and overlaid by a coat of resin adhesive. The degree of conversion of the adhesive was examined by FTIR-ATR. The effect of riboflavin in enhancing dentin bonding was assessed. Teeth with exposed occlusal dentin were treated with riboflavin at different stages of the dentin bonding treatment: A, application in-between etching and the adhesive Singlebond (3M / ESPE); B, apply before the adhesive but co-cuing; and C, mix with Singlebond. A microtensile bond strength (μTBS) test was performed, and the nanoleakage on resin-dentin microbeams was examined under SEM.

Results: The SOSG test showed the amount of oxygen generated by riboflavin was dependent on the concentration of riboflavin and irradiation time. FTIR-ATR analysis showed that the lower degree of conversion of bonding adhesive was correlated with the higher oxygen generation in SOSG test. Group A showed the highest μTBS and the less silver infiltration than others.

Conclusions: The blue light activated riboflavin generated singlet oxygen which may impair the polymerization of bonding adhesive. Optimizing the treating strategy might decrease the negative effect and improve the bonding strength.

P28

The Relation between the Bone Density and Accuracy of Dental Surgical Guide- a Preliminary Study

Yao-Te Peng*[1], Chung-Chih Tseng*[2,4,5], Chih-Han Chang[1], Chun-Ting Li[3], Yen-Nien Chen[1]

[1]Department of Biomedical Engineering, National Cheng Kung University, Tainan, Taiwan, [2]Department of Dentistry, Zuoying Branch of Kaohsiung Armed Forces General Hospital, Kaohsiung, Taiwan, [3]Graduate Institute of Mechatronic System Engineering, National University of Tainan, Tainan, Taiwan, [4]Department of Marine Biotechnology and Resources, National Sun Yat-Sen University, Kaohsiung, Taiwan, [5]School of Dentistry, College of Dental Medicine, Kaohsiung Medical University, Kaohsiung, Taiwan

***Corresponding author:**

Yao-Te Peng Tel.: +886-92121662; email: yautepeg@gmail.com

Chung-Chih Tseng Tel.: +886-932778965; email: caviton@gmail.com

Abstract: The bone density of edentulous region might cause the instability of surgical guide. To investigate the relation between bone density and accuracy of guide surgery is still clinical interest. The aim of this study is to evaluate the relation between the factor and accuracy of surgical guide by in vivo test

Five edentulous patients were chosen for implant surgery with surgical guides. The preoperative CBCT photography images were imported into MIRDC Dental software for implant planning. The surgical guides were fabricated by CAM machine. The deviation between planned and placed implants were calculated in implant's head and apex. The bone density of each implant site was measured from gray value (Hu number) of CBCT image.

Results: From the results, total of 10 implants sites were evaluated. The deviation between planned and placed implants were 1.54±0.79mm in implant's head and 1.74±0.77mm in implant's apex. The mean bone density was 992±0.79 in Hu number. The correlation coefficients between each deviation and bone density was R=0.83. Based on the present results, the bone density seem to affect the accuracy of surgical guide.

Keywords: Dental implant, Surgical guide, Bone density

http://www.icbbs.org/

Paper ID: S0015

http://link.springer.com/journal/12539

Interdisciplinary Sciences: Computational Life Sciences

*ISSN: 1913-2751 (Print) 1867-1462 (Online) Impact Factor: 0.853

The journal Interdisciplinary Sciences-Computational Life Sciences presents outstanding coverage of significant research across scientific disciplines. The coverage ranges across the broad field of computational life sciences, an area that has recently seen rapid development at the forefront of scientific research and technology. The editorial board comprises experts from around the world. Taking full advantage of Springer online technology, the journal combines rapid print publication with early OnlineFirst distribution through SpringerLink.

P29

Angle Class III Malocclusion Corrected by Lower Dentition Distalization Using Orthodontic Miniscrews- a Case Report

Kai Jing Yeh

Introduction: This case report describes the orthodontic treatment and follow-up of a patient with Angle Class III malocclusion. We started the orthodontic treatment after inflammation control. Orthodontic miniscrews were used to facilitate lower dentition distalization and crowding relief. Afterwards, prosthodontic treatment was conducted to rehabilitate the dentition.

Case Report: The 37-year-old male revealed a straight profile and Angle class III malocclusion with anterior crossbite. The upper and lower dental midline were coincident to facial midline. Diastema was present between 11, 21. The lower dentition showed mild crowding. The panoramic x-ray showed 15, 24, 25 previously received endodontic treatment, and 24 apical lesion was noted. During clinical examination, 15 inappropriate crown size was noted. The cephalometric analysis presented a Class I skeletal pattern with average mandibular angle and flared lower incisors.

Treatment Plan & Progress: The objectives of treatment were to obtain a class I molar and canine relationship with ideal overjet and overbite, relieve the crowding in the mandibular arch. Therefore, we planned to extract all of the third molars. Orthodontic miniscrews were inserted at bilateral lower buccal shelf for anchorage. We bonded lower posterior teeth and skipped anterior teeth to avoid round tripping in the distalization phase. Bilateral sliding jigs and inter-arch elastics were then used for lower dentition distalization. When space created, mandibular anterior teeth were En-masse retracted. After 20 months, canine and molar Class I relationship with normal overbite and overjet were established. The lower molars were distalized (LR: 3.5mm, LL: 2mm) and intruded (LR: 1mm, LL: 1mm), as shown in the superimposition of lateral cephalometric tracings. Facial profile was improved. One year post-treatment follow up showed stable result.

Discussion & Conclusion: In treating dental Class III adult patient without skeletal discrepancy, orthodontic camouflage treatment is the choice. Usually bicuspids were extracted to relieve crowding and achieve better overjet. However, extraction may deepen the anterior overbite and make treatment more difficult. Lower dentition distalization is another treatment alternative. To reach this goal, many devices can be used, including lip bumper, distal extension lingual arch, Jones jig, multi-brackets with class III elastics, and multi-loop edgewise therapy. But these devices mostly produce distal tipping of the molars rather than bodily movement.

Dental implants, orthodontic miniscrews, and miniplates on the other hand, provide absolute anchorage without unwanted side effect on the anterior teeth. Above all, orthodontic miniscrews have the advantages of easy placement and removal, small sizes, less soft tissue irritation, and low cost. In this case, orthodontic miniscrews were inserted at bilateral lower buccal shelf for anchorage. We bonded lower posterior teeth and skipped anterior teeth to avoid round tripping in the distalization phase. When space created, mandibular anterior teeth were En-masse retracted.

Moving the molars distally by distalization appliance tend to open the mandibular plane angle due to

the wedging effect. But with the aid of the orthodontic miniscrews, opening mandibular plane angle could be prevented. In this case, the vertical position of orthodontic miniscrews and the intrusive component of the force intrude mandibular molars by 1mm. On the other hand, interarch class III elastics mechanics was accompanied by upper molars extrusion 1mm, and mandibular plane angle increase 0.5 degrees. However, the vertical dimension remained and was not problematic in mesofacial patient.

In this case, overbite, overjet, and facial profile was improved with the orthodontic miniscrews. One year post-treatment follow up showed stable result. This case demonstrates that by using orthodontic miniscrews as anchorage for lower dentition distalization is a viable option when treating Angle Class III malocclusion with anterior crossbite. Besides, the cooperation of the interdisciplinary specialties, including orthodontics, prosthodontics, and appropriate treatment planning were required to achieve an ideal occlusion.

Reference:

1. Park HS, Kwon DG, Sung JH. Nonextraction treatment with microscrew implant. Angle Orthod. 2004; 74: 539–549.
2. Park H-S, Lee S-K, Kwon O-W. Group distal movement of teeth using microscrew implant anchorage. Angle Orthod. 2005; 75(4): 602–09.
3. Oh Y-H, Park H-S, Kwon T-G. Treatment effects of microimplant-aided sliding mechanics on distal retraction of posterior teeth. Am J Orthod Dentofacial Orthop. 2011; 139(4): 470–81.