Oral Presentation

0001

The Performance of One-Year Dental Internship Evaluation using Osce

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Introduction: The objective structured clinical examination (OSCE) is being widely used for assessment of students' progress toward competence in dental education around the world. In Taiwan, Dental OSCE have been made in its implementation in the pre- or clinical training requirement.

Objectives: The aim of this study is to evaluation Interns performance by using a five-station OSCE for formative assessment of their progress toward competence under one year internship in CMUH.

Method: Twenty interns (12 males and 8 females) were included in this study, two times of dental OSCE were performed before and after their one year clinical training in CMUH. The test content for five-station OSCE were designed to be equal difficulty levels for pre- and after test: 1 Simulation Patient station and 4 Skill stations; Station 1 and Station 2 were designed the same for pre- and after test. 10 minutes were set for each station: 1 minute for reading the test description, 8 minutes for processing and 1 minute for evaluator feedback. The paired Sign test was used for comparisons from pre-test to post-test.

Results: The average scores of all interns for pre-test is 51.1: male/ 52.5, female/ 49.8; post-test is 72.1: male/ 73.1, female/ 70.9. Both female and male interns revealed that there was a shift of scores to higher values after one year internship training.

Conclusion: Both female and male interns revealed that there was a shift of scores to higher values after one year internship training. But the male interns revealed big scores improvement after one year clinical training than female interns did.

0002

Achievement of Problem-Based Research Methodology Learning in Postgraduate Level

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Introduction: Research methodology is an important part in postgraduate studying. However, some students have a problem in applying this knowledge to real practices, from proposal developing until research conduct and manuscript submission. Bangkok Thonburi University (BTU) has developed the novel research methodology course using problem-based learning (PBL) concept, and implemented it in Postgraduate Program in Orthodontics.

Objective: To assess an achievement of problem-based research methodology learning.

Methods: The five-week module of problem-based research methodology was implemented in January-February, 2017. It composed of workshops in research question, sample size calculation, research ethics and article criticizing. Pre-test and post-test were performed in each student (n=14), and scores in knowledge and application domains were compared using paired t-test. Problem-solving test was done only in the post-test and compared to conventional research learning.

Results: In the knowledge domain, pre-test score (23.7±12.8%) was statistically different from post-test score (89.0±13.0%) and conventional learning mean score (52.0%). In the application domain, pre-test score (36.7±18.5%) was statistically different from post-test score (94.6±18.1%) and conventional learning mean score (50.0%). In the problem-solving domain, the PBL group score was 69.7±27.3% whereas the conventional learning mean score was 33.3%.

Conclusion: Achievements of problem-based research methodology learning in knowledge and application domains were good to excellent. Capability for problem-solving was fair, but still better than those of conventional learning. This learning technique in different setting, such as short-course module, as well as student's capabilities in proposal developing and research conducting will be further assessed.

0003

Extramural Oral Health Educational Program Involving Individuals With Disabilities-Impact on Dental Students' Professionalism

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Introduction: Oral health inequalities experienced by patients with disabilities (PWD) have been related to dentists' lack of professionalism, indicating the importance of professional development training during undergraduate studies.

Objective: This study investigated the effectiveness of an extramural program involving PWD on dental students' professional development.

Method: 165 undergraduate dental students (Year 1 to Year 5) participated in a voluntary program involving 124 visually impaired adolescents at a special education school in Kuala Lumpur. A dedicated module in oral health was developed by two clinical specialists in Special Needs Dentistry, consisting of dental check-up, dental 'explorace', neuro-linguistic programming, as well as oral health educational program on oral hygiene care, smoking cessation and healthy diet using innovative tactile-verbal-stimulated toolkit and exhibition materials. Following the completion of the program, dental students underwent a semi-structured focus group interview survey to gain their perception of their learning experience. Qualitative data was analysed via thematic analysis.

Results: The program had positive impact on various aspects under four major domains- professional knowledge (e.g. understanding oral-systemic-social-environmental health interaction and establishing smart partnership), professional competency (e.g. behavioural guidance and communication skills), professional behaviour (e.g. empathy and teamwork), as well as added values (e.g. event management and financial planning). Students demonstrated improved willingness to, and comfort in managing PWD, and expressed support for future educational programs involving this group of patient cohort.

Conclusion: Improved knowledge, competency, behaviour and values as well as support for future programs indicate effectiveness of educational activities involving PWD in developing professionalism among the future dental practitioners.

Keywords: disability, special needs, Special Needs Dentistry, Special Care Dentistry

0004

The Effectivenes of 5% Cosmos (*Cosmos Caudatus*) Extract as a Mouthwash Towards Saliva Gluthathione in Moderate Gingivitis Patients.

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Introduction: Gingivitis, an inflammation of the gums caused by bacterial plaque accumulation producing reactive oxygen species (ROS). Reactive oxygen species functions in body protection by destroying infectious bacteria although tissue damage may occur. Antioxidants can counter ROS activities. Oxidative stress may occur due to an imbalance between ROS and antioxidants. Glutathione (GSH) acts as an antioxidant that protects cells against oxidative damage. Cosmos is rich in antioxidants due to its flavonoid and phenolic contents.

Objectives: The aim of this study was to detect the concentration of saliva GSH in moderate gingivits patients after gargling with a solution containing 5% Cosmos (*Cosmos caudatus*) extract.

Method: Twenty subjects with moderate gingivitis were randomly divided into 2 groups, the treatment and control group. The treatment group gargled with 5% Cosmos extract whereas the controlled group gargled with Chlorhexidine 0.1%. Each subject is required to gargle for 60 seconds every morning and night, 5 days consecutively. The GSH level was measured before gargling and on the sixth day after treatment using a spectrophotometer at a wavelength of 412 nm. The data was analyzed using independant T-Test ($p<0.05$).

Result: The results of the study showed that there was significant difference between saliva GSH level of each group before and after gargling; moreover, after gargling with the solutions showed no significant difference of saliva GSH was found when compared between the treatment group and the controlled group.

Conclusion: the level of saliva GSH increases after gargling using 5% Cosmos extract and has the same effect with Chlorhexidine 0.1%.

0005

Use of Instagram to Obtain a Diet Diary: Undergraduates' Attitudes and Perceptions

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Introduction: The smart-phone technology has equipped most people with mobile cameras. This has popularised food photography and its sharing on social media spaces has been facilitated by applications such as Instagram. Such technology can be exploited to transform traditional methods of compiling diet diaries.

Objectives: This study assessed dental undergraduates' attitudes towards the use of Instagram to obtain a diet diary.

Method: Fifty-four first-year pre-clinical undergraduates completed a week-long diet diary using Instagram. They were requested to snap pictures of their everything they ingested. At the end of the exercise, students completed a questionnaire to evaluate their attitudes and experiences of using technology to record their dietary intake.

Results: 33 undergraduates completed the questionnaire. About 80% of them felt that the exercise helped them apply their knowledge about the aetiology and progression of dental caries. 90.9% of them would rather do the diary on Instagram than on paper. 90.9% of them agreed that the exercise was useful in helping them understand what their patients would experience when offered dietary advice. Interestingly, only 54.5% of them indicated that they would use Instagram to help their patients keep a diet diary when they become clinicians in the future.

Conclusion: The use of Instagram made the process more social and dynamic; possibly resulting in greater novelty and engagement in collecting dietary information. This simple exercise helped the undergraduates apply their knowledge about cariology and offered them with a technological alternative to the traditional pen-paper method of compiling a diet diary.

0006

Simulation Training for Medical Emergencies in Dentistry

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Introduction: Dental Students are expected to be able to anticipate, recognize and handle medical emergencies occurring in the dental office. The Undergraduate Curriculum mostly lacks opportunities for dental students to perform actions when faced with such emergencies. As these emergencies are relatively rare, a simulation programme is ideal to train students to diagnose as well as react to such emergency situations.

Objectives: The objective of this study was to assess if Simulation Training in a controlled environment is effective in imparting the knowledge in a practical aspect on management of medical emergencies in general dental practice.

Method: The study was performed in the following manner:

1. Pre course MCQ of 20 questions in the management of common medical emergencies.
2. Small group teaching incorporating simulated scenarios using standardized patients and mannequins on
   - i. Acute Myocardial Infarction
   - ii. Diabetic Hypoglycaemic crisis
   - iii. Anaphylaxis reaction
   - iv. Airway Obstruction
   - v. Layout of Emergency trolley
   - vi. intravenous and intramuscular access and administration of drugs
3. Post Course MCQ and Survey

Results: A majority of students 95% agreed that their knowledge of managing medical emergencies was inadequate and 78% felt confident in managing real life medical emergencies in the dental office following the simulation training. There was a marked statistically significant improvement in the pre and post MCQ scores ($p < 0.001$). The feedback about the course was unanimously positive.

Conclusion: Simulation type or hands-on training in a controlled environment improves understanding and management of medical emergencies in the dental office.

0007

Assessment of Flipped Classroom Teaching in Dentistry

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Introduction: Flipped classroom teaching is a renovated teaching approach that reverses traditional learning environment. The concept was first published in 1993 by Alison King and was further developed in 1997 by Professor Mazur. The teaching methodology allows teachers to interact with students in class rather than lecturing.

Objectives: To study if dental students well accept this novel teaching methods

Method: Class of 2012 students who enrolled in Oral Diagnosis course (5th year dental students). Flipped classroom teaching was performed and questionnaires were requested from all students.

Results: Sixty-four of eighty-three (64/83) students responded to the questionnaires. Regarding if flipped classroom teaching promotes learning in the class, 93.8% (60/64) responded “yes”. While asking if this novel teaching enhances personal interest of learning, 92.2% (59/64) responded “yes”.

Conclusion: Flipped classroom teaching frees up teachers’ lecturing time in class and allows more interactive discussions with students. Majority of dental students adopted this novel teaching approach very well and, therefore, is worth of promoting in teaching dentistry.

0008

Impact of Incorporating Recent Cariology Principals in an Undergraduate Curriculum

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Introduction: The majority of Black's principals are no longer applicable in restorative field, hence, it is mandatory to update our dental schools undergraduate curricula to accommodate the revolutionary changes in dental scientific evidence

Objectives: To present the effect of incorporating updated cariology principals in the undergraduate curriculum in Hong Kong.

Method: The 2016/2017 cariology course in the Faculty of Dentistry, The University of Hong Kong were delivered to BDS2 students through problem base learning (PBL) discussion, theme-based sessions, clinical practical sessions and hands-on workshops. Students have learnt the International Caries Detection and Assessment System (ICDAS), salivary function test, caries management by caries risk assessment (CAMBRA) and Cariogram for evaluation of caries risk. At the end of the course each student was invited to voluntarily submit a portfolio reporting the outcome of his/her clinical peer-based practice. They were asked to write one paragraph summarizing the application of learned principals in their clinical practice.

Results: Forty-nine (89%) from total of 55 students submitted their course products on time. The analysis of student products, particularly the sections describing the application of taught principals in future clinical practice, revealed that the course learning objective have been achieved.

Conclusion: Incorporation of recent cariology concepts in undergraduate curriculum may lead to improve student professionalism. Consequently, this may have a positive impact on student's clinical performance and acting as an effective introductory approach to minimally invasive dentistry. The voluntary submission of student products seems to be an effective method in evaluating the student engagement to course content.

0009

Evaluating the Performance of Dental Students with Different Levels of Clinical Experience in Learning ICDAS

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Introduction: Training and calibration of dental students in the International Caries Detection and Assessment System (ICDAS) is an essential part for its implementation in the clinical setting of any dental teaching institution.

Objectives: To evaluate the performance in ICDAS caries severity coding by dental students with different levels of clinical experience.

Methodology: Year 3 (n=44), year 4 (n= 37) and year 5 (n=41) dental students received training by an experience examiner, which included a two hour introductory lecture on ICDAS, followed by a 90 min e-learning video and practice sessions using extracted teeth and photographs. After the training session, the students examined a pre-validated set of extracted teeth and assigned scores in two sessions. The intra-examiner and inter-examiner agreement among the students was analysed using weighted kappa statistics.

Results: The range of kappa values for intra-examiner agreement among the year 3, year 4 and year 5 students was found to be between 0.60 to 0.90, 0.60 to 0.80 and 0.65 to 0.97 respectively. The inter-examiner agreement was 0.70 for year 3, 0.68 for year 4 and 0.76 for year 5 students. The mean kappa values of the three groups did not differ significantly (p> 00.5)

Conclusion: ICDAS caries severity coding by dental students was found not to differ significantly with differing levels of clinical experience

0010

A Framework to Develop, Use, and Evaluate Technology for Teaching and Learning in Dental Education

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Introduction: Technology permits the teacher to expand and extend the reach of content beyond the confines of the traditional classroom. The goal of Technology-Enhanced Learning (TEL) is learning. Learning is enhanced when technology increases and improves the quality and value of learning.

Objectives: The presentation shares a framework to guide the development, use, and evaluation of technology for teaching and learning at the Faculty of Dentistry, NUS.

Method: The Faculty formed a Workgroup to develop a framework for TEL in Dental Education. Workgroup discussions and analysis of education literature were informative in forming the framework.

Results: The framework consists of five principal stages:

(i) **Evaluation of need.** An essential first step; the teacher identifies the learning gap between expected and actual learning outcomes.

(ii) **Design, Development, and Implementation.** Appropriate instructional design approaches and relevant educational theories are considered to inform the design/development/purchase of the technology solution.

(iii) **Assess learner satisfaction** through peer review and by testing usability.

(iv) **Assess learner gain** using pre-test and post-test questions and appropriate experimental designs, as well as the use of QUEST principles based on BEME guidelines.

(v) **Assess learner impact** through important questions under a research framework to study the potential impact of TEL on students' behaviours / actions.

Conclusion: The framework simplifies the important steps needed to be taken. It presents a rational approach for an academic department or dental school to invest resources to develop / purchase TEL solutions as well as to investigate the value of TEL to student learning.

0011

Evaluation of A-Mis Supports Academic Proffesion Process

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Introduction: Academic Management information system (A-MIS) was developed to support accuracy and consistency of educational process at Muhammadiyah dental hospital Yogyakarta. The system was built to assure the quality of the academic learning process like setting student's performance record and assessment of the global requirement. Therefore, evaluation of A-MIS' ongoing process should be initiated to improve the system.

Objectives: The aim of this study is to evaluate perceived usefulness and ease of use, which is considered to be fundamental determinants of A-MIS' user acceptance.

Method: A questionnaire of Technology Acceptance Model (TAM) was used to evaluate perceived usefulness and ease of use of A-MIS by users. The subject of this research is 56 lecturers (total sampling) and 106 students (purposive sampling).

Results: A-MIS were perceived useful by 52 (90,88%) lecturers and 36 (33%) students. Most of the lecturers (96,14%) and students (76,92%) agreed that A-MIS is easy to use.

Conclusion: Burden to input all academic process in A-MIS may cause a poor rate of perceived of usefulness by students. An integrated feedback report in A-MIS to show students' performance should be further developed.

0012

An Examination of E-Learning Outcomes-Implications for Teaching and Learning

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Introduction: E-learning has a range of perceived advantages based on: unlimited access, scalability, re-usability, cost efficiency and analytics however, the evidence based for best-practice use is not clear.

Objectives: This paper analyzes e-learning interventions and examines the outcomes reported and implications for future for research design, reporting and e-learning goals.

Method: A systematic review identified articles, abstracts read and papers identified that met the inclusion criteria. Data were extracted relating to quantitate and qualitative outcomes. In addition, the nature of the learning interventions and research methods were also examined.

Results: From 514 papers, 15 met the inclusion criteria. 13 papers reported positive students' attitudes to e-learning. Six studies demonstrated significant knowledge effects, three no difference and one study used incorrect analysis. Two studies had no control groups. E-learning interventions were various, from one 30-minute activity to integrated online resources for a "blended" learning "course". Study design ranged from RCT to intervention with no control group. An analysis of the goals/outcomes, the level of knowledge was categorized into 4-levels: understanding, analysis, diagnosis and performance (UDAP). Of the 6 studies that identified significant differences, 5 were at the level of understanding and one at the level of diagnosis and one at the level of analysis and skills performance.

Conclusion: The e-learning interventions and evaluation outcome "knowledge" levels were not clearly defined and were at a low level. More systematic education interventions and research measures need to carefully define goals and categorize learning content and outcomes at knowledge performance levels (UADP).

0013

Prothrombotic Effect of Mimosa Pudica (Makahiya) Root Extract and Commercially-available Hemostatic Agent

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Introduction: Makahiya, "the touch me not plant", used as a traditional remedy for wound healing, is known to contain tannins that have prothrombotic effects.

Objectives: This study determined the difference in time for fibrin strand formation between blood treated with Makahiya extract and the baseline, blood treated with 20% ferric sulfate, commercially-available hemostatic agent and the baseline and lastly, Makahiya extract and 20% ferric sulfate.

Method: Using a 1mL tuberculin syringe, blood sample of 0.3mL was extracted from tooth extraction sockets of 20 participants at the Oral Surgery Section of the UE College of Dentistry. Three drops of 0.1mL blood were prepared on a glass slide. Sample A was used as baseline, Sample B was treated with Makahiya extract and Sample C was treated with 20% ferric sulfate. Fibrin test was done and measured in seconds using a stopwatch.

Results: The results showed that the mean difference in time with Sample B (M=20.789,SD=8.95), was significantly lower than with Sample A (M=308.3, SD=58.65), t(19)=21.67, p=0.000. The mean difference in time was also significantly lower when Sample C (M=8.92, SD=5.49) was compared with Sample A, t(20)=22.73 p=0.000. Effect sizes (d=6.85 & d=7.18, respectively) both exceed Cohen's (1988) Convention for a huge effect (d=2). When Sample B was compared with Sample C, there was no significant difference in time but Sample C showed faster clotting time, t(19)=5.06, p=.000. Effect size (d=1.59) exceeded Cohen (1988) Convention for a very large effect (1.2).

Conclusion: Makahiya extract showed a significant prothrombotic effect although not as effective as the 20% Ferric Sulfate.

0014

Orofacial Pain and Specific Dental Treatments are Associated with Changes in Cardiac Output Measurements

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Introduction: Subjects seeking oral care commonly associate specific dental treatments with orofacial pain, thereby developing anxiety states. Recent pain and anxiety literature suggested that pain and anxiety experienced during dental treatment can influence cardiac functional output measurements, including arterial blood pressure (BP) and heart rate (HR).

Objectives: To investigate how orofacial pain and type of dental treatment relates to cardiovascular function output.

Method: Ninety subjects seeking oral care were recruited from the National University Hospital and Faculty of Dentistry Clinics. Subjects were asked to complete questionnaires to assess potential risk factors for pain perception and dental anxiety. Furthermore, orofacial pain, anxiety, BP and HR were evaluated both before and after specific dental treatments. Statistical analysis was carried out using the SPSS software (IBM). The National Healthcare Group Domain Specific Review Board gave ethical approval to this study with reference code: 2015 / 00712.

Results: Participants who underwent periodontal therapy experienced a statistically significant increase in systolic BP and decrease in HR after treatment, regardless of the presence of vasoconstrictor in local anaesthesia (LA). In addition, orofacial pain intensity and anxiety status before treatment did not predict changes in cardiovascular autonomic functional outputs after treatment. Orofacial pain-related disability and jaw functional impairment were mild-to-moderately associated with BP changes. Subjects' age and the presence of vasoconstrictor in LA were found to be mildly and moderately correlated with HR changes, respectively.

Conclusion: Preventive measurements should be employed (e.g. take BP/HR) when managing patients undergoing periodontal treatments, particularly mid-aged adults and elderly with cardiovascular conditions.

0015

Effective Use of International Caries Detection and Assessment System (ICDAS) in Measuring Caries by Undergraduate Students

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Introduction: The Malaysian Dental Dean Council in 2013 agreed to introduce ICDAS in all dental faculties. At Lincoln University College, ICDAS was introduced from Year 2 onwards.

Objectives: This study aims to evaluate the effective use of ICDAS in measuring caries by undergraduate dental students in a new private institution.

Method: ICDAS introduced comprised of three lectures, a 2-day-Year-2 workshop (diagnostic photographs assessment and scoring on validated extracted teeth), followed by clinical use in Year 3 for patient screening and treatment. Effective use of ICDAS was based on practical test on extracted teeth in Year 2, Competency clinical screening test in Year 3 prior to starting patient treatment, written test on knowledge and application and, Questionnaire survey to Year 3 students post ICDAS use.

Results: Eighty-three students (in 3 different academic year intake) undertook the training exercise. Practical tests showed an overall pass of 97.2% (Groups 1 and 2) and 97.7% (Group 3) were obtained in the practical tests. A 100% pass was obtained by all groups in the competency test held on patients in Year 3. No student scored A and B^+ in first two groups whereas 10.4% scored A and 18.8% scored B^+ in group 3. The written test showed a pass percentage of 94.4% (Group 1 & 2 combined) and 95.9% obtained by Batch 3. The questionnaire results showed a high acceptance rate for the training program (98.8 % found ICDAS useful for patient screening). However, 38.6% had difficulties in screening patients using ICDAS codes and, found code 4 the most difficult. 100% thought combining codes 1 and 2 makes it easier and saves clinical time. Additionally, 95.2% found it easy to do treatment planning based on ICDAS codes.

Conclusion: Students found ICDAS training to be easy to understand and apply in measuring caries on dental patients.

0016

Coloring and Anti-Microbial Effect of Diluted Gential Violet on Dental Biofilm

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Introduction: Gentian Violet (GV), when prepared at 0.1% solution, has long been used as anti-microbial medication for oral candidiasis with potential side effect of coloring the oral mucosa.

Objectives: This study aimed to evaluate staining and anti-microbial effects of different concentrations of GV on dental biofilm. Specifically, it aimed to compare the proportion of stained and unstained biofilm samples treated with different GV concentrations and the mean microbial count of stained samples to that of the distilled water treated group.

Method: Dental biofilm samples were cultured and treated with different concentrations of GV ranging from 0.00165%- 0.1% at increments of 0.02%. Stained samples were inoculated onto agar plates for colony counting to compare the treated samples with the distilled water treated group.

Results: Chi-square Test for Independence showed that the number of stained samples at 0.02165% was dependent on concentration of GV, $\chi 2$ (29)=15, p=0.000. Hence, it is the least concentration acting as effective colorant. Student's T-test showed that concentrations 0.02165% (M=10.75, SD=27.47), t(20.00)=2.39, p=0.03 up to 0.08165% (M=2.48, SD=3.69), t(31.00)=3.55, p=0.001 yielded significantly lower mean microbial counts than control group (M=184.6, SD=250.99). Student's T-test also showed that mean microbial count of 0.1% GV (M=0.58, SD=2.22), t(34.00)=3.83, p=0.000 was equal to 0. Thus, 0.1% GV can be considered bactericidal.

Conclusion: GV can stain biofilm at 0.02165% with a bacteriostatic effect until 0.08165% while 0.1% GV colors and is bactericidal. The results support using GV as a cheaper alternative disclosing solution that inhibits or stops bacterial growth hence making it a valuable tool in promoting public dental health and in early dental caries prevention.

0017

Tooth Preparation Procedural Skills Using Typodont Compared with Human Teeth in Clinical Skills Learning

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Introduction: Tooth preparation procedural skills of indirect restoration is one of the competencies to be achieved during pre clinical education in prostodontics. Learning resources used are typodont that resembles human teeth. Clinical skills learning facilitates students in terms of representation and repetition so as to achieve the expected skills. The achievement of tooth preparation procedural skills using typodont should be able to represent the competencies of tooth preparation on human teeth.

Objectives: The aim of this study was to evaluate the achievement of students' tooth preparation procedural skills using typodont compared with human teeth.

Method: This study was a quasi experimental study with post-test only control group design, using 103 samples of dental students on pre clinical stage in undergraduate program Faculty of Dentistry, University of Brawijaya. Students asked to do preparation of first bicuspid of mandibular jaw as abutment teeth for fixed partial dentures using both typodont and human teeth. The abutment teeth were assessed and scored using modification Rubric Baylor College of Dentistry crown preparation scoring criteria rating scale by Nunez et. Al. (2012) and the data was analyzed using Mann-Whitney Test.

Results: It was found that there was a significant difference of student's tooth preparation procedural skills, which in typodont were scored higher than human teeth.

Conclusion: Clinical skills learning should provide a learning resource facility that is as close as possible to real conditions in a clinical setting.

0018

Dental Professional Student Education through Community-Based to Support Dental-Education-Curricula

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Introduction: Dental schools are challenged to develop new learning methodologies and experiences to better prepare future dental practitioners. In the Faculty of Dentistry, Universitas Indonesia, dental education curricula of Dental Public Health and Preventive Dentistry is based on standard competence of dental education from Dental Council Indonesia, which is to perform community dental health services. Closer collaboration is needed between health and social care professions is continually stressed at national and international policy level.

Objectives: To evaluate the implementation dental education curricula of Dental Public Health and Preventive Dentistry

Method: to help overcome the challenges of relying upon before-and-after measures, the study employed a process-based approach to data collection. This allowed the study to explore and track the educational and social processes connected to the methodology such as Inter-Professional-Education or Problem-Based-Learning on the placement.

Results: the implementation of dental education curricula of Dental Public Health and Preventive Dentistry in community can enable the changes of dental health behavior of community to support free dental caries in 2030.

Conclusion: this study concludes with brief descriptions of recommended resources for integrating between dental services and dental education into the dental education curriculum. By focusing on an inter-professional placement for prequalification students, this study has attempted to provide some insight into the issues surrounding Inter-Professional-Education or Problem-Based-Learning at our faculty.

0019

Patients' Knowledge on Medical Terminology: Evaluation on Dental Student's Communication Skill

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Introduction: Effective communication is the core element in the exchange of information between patients and health professionals. Some medical terms have been commonly used by dental students when treating patients. However, there is a possibility that there might be difficulties in understanding the terms which are not familiar to the patient.

Objectives: The aim of this study is to assess patient's knowledge on medical terms which is commonly used by dental students when performing a dental care.

Method: Knowledge of medical terminology of 389 patients attending UGM Dental Hospital was assessed using a questionnaire. Multiple regression analysis with a confidence level of 95% was used to explore the effect of education, income, and the primary language on knowledge.

Results: The results showed 83.1% of the subjects had a low score of knowledge on medical terms. The results of multiple regression showed that levels of education had the strongest effect on the knowledge. Dose, hormone, diagnosis and abnormal are most-understood terms by respondents (> 75% answered correctly). The least-understood terms are calculus, occlusion, inflammation, abscess, infection and pathology (<30% answered correctly).

Conclusion: Medical terms can be easily misunderstood by patient. Familiarizing the student with local language which equivalent to a medical terminology should become part of communication skills curricula.

0020

The Implementation of Hits Program on New Dentistry Students Considering Socio-Cultural Diversity in Universitas Padjadjaran

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Objective: Happiness Integrity Transition Study (HITS) Program had been applied for new students of Universitas Padjadjaran (Unpad) Undergraduate Level in first year academic. HITS is a small part of student's learning process during their study time in Unpad both academically / non-academic lecture such as sport, art, creativity. The objective was to evaluate the implementation of HITS Program as learning process innovation method to overcome socio-cultural diversity on Student's GPA

Method: An evaluation study has been carried out among 174 students as total sampling. Key outcomes variables were socio-cultural background student's high school which was reflected of the province where the student study in high school and welfare status. The impact of HITS Program has been reviewed by Grade Point Average (GPA). The analysed method was distribution frequency tabulation in percentage category.

Results: Most new students comes from West Java Province (67,81%), followed by DKI Jakarta (9,78%), West Sumatera (4,02%), North Sumatera (2,87%), and the remain comes from others province with the percentage are below the 2,87%. This data reflected the divercity of socio-cultural background. Another variables of socio-economic background is a group of students who got the scholarship for low income status of their parents (2,87%). Only a few student got GPA below 3,0 (9,77%). This results showed that HITS program increase the student's GPA in range 3,00-3,69 (90,2%).

Conclusion: The HITS Program made the students adapt more seamlessly to the college environment and learning process much better prepare to face lectures in the next semester.

Keywords: HITS Program, Socio-cultural Diversity, GPA

0021

The Effectiveness of Blended Learning as a Teaching and Learning Method in Dentistry

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Introduction: The combination of millennial generations students and advancement in technology promotes the use of blended learning to excites the students' learning process and overcome drawbacks from conventional teaching. However, data comparing the effectiveness of blended learning with conventional teaching method in dentistry is still lack.

Objectives: This study aimed to compare students' performance in easy and difficult level of Fixed Prosthodontics preclinical projects, when given by either blended learning or conventional teaching.

Materials and methods: 72 Second year dental students in Faculty of Dentistry, UiTM were evaluated for their baseline skill in Prosthodontics and type of learning preferences using VARK questionnaire before randomly segregated into two groups; conventional teaching (n=36) and blended learning (n=36). After each group experienced the allocated teaching and learning methods, they performed two preclinical projects (easy and difficult level). Comparison of performance was made between these two groups on both preclinical projects. Data was analyzed using independent t-test (significant at $p < 0.05$).

Results: The highest prevalence of learning preferences (51%) was the multimodal preferences which were visual, auditory, reading/writing and kinesthetic. Between the two groups, there were no significant differences on their baseline skills (p=0.248) and learning preferences (p=16.345). For the comparison on learning methods received, there was no significant difference between blended learning and conventional teaching group for easy (p=0.319) and difficult level projects (p=0.339). In the blended learning group only, no significant differences were found in both difficulty level projects (p=0.064).

Conclusion: The effectiveness of learning by conventional teaching or blended learning is the same. However, as blended learning is more cost and time effective, easily accessible and flexible to accommodate larger group of students, thus suggested to be used in Fixed Prosthodontics teaching.

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0022

Minimal Intervention Dentistry (MID) Approaches Implementation in Undergraduates Clinical Practices

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Introduction: Development of dental materials mainly in adhesion has shifted dental treatment paradigm towards Minimally Invasive Dentistry (MID) approach. MID concept highly utilized adhesive procedure and preserved sound tooth structure. It has gained its popularity in both direct restorations and indirect prosthodontics treatment.

Objective: This study was conducted to assess the frequency of MID approach in treatment provided by UiTM undergraduates.

Methodology: 108 clinical logbooks from three undergraduates cohorts of 2009/2014, 2010/2015 and 2011/2016 were gathered. The number of direct restorations; amalgam restorations (AR) and composite restorations (CR), single-tooth replacement prostheses; conventional bridges (CB) and resin-bonded-bridges (RBB) and cuspal protection; crowns (C) and onlays (O) provided to patients were recorded. Descriptive and statistical analyses (ANOVA) were carried out on the prevalence of each treatment modality provided by all cohorts.

Results: Among the 3 cohorts, a pattern of decrease in AR and increase of CR were observed, with the highest AR (40.6%) was carried out by cohort 2010/2015 and the highest CR (50.7%) by cohort 2011/2016. For single-tooth replacement prostheses, RBB (67.6%) was the main choice of treatment compared to CB (32.4%). Cohort 2011/2016 compared to earlier cohorts provided a three-fold increase of RBB. In cases where teeth required cuspal coverage, crowns (91.4%) dominated the treatment modality compared to onlays (8.6%). The increase incidence of CR and RBB and the decrease of AR pattern were statistically significant among the three cohorts ($p < 0.05$).

Conclusion: The MID approach treatment modalities (CR and RBB) were well implemented in the clinical practices by UiTM undergraduates in line with the current approach of restorative dentistry worldwide.

0023

Should Endodontic Treatment for Molar Teeth in Teaching Institutions be Subsidised?

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Introduction: In recent times, demand for endodontic treatment from the public has increased due to awareness of treatment options. As such, dental students must be trained to perform quality endodontics yet constraints in budget allocations to public dental teaching institutions may not allow for subsidy of this treatment.

Objectives: The aim of this study is to estimate direct medical cost of endodontic treatment for molar teeth performed at Universiti Kebangsaan Malaysia student clinics.

Method: We collected restrospective data from undergraduate (30 molars) and postgraduate (30 molars) case notes. We conducted a clinical pathway to determine types of procedures and materials used for endodontic treatment, reviewed the case notes and estimated the direct cost using activity-based costing method.

Results: We reviewed 120 case notes and found a total of 1525 procedures performed. Highest cost was for performing access cavity with microscope, while the lowest cost was consultation and referral. Cases diagnosed with acute apical periodontitis were highest to treat, while periapical abscess was the lowest. About two-thirds of cost was contributed by dental equipment, a quarter by simulated salary, and about 10% by dental consumables.

Conclusion: Direct cost for endodontic treatment was substantial; treatment provided by undergraduates cost more than postgraduates as they take longer time to complete. Expensive dental equipment suggests that reduction of subsidy for endodontic treatment is crucial to ease the financial burden of a teaching institution.

0024

Virtual Simulation Teaching Center in Dental Education: a Report from Fujian Medical University, China

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Introduction: After 8 years' development, the VSFMUSS has become province-level virtual simulation teaching center and been recognized as one of the best simulation laboratories in China, as assessed by the overall strength of its training.

Objectives: The objective of this article is to give a brief introduction to the Virtual Simulation Teaching Center of Fujian Medical University School of Stomatology (VSFMUSS), PR China.

Method: As one of the best dental simulation laboratories in China, the VSFMUSS aims to train dental students and dentists to be professionals who are able to provide optimal oral health care by giving them the best virtual patient care experience possible in a nonclinical setting.

Results: The features, achievements, and future directions of the VSFMUSS are addressed in the present article. Moreover, the role of the VSFMUSS was evaluated and discussed based on the students' and faculties' perceptions, rate of employment after graduation, and so on.

Conclusion: The VSFMUSS fully put its excellent virtual simulation educational resources to good use, serving as an outstanding model of dental education in Fujian, China.

S0001

Arresting Early-Childhood-Caries with Silver Nitrate and Sodium Fluoride – 12-Month Result

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Objectives: To compare the effectiveness of an adjunctive application of 25% silver nitrate ($AgNO_3$) solution followed by 5% sodium fluoride (NaF) varnish with 38% silver diamine fluoride (SDF) solution in arresting early-childhood-caries (ECC).

Methods: This is a randomised, double-blinded, non-inferiority clinical trial registered in ClinicalTrial.gov (NCT02019160). The hypothesis is that adjunctive application of 25% $AgNO_3$ followed by 5% NaF is not appreciably worse than 38% SDF in arresting ECC. Healthy 3-year-old kindergarten children with active caries were randomly allocated into 2 groups for intervention: Group A- application of 25% AgNO3 solution followed by 5% NaF varnish every 6 months, and Group B- application of 38% SDF solution followed by placebo varnish every 6 months. Decayed, missing, filled surfaces (dmfs) and status of the carious surfaces (active or arrested) were recorded at baseline and after 6 and 12 months. The outcome measure is the number of active carious surfaces that become arrested. Intention-to-treat analysis was performed. Non-inferiority of Group A was accepted if the lower limit of the confidence interval (CI) for the difference in mean arrested carious surfaces was greater than -0.5.

Results: A total of 1,070 children with untreated caries were recruited with 535 children in each group. After 12 months, the dmfs in Group A and B were 7.32±6.99 and 7.43±6.87, respectively (p=0.947) and the mean of arrested decayed surfaces in Group A and B were 3.02±3.41 and 3.01±3.46, respectively (p=0.972). The estimate mean difference of arrested surfaces between two groups was 0.007 (95% CI: -0.404 to 0.419). The lower limit of 95% CI was greater than -0.5, indicating that Group A had a non-inferiority effect as Group B for caries arrest.

Conclusions: Application of 25% $AgNO_3$ solution followed by 5% NaF varnish had a non-inferiority effect as 38% SDF in arresting ECC in young children after 12 months.

S0003

Risk Factors of Oral Clefts in Vietnamese Children

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Objectives: We investigated the association between oral clefts in Vietnamese children and maternal exposure in the first trimester to passive smoking, caffeine intake, liver consumption, folic acid supplement, and multivitamins use.

Methods: This case-control study recruited 170 mother-infant pairs. Cases were patients with isolated cleft lip with or without cleft palate and those with cleft palate only at two Odonto-Stomatology hospitals in Ho Chi Minh City, Vietnam. Controls were children receiving routine immunization at Tu Du Hospital, matched to each case by gender and age. Mothers of both groups were interviewed face-to-face using a structured questionnaire. We used conditional logistic regression to estimate crude and adjusted odds ratios (ORs) and 95% confidence intervals (CIs) for primary exposures of interest.

Results: Mothers who consumed caffeine during the first trimester had higher risk of having a cleft infant than the non-users (adjusted OR [aOR] 5.89, 95% CI 1.08 to 32.00). Consumption of folic acid and multivitamins supplement in pregnant mothers during the first trimester reduced the risk of oral clefts (aOR 0.01, 95% CI 0.00 to 0.09 and aOR 0.03, 95% CI 0.01 to 0.13, respectively). No association was observed between maternal passive smoking or liver intake and oral clefts.

Conclusions: This study is one of the first studies to investigate risk factors of oral clefts in Vietnam. The results suggest that maternal caffeine intake in the first trimester was associated with increased risk, while folic acid and multivitamins supplementations were associated with decreased risk of oral clefts. Further studies are warranted to confirm these findings.

S0004

Ohrqol among Pregnant Women in Hong Kong: A Cross-Sectional Study

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Objectives: To investigate oral health problems experienced during pregnancy and oral health-related quality of life (OHRQoL) among pregnant women in Hong Kong.

Methods: Pregnant women were invited to participate in a self-completed questionnaire survey when they were attending antenatal checkup at two public hospitals in Hong Kong. Data on oral health problems experienced during pregnancy and OHRQoL using OHIP-14 as well as socio-demographic characteristics were collected. Multiple logistic regression and Negative binomial regression were used to investigate factors associated with the experience of oral health problems and the OHIP-14 scores respectively.

Results: 781 pregnant women with a mean age of 32.4 (SD 4.5) years and a mean gestational age of 23.4 (SD 9.1) weeks participated in the survey.

More than 60% of the participants reported having dental problems during pregnancy and 20% had multiple oral health problems. The most frequently mentioned problems were gum bleeding (37%), bad breath (22%) and sensitivity (16%). Multiple logistic regression showed that participants with no childbearing history (OR=1.52, p=0.006), and lower household monthly income (≤HK$19,999 vs. ≥HK$40,000, OR=1.822; HK$20,000-39,999 vs. ≥HK$40,000, OR=1.305, p=0.009) had a higher chance to experience oral health problems.

The mean OHIP-14 score was 3.72 (SD=6.33) ranging from 0 to 43. Negative binomial regression showed that participants experiencing oral health problems (IRR=2.50, p<0.001), perceiving poorer oral health status (poor vs. good, IRR=2.66; fair vs. good, IRR=1.14, p=0.004), having negative oral health attitude (IRR=1.21, p=0.001) and having nausea-vomiting currently (IRR=1.44, p=0.009) had higher OHIP-14 scores.

Conclusions: Experience of oral health problems is common among pregnant women in Hong Kong. Childbearing history and income level are associated with the experience of oral health problems. In general, the OHRQoL of pregnant women is good. Experience of oral health problems, perceived oral health status, oral health attitude and nausea-vomiting are associated with OHRQoL.

S0005

Discriminative Properties of Child Perceptions Questionnaire in Cambodian Children

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Friends of Cleft Cambodia

Objectives: To evaluate the discriminative properties of the Child Perceptions Questionnaire (CPQ) in assessing the OHRQoL of Cleft Lip and Palate (CLP) children against two other clinical groups of Cambodian children.

Methods: Three examiners were calibrated across all clinical measures (caries, malocclusion, and classification of cleft) in order to assess a convenience sample of CLP children between 8 to 14 years old attending a multidisciplinary cleft clinic in Phnom Penh. After consent was obtained, each child underwent an interview and then an intraoral examination. The interview consisted of 16 questions from CPQ11-14 which has been cross-culturally adapted and validated for 8-to 14-year old children with caries and malocclusion in a Cambodian setting. A pilot analysis was conducted to compare those in the CLP clinical group against those from historical samples of children with one or more pulpally involved teeth (PUFA group) and children with 'great need' of orthodontic treatment as assessed by Index of Orthodontic Treatment Need (malocclusion group).

Results: A total of 259 participants were included in this analysis; 18 CLP, 109 PUFA, and 132 malocclusion participants. Those in the cleft group were more likely to have an impact reported; 66.7% compared with 35.6% of those in the malocclusion group and 56.3% of those in the PUFA group. In the CLP group, 44.4% had an impact in the emotional wellbeing subscale compared with 23.4% of those in the PUFA group and 23.0% of those in the malocclusion group.

Conclusions: The pilot analysis indicates that the CPQ may have good discriminant validity in the Cambodian context and that there is a major difference in the emotional impacts for CLP children compared with non-CLP children. A larger sample of CLP children and further analyses are required to confirm these findings.

S0006

The Surface Treatments Differences on Shear Bond Strength Composite-Resin Repair

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Objectives: Composite-resin is a tooth colour restoration that often be used in dental practice. Composite-resin restoration can suffer any damage. Repair of the restoration is one of treatment choice of composite-resin restoration's damage. Repair of composite-resin restoration is a conservative approach than replace it. Surface treatment is a procedure that can enhance repair bond strength. The purpose of this study was to determine the effect of different surface roughness methods to repair bond strength.

Methods: Thirty-six disk-shaped speciments were exposed to Streptococcus mutans for 2 weeks. Speciments were divided into 1 control group and 3 treatment groups (n=6). The treatment groups were treated with phosphoric acid 35%, diamond bur and sandblasting. Each group was repaired with universal adhesive and new composite-resin. All speciments were tested with universal testing machine. The data were analyzed with Kruskal-Wallis and Mann-Whitney tests.

Results: According to Kruskal-Wallis test, there are difference among speciment's groups ($p<0,05$). Mann-Whitney test's results showed that there are significant different between control group and diamond bur group, control-sandblasting, phosphoric acid 35%-diamond bur and phosphoric acid 35%-sandblasting.

Conclusions: The conclusion of this study were there are differences of repair bond strength among the groups. Phosphoric acid 35% didn't gave any difference on repair bond strength. Diamond bur and sandblasting were surface roughness methods that can be done in composite-resin repair.

S0007

β-Carotene Patch Application Prevent Micronucleus Formation By Increasing Cx-43 Expression

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Objectives: Radiation of panoramic radiography exposure might be related to carcinogenesis mechanism. Detection of micronucleus is one of early markers of DNA damage. From the previous studies, it proved that micronucleus increased after panoramic radiography exposure in gingival mucosa. β-Carotene is the lipid soluble antioxidant substance which is expected to prevent the oxidative reaction and to improve the juctional communication which detected by Cx-43. The objective of this research is to evaluate the correlation of the micronucleus increasing number and Cx-43 expression due to panoramic radiography exposure after topical β-Carotene patch application.

Methods: A total of 18 New Zealand rabbits were divided into 2 groups. Group I was the control group that were given panoramic radiography exposure without β-carotene gingival mucoadhesive patch application. Group II was given an application of β-carotene gingival mucoadhesive patch before panoramic radiography exposure. Micronucleus samples were taken from the swabbed of rabbit's gingival mucosa then stained by using modified Feulgen-Rossenbeck. The Cx-43 expression were detected using immunohistochemistry technique.

Results: The results were analyzed using t-test and Pearson correlation. It showed that the increased number of micronucleus from Group I had different mean ($p<0.05$) with Group II. There was significant correlation ($r=0.625$) between micronucleus increased and Cx-43 expression after β-Carotene gingival mucoadhesif patch application due to panoramic radiography exposure.

Conclusions: β-Carotene gingival mucoadhesive patch application prevent micronucleus formation by increasing Cx-43 expression.

S0008

Dental Pulp Cell Viability after Exposed to Hydroxyapatite Synthesized from Yellowfin Tuna Bone

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Objectives: Yellowfin tuna (Thunnus albacares) is one of the most widely consumed fish in Indonesia. The bone of the fish contains high calcium and phosphor and can be synthesized into hydroxyapatite (HA). Due to its mineral content and similarity in chemical composition with human hard tissue, HA may have a potency as a pulp capping material. The aim of this study was to evaluate the viability of dental pulp cells after exposed to HA synthesized from yellowfin tuna bone.

Methods: Pulp cells were isolated from human third molar. The cells were cultured in DMEM supplemented with 10% FBS, 2% Penicillin and Streptomycin, and 0.5% fungizone. The cells were exposed to various concentrations (200 to 3.125 µg / ml) of HA for 24, 48, 72, 96, and 120 hours. The viability of the cells was examined using MTT assay and the morphology of the cells was observed under a fluorescence microscope after stained with ethidium bromide acridine orange. All of the experiments were conducted in triplicate.

Results: Results showed that the viability of the cells was 92%-97% after exposed to HA for 24 hours. Cell viability was increased slightly over the time. After 120 hours, the viability of the cells increased to 101%-118%. Morphological observation showed neither nuclear changes nor apoptotic body formation.

Conclusions: In conclusion, dental pulp cells maintain their viability after exposed to HA synthesized from yellowfin tuna bone.

S0009

Wear of Powder / Liquid Composite in Relation to GIC and Composite

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Objectives: To evaluate the wear in vitro of a new ion-releasing powder / liquid composite in relation to glass ionomer cements and conventional composites.

Methods: Flat specimens (8 per material) of the new ion-releasing powder/liquid composite resin Cention N (Ivoclar Vivadent), eleven resin-modified glass ionomer cements (ChemFil Rock, Equia (with and without coat), Fuji II, Fuji IX, Fuji IX GP, Ionofil Molar, Ketac Fil Plus, Ketac Molar, Ketac Universal, Photac Fil, Riva) and two popular composite resins (CeramX, Z350 XT) were processed and luted to aluminium holders. After storage in water at 37°C for 24 hours, the specimens were polished to 2500 grit and subjected to the Ivoclar wear method (Heintze, 2005), which mainly simulates attrition wear using a commercially available chewing simulator (SD Mechatronik, Germany). The Ivoclar wear method correlates moderately with clinical wear (Heintze et al 2012). A standardized stylus made of pressable ceramic (IPS Empress) hits flat specimens 120,000 times with a 5kg weight and a lateral movement of 0.7mm under constant exchange of water at different temperatures (5°C / 55°C). The vertical loss was measured on plaster replicas with an etkon es1 laser scanner (Willytec) and the Match 3D software.

Results: The mean vertical wear of the resin-modified glass ionomer cements was statistically significantly higher (between 616±44µm (Ionofil Molar) and 946±101µm (Fuji IX GP)) than that of the ion-releasing composite resin Cention N (327±63µm) (ANOVA post-hoc Tukey B, $p<0,01$) which was in the same statistical group of conventional resins (CeramX 323±31µm, Z350 XT 221±19µm) (ANOVA post-hoc Tukey B, $p>0,05$).

Conclusions: For permanent posterior restorations, the new ion-releasing powder / liquid composite resin showed wear that was comparable to conventional resin composites and should be preferred over resin-modified glass ionomer cements, whose wear rate was two to three times higher.

S0010

Antimicrobial and Mechanical Properties of Experimental TCM-Loaded Dental Resin

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Objectives: Traditional Chinese Medicines (TCM) has been used for more than four thousand years to treat various infectious diseases. *Galla chinensis* (GC) and *Rhizoma coptidis* (RC) have been previously demonstrated having antibacterial properties on various oral bacteria. Given this, adding GC and RC into dental resin might give antibacterial function. The objective of this study is to study the antimicrobial and mechanical effects on GC and RC mixed experimental dental resins.

Methods: Three groups were prepared as **1)** control group, **2)** RC-group and **3)** GC-group. RC- and GC-groups were added respectively in 1, 2, 3, 4 & 5-wt% of experimental resin (70.6-wt% UEDMA, 27.44-wt% MMA, 0.98-wt% camphorquinone and 0.98-wt% N,N-cyanoethylmethylanine). These resin cements were dispensed and light-cured in various moulds for flexural (2.0×2.0×25.0-mm^3) and compressive (Ø3-mm×9-mm) strength tests, and antimicrobial tests with *Porphyromonas gingivals*, *Streptococcus mitis*, *Streptococcus mutans* and *Streptococcus sanguis*. The data were further analyzed statistically by one-way ANOVA and Tukey post hoc test at α=0.05.

Results: The results showed that all the TCM-loaded resin cements had lower flexural strength (70.8-132.1 MPa) than the control (133.3 MPa), but only in certain wt% (i.e. 4 and 5-wt% RC and 4-wt% GC) demonstrated a statistically significantly lower value ($p<0.05$). For compressive strength, addition of 1-3 wt% GC showed higher compressive strength (19.5-23.8 MPa) than control (19.3 MPa), whilst others showed a lower value. For the antimicrobial properties, there were no differences in inhibition of *S.mitis*, *S.mutans* and *S.sanguis* between control and RC or GC groups. GC had no inhibitory effect on *P.gingivalis* compared to the control group. However, *P.gingivalis* was significantly inhibited ($p<0.05$) in the RC group compared to the control group such that 3- and 5-wt% RC of *P.gingivalis* bacteria was reduced to 53%±16% and 51%±11%, respectively.

Conclusions: In conclusion, 3wt% *Rhinzoma coptidis* deemed to be the best entity to be added into the dental resin cement formulation without compromising the mechanical properties whilst giving better antimicrobial properties.

S0011

Comparative Surface Roughness and Volume Loss of Resin-Based Sealants Post-Toothbrushing

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Objectives: The aim of this study was to compare the surface roughness and volume loss of unfilled and filled resin-based sealants.

Methods: Five dental sealants were used in this study: Helioseal clear (HC), Delton clear (DC), LAS-clear (LC), Clinpro (C), and Helioseal opaque (HO). Based on ISO / TR 14569-1, each dental sealant (n=30) was placed in a customized stainless steel mold (5x2x3 mm^3). The dental sealants were cured using activating-light exposures for 20 seconds following the manufacturer's instruction. The specimen was light-cured on the opposite side of the mold in the same manner. Then samples were conditioned in deionized water for 7 days at 37°C. The samples were subjected to a linear vertical brushing movement equivalent to one year of toothbrushing. The surface roughness and volume loss were evaluated using a contact profilometer (Talyscan 150, Taylor Hobson) before and after brushing. Data were treated using one-way ANOVA and statistical analysis was done using IBM SPSS version 22.

Results: The study revealed that toothbrushing causes different surface roughness and volume loss among the materials. The mean and SD (+-) values for surface roughness of HC, DC, LC, C, and HO were 0.0362+-0.0056, 0.0306+-0.0071, 0.0290+-0.0070, 0.0201+-0.0019, and 0.0274+-0.0055 respectively. Whereas for volume loss of HC, DC, LC, C, and HO were 0.0310+-0.0203, 0.0238+-0.0241, 0.0430+-0.0719, 0.0212+-0.0199, and 0.0356+-0.0481, respectively. There was a significant difference in the surface roughness of HC and C ($p<0.05$). Whereas, no significant difference was found in volume loss among the groups after toothbrushing ($p>0.05$).

Conclusions: After one year worth of toothbrushing the roughness of the surface and amount of wear varies among sealant types.

S0012

Frequent Relapsing Symptoms in Atopic Dermatitis and Dental Caries Susceptibility

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Objectives: A novel link has recently been reported between atopic dermatitis (AD) and tooth decay (early childhood caries, ECC) in preschool children. This study was aimed to determine whether frequent relapsing symptoms in children with AD is associated with increased ECC susceptibility.

Methods: Data, including demographics and disease diagnosis, was collected from National Health Insurance Research Database (NHIRD), consisting of health care data from >99% of Taiwanese population. The diagnostic codes used were based on the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM). AD cohort included children who fulfilled these criteria: **a)** aged less than 6 years; **b)** diagnosed with atopic dermatitis (ICD-9-CM code 691.8) by dermatologists between January 1, 1998 and December 31, 2008; **c)** no history of caries before AD diagnosis; **d)** no congenital anomaly. The age-, sex-, and enrollment time-matched (1:4) control cohort was randomly identified after excluding subjects with AD at any time, congenital anomalies, or previous caries before enrolment in the study. ECC group included children aged less than 6 years and diagnosed with caries (ICD-9-CM code 521.0) by board-certified dentists. The frequency of clinic visits for AD (times / year), was used as a proxy indicator for frequent relapsing of AD-related symptoms. The Cox regression model was used to assess ECC risk for subjects with AD, compared to those without AD.

Results: Out of 1297 children diagnosed with AD, 71.9% of them had ECC lesions, in comparison to 62.2% among the control group ($p<0.001$). After adjusting for potential confounders, presence of AD was shown to be at higher risk of ECC ($p<0.001$). Furthermore, an incremental increase in ECC risk was shown with increasing frequency of annual clinic visits for AD children.

Conclusions: This study confirms the novel AD-ECC association and highlights the dose-response relationship between frequency of relapsing symptoms and dental caries susceptibility.

S0013

Ethnic Differences in Caries Susceptibility in a Multi-Ethnic Asian Cohort

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Objectives: Tooth decay in young children (early childhood caries, ECC) is a highly prevalent diet-related, infectious multifactorial oral disease. However, published comparative information on ethnic differences in caries experience among Asian populations is nearly non-existent. Hence, this study was aimed to investigate the role of ethnicity in variations in caries development among preschool children.

Methods: Data was collected from a mother-offspring cohort, Growing Up in Singapore Towards Healthy Outcomes (GUSTO), which recruited healthy pregnant mothers and followed them through pregnancy and their offspring into childhood. Detailed interviewer-administered questionnaires were periodically conducted to collect general and health-related information of mothers and their infants / toddlers, including child's feeding patterns, oral hygiene practices and parental oral health-related knowledge-attitude-practices. At 3 years of age, oral examinations were performed in 721 children by dentists trained using a standardized approach to determine the children's oral hygiene (Silness-Loe Plaque index) and ECC status (modified ICDAS II criteria). Univariable and multivariable regression analysis was used to assess the ethnicity-ECC relationship.

Results: ECC lesions were observed in 42.9% (309 / 721) of children at 3 years of age. After adjusting for potential confounders, a two-fold higher ECC risk was observed in Chinese and Malay children, compared to Indian children. Ethnic differences in pre-, peri-, and post-natal factors were noted.

Conclusions: Indian children are at lower risk of caries development, compared to Chinese and Malay children, possibly due to variations in the pathogenic pathways leading to ECC.

S0014

Preventive Practices of Dentists in Phnom Penh, Cambodia

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Objectives: To describe the preventive dental practices of general dentists in Phnom Penh, Cambodia.

Methods: Dentists from 100 randomly selected dental clinics in Phnom Penh were interviewed by one of 3 trained interviewers. Open and closed questions included: background information, knowledge of prevention, resources for prevention, and preventive practices. Data presented are from the results of the first 30 participants.

Results: 66.7% of dentists believed prevention was very important. 87% gave oral health education at least several times a week. 42.9% never used F varnish and 48.3% never used resin sealants. When shown a picture of a white spot lesion, 30% said they would provide no treatment, 6.7% would apply fluoride, and 46.7% would restore. 53.3% believed that caries in enamel is reversible. 89.7% said preschoolers should use a F toothpaste, and 90% said this should be low F paste. 70% said women should take F tablets during pregnancy. 85.2% said that all patients should be recalled 6 monthly. 79.3% said that plaque was composed mainly of food particles. 31% were in favor of a sugar tax, and 83.3% in favor of water fluoridation. 68.9% agreed that selling of sugary foods and drinks at schools should not be permitted. 86.3% of dentists suggested having more education on prevention at dental conferences.

Conclusions: Cambodian dentists have limited knowledge of dental prevention and the basic principles of cariology and provide only limited preventive interventions for their patients. This survey is the first important step in a campaign to improve preventive practices of Cambodian dentists; actions should be taken to orientate dentists towards implementing evidence-based prevention in their clinics.

S0015

Silver Diamine Fluoride Promotes Formation of Fluorohydroxyapatite

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Objectives: This in vitro experiment was designed to investigate the effects of addition of silver diamine fluoride (SDF) on the nucleation and growth of apatite crystals of calcium phosphate.

Methods: In this in vitro experiment different concentrations of SDF (0.38 mg / ml, 1.52 mg / ml, 2.66 mg/ml and 3.80 mg / ml) were added to a calcium phosphate solution (5.88 mM $CaCl_2$+4.12 mM K_2HPO_4). Two control groups, namely calcium phosphate only ($CaCl_2$+ K_2HPO_4 in buffer solution) and SDF only ($AgF(NH_3)_2$ in buffer solution) were also prepared. After incubation at 37°C for 24 hrs, the shape and organisation of the crystals were examined by bright field transmission electron microscopy (TEM) and electron diffraction. Unit cell parameters of the obtained crystals were determined with powder X-ray diffraction (P-XRD). The vibrational and rotational modes of the crystals in the various groups were analysed using Raman microscopy.

Results: The TEM and selected-area electron diffraction confirmed that all solids precipitated within the SDF groups were crystalline and that there was a positive correlation between the crystal size and the concentration of SDF. The P-XRD patterns indicated that fluorohydroxyapatite and silver chloride were formed in all the SDF groups. Compared with calcium phosphate only control, a contraction of the unit cell in the a-direction but not the c-direction in the crystals of the SDF groups was revealed, which suggested that small, localised fluoride anions substituted the hydroxyl anions in the hydroxyapatite crystals. This was further supported by the Raman spectra, which displayed up-field shift of the phosphate band in all of the SDF groups and confirmed that the chemical environment of the phosphate functionalities indeed changed. As expected, no hydroxyapatite crystal was detected in the SDF control. These results suggested that SDF reacted with calcium and phosphate ions to produce fluorohydroxyapatite.

Conclusions: Preferential precipitation of fluorohydroxyapatite with reduced solubility provides an explanation for the remineralisation of dental caries lesions treated with SDF.

S0016

Mini Dental Implants (MDI) for the Retention of Mandibular Overdentures - A Two-Year Report

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Objectives: To evaluate the success rate of using 2 MDI's to retain mandibular overdentures over a 2-year period

Methods: 2 MDI (2.1mmx10mm) were placed in the mandible of 31 fully edentulous participants at the canine regions using a flapless surgical procedure. Soft liner was added to the denture at the sites of the implants to obtain temporary retention. 2 months after surgery, the soft liner was replaced by O-ring attachments to achieve retention from the implants.Implant success rates, plaque index (PI), probing depths (PD), bone loss around implants (from radiographs), mechanical and prosthetic complications of the dentures and patients' satisfaction levels using visual analog scores (VAS) during function and social interaction were evaluated at 3, 12 and 24 months.

Results: Of the initial 31 participants, only 25 completed this 24-month trial. The 2-year success rate was 93.8%. PI, GI and vertical marginal bone loss increased significantly ($p<0.05$) across the 3 observation periods. PD and horizontal bone loss were significant only ant 3 and 12 months. The median VAS for function increased from 2.00 (control) to 10.00 (3-month), 9.50 (12-month) and 10.00 (24-month at $p<0.05$. Median VAS for comfort increased from 2.5 (control) to 9.00 (3-month), 9.500 (12-month) and 10.00 (24-month) at $p<0.05$.Incidence of mechanical and prosthetic complications were also noted.

Conclusions: Within the limitations of this study, the results indicated that placement of 2 MDI's as retentive elements for mandibular complete dentures can improve the participants-centred outcomes of satisfaction with their dentures with regards to function and comfort, thereby improve the quality of life of patients

S0017

Effects of Different Drilling Protocols on Osseointegration Performance and Implant Stability Measurement

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Objectives: In order to obtain a higher initial implant stability, modifying the drilling protocol is the most common method. However, the influence of different drilling protocols on biomechanical characteristics and bone healing capacities of dental implants was unclear. Thus, the aim of this study was to evaluate the effects of these drilling protocols on changes of osseointegration performance and implant stability during the healing period.

Methods: Twenty-four New Zealand white rabbits were used in this study. Three experimental groups with different surgical protocols (undersized preparation, standard and oversized preparation) were designed. Measurement of implant stability parameters was performed immediately after implant insertion and then at 2, 4 and 8 weeks after the operation. After 0, 2, 4, and 8 weeks of healing, the animals were sacrificed and the bone block with implant fixture were prepared for histomophometric analysis.

Results: The preliminary results of the present study demonstrated that the ISQ values of each group increased gradually through the implant healing time. In the damping factor analysis, the opposite tendency was observed and gradually decreased. The histomorphometric analysis revealed that BIC (bone-implant contact) increased with time until 8 weeks of healing. In addition, the undersized group has the highest initial BIC (25.16%±7.25%) and the lowest values were found in oversized group (9.13%±5.89%). The BIC values of these groups also gradually increased during the healing period. However, no significant difference was found in BIC values among these experimental groups at week 8.

Conclusions: In conclusion, the undersized surgical protocol group seemed to have the highest bone to implant contact and primary stability in the whole healing period. These results also suggested that the individual measurement of implant stability using RFA or DF should be performed with caution and used in combination with other objective methods or clinical parameters.

S0018

An Automated Framework for Constructing Numerical Model from Radiographic Images

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Objectives: To develop a framework that can automatically perform segmentation of jaw bones' radiographic images, characterize mechanical properties of osseous tissues, construct finite element (FE) model and conduct stress analysis.

Methods: The automated characterization of bone's mechanical properties was developed. CT images were smoothed by bilateral filtering and the image pixels were classified and labeled by K-means clustering. Then, the bone was segmented by setting a threshold of grayscale values. Finally, an FE model was formed and each element was assigned with a value of Young's modulus estimated from the intensity label of the pixel nearest to the element's centroid. The framework was then used to create an FE model for a previous in vitro study. To replicate the same bone model, an artificial bone model was created by attaching the closed-cell foam to a 2-mm thick cortical shell. The micro-CT images of the bone model were input to the framework for image segmentation and material characterization. Young's moduli of 16~123MPa (from the manufacturer's data sheet) were assigned to elements in cancellous bone according to the ten intensity labels classified. Another FE model with a uniform Young's modulus of 47.5MPa was created as a control.

Results: When the implant was applied a vertical load of 130 N, both our FE models and the control predicted a peak minimum principal strain of -0.0008 at the buccal and lingual side of the cortical bone, which was close to the value (-0.001) measured by the experiment. However, when an oblique load (130N) was applied, our FE model predicted a peak minimum principal strain of -0.0034 that perfectly matched the experimental study while the control produced a 17.6% error.

Conclusions: The developed framework was able to automatically reconstruct the numerical model. With our algorithm for assigning material properties, our FE model was proved to provide more accurate strain values at local regions. The next step is to conduct experiments to confirm this finding at different locations of local strains. Our ultimate goal is to enable implant design optimization using patient-specific bone geometry and material properties.

S0019

Anatomical and Mechanical Properties of the Midpalatal Suture

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Objectives: Rapid maxillary expansion (RME) is based on sutural distraction osteogenesis (SDO) of the midpalatal suture. It consists of load application in order to divide the maxillary halves while inducing osteogenesis through the sutural ligament. Anatomical and mechanical properties of the midpalatal suture were assessed.

Methods: Soft tissues were removed from ten swine heads (12-month-old). Samples were obtained by slicing the hard palate (automatic cutting machine, water irrigation, 2500rpm) perpendicular to the midpalatal suture. Thirteen specimens were collected from each palate, with length according to anatomy (22.5~40.0mm) and standardised width (2.5mm). One hundred and thirty specimens were scanned with micro-CT (25μm pixel) and tested in four-point-bending (1.00mm/min) within 48h (storage in 0.9%NaCl at 4°C). Fracture type (Ft), linear interdigitation index (LII), linear obliteration index (LOI), ultimate stress (σf), and elastic modulus (E), were calculated. Kruskal-Wallis one-way ANOVA with Mann-Whitney's post hoc test and Fisher's exact test (α=0.05) were applied to compare values among anterior, median, and posterior region.

Results: Anterior (95.0%) and median (85.6%) regions exhibited higher prevalence of fracture within the suture, compared to the posterior one (30.0%) ($p<0.001$). LII had values of 1.0 (IQR=0.0) anteriorly, 2.9 (IQR=1.5) medially, and 4.3 (IQR=1.0) posteriorly. LOI had values of 0.0% (IQR=0.0%) anteriorly, 2.5% (IQR=2.6%) medially, and 4.5% (IQR=2.3%) posteriorly. E had values of 12.5MPa (IQR=11.2MPa) anteriorly, 31.3MPa (IQR=29.6MPa) medially, and 98.5MPa (IQR=250.3MPa) posteriorly. σf had values of 3.8MPa (IQR=1.7MPa) anteriorly, 3.2MPa (IQR=2.2MPa) medially, and 11.1MPa (IQR=10.7MPa) posteriorly. Apart for σf between anterior and median regions, all values showed significant differences ($p<0.05$).

Conclusions: Ultimate stress and rigidity of the midpalatal suture increased from rostral to caudal, according to greater interdigitation and obliteration. These anatomical and mechanical differences may contribute to the non-parallel opening during RME.

S0020

RpoB and *DnaK* Sequences of Unidentified *Veillonella* Isolates

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Objectives: Currently, the genus *Veillonella* is subdivided into 13 species. Of these species, only *V. atypica, V. denticariosi, V. dispar, V. parvula, V. rogosae* and *V. tobetsuensis* have been isolated from human oral cavities as oral *Veillonella*. In our previous study, 1609 strains of genus *Veillonella* were isolated from the saliva of children. Among these 1609 isolates, 167 isolates (10.4%) could not be identified as belonging to the 6 oral *Veillonella* species, and were suggested to be member of one or more novel *Veillonella* species. Therefore, the objective of this study was to analyze the phylogenetics of the unidentified isolates based on *rpoB* and *dnaK* gene sequences to establish the novel species of genus *Veillonella*.

Methods: As the representative of the unidentified isolates, 24 isolates were chosen in this study. The PCR-based amplification and sequence analysis of *rpoB* and *dnaK* were performed by using the previously described primers. The sequences are determined with an ABI PRISM 310 Genetic Analyzer. The *rpoB* (495-632nt) and *dnaK* (543-607nt) partial sequences of these isolates were aligned against the sequences of the representative strains retrieved from GenBank. BLAST search, pairwise similarity values and construction of phylogenetic tree were studied by using LASERGENE program (DNASTAR).

Results: In the phylogenetic tree of *rpoB* and *dnaK* gene, these unidentified isolates formed distinct cluster within the established species of genus *Veillonella*. The intraspecific similarities of these unidentified isolates were varied between 94.3% and 100% of the *rpoB* and *dnaK* gene sequences, respectively. Meanwhile, the pairwise similarity of these isolates showed less than 93% level of *rpoB* and *dnaK* against the established species of genus *Veillonella*.

Conclusions: These results strongly indicated the possibility of some novel species of the genus *Veillonella*.

S0021

New Haploid *Candida Albicans* Model to Uncover Novel Drug Targets

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Objectives: *Candida albicans* is the major fungal pathogen in humans. There are only a few antifungal agents available for *Candida* infections. Recently we discovered a novel antifungal small molecule SM21, which demonstrated promising antifungal activity *in vitro* and *in vivo*. However, mechanism by which SM21 exerts its fungicidal effects on C. *albicans* remains unknown. In the present study, we used novel haploid form of C. *albicans* as a model system to uncover the drug target of SM21.

Methods: A standard C. *albicans* haploid strain, GZY803, was employed to examine the transcriptomics profiles in response to SM21 treatment. RNA from SM21 treated cultures were extracted for sequencing. Subsequent bioinformatics analysis identified altered pathways in SM21 exposed cultures. In parallel, SM21 resistant haploid strains were developed by sequential exposure of parent GZY803 strain to the antifungal agents. DNA and RNA sequencing analysis of the resistant strains were also performed to understand the mechanism of resistance. Growth curve analysis and ATP production measurement were conducted to confirm the bioinformatics findings from sequencing data.

Results: RNAseq analysis C. *albicans* transcriptome identified a significant reduction in ATP generation and transmembrane transport when treated with SM21. Enhanced cytochrome assembly was also reported in SM21 exposed cultures. Downstream experiments further confirmed inhibition at mitochondrial activity in the SM21 treated C. *albicans*. On the other hand, resistant strains showed an increase in Secreted aspartic proteins (SAPs) expression. This probably is to compensate for the loss of amino acid synthesis at mitochondrial level.

Conclusions: The new haploid C. *albicans* haploid model has uncovered the inhibition of mitochondrial activity as the mechanism of action of SM21. These new findings will aid the development of SM21 as a novel antifungal molecule, which could bring enormous benefits to million patients suffering from *Candida* related infections.

S0022

Intra-Oral Comparison of Peri-Implant Mucositis and Gingivitis Microbiota

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Objectives: To characterize and compare the supra-gingival / supra-mucosal and subgingival / sub-mucosal microbiota from diseased periodontal and peri-implant niches within individuals presenting with both gingivitis and peri-implant mucositis.

Methods: 22 Chinese subjects were recruited with informed consent. Each subject carried at least one implant with peri-implant mucositis and one tooth with gingivitis. Supra-gingival/supra-mucosal and subgingival / sub-mucosal plaques were sampled from diseased implant/tooth sites in each subject. Samples (n=198) were characterized by 16S rRNA gene amplicon sequencing (V3-V4) using the Illumina MiSeq PE300 system. Sequence data were analyzed using QIIME and other bioinformatics and statistical approaches.

Results: A total of 3,911,219 quality-filtered reads were assigned to 2,418 operational taxonomic units (OTUs; 97% similarity cut-off). Bacteria from 11 phyla comprising 118 genera were identified. Approximately half of the OTUs (1,705) were detected in all four clinical sites. Diversity analyses based on the species richness estimates, observed OTUs and phylogenetic diversity revealed no statistically-significant differences between the microbiota present within the supra-gingival supra-mucosal, subgingival and sub-mucosal niches. Further analyses of the relative abundances of individual species revealed significant differences ($p<0.05$) in 36 species from the supra-gingival / supra-mucosal niches; and 43 species from the subgingival / sub-mucosal niches between teeth and implants. Notably *Veillonella dispar*, *Corynebacterium matruchotii*, *Corynebacterium durum*, *Selenomonas noxia* and *Capnocytophaga* sp. HOT336 were all more abundant in teeth than in implants in both the supra- and sub-gingival / mucosal fractions; whilst *Neisseria oralis*, *Granulicatella elegans*, *Aggregatibacter* sp. HOT898 and *Ottowia* sp. HOT894 were significantly less abundant in teeth.

Conclusions: The bacterial microbiota within gingivitis and peri-implant mucositis tooth / implant sites in the same individual share high levels of overall similarity. We speculate that differences in bacterial taxa present at diseased implant versus tooth niches primarily reflect differences in the host physiology and histology at the respective implant / tooth sites.

S0132

Drug Induced Gingival Overgrowth in Patients on Calcium Channel Blockers

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Objectives: Drug induced gingival overgrowth (DIGO) is a multifactorial disease associated with administration of specific family of drugs like cyclosporine, calcium channel blockers (CCBs) and phenytoin. The onset, severity and susceptibility of DIGO depends on various factors like patient's age, gender, race, genetic predisposition, gingival health status and oral hygiene. We aim to study the prevalence and risk factors of DIGO in patients taking antihypertensive medications in Singapore.

Methods: Seventy four patients with hypertension attending the dental clinic at National University Hospital were enrolled for the pilot study. Cases include 54 patients who were on CCBs and 22 patients were not on any CCB medications. Details of demographics, personal and family history and use of type of CCB medication were collected from all the subjects and clinical parameters like pocket probing depth, bleeding on probing, plaque score, clinical attachment level, calculus and gingival overgrowth were evaluated at six upper and lower anterior teeth in each patient. Gingival overgrowth was assessed using Ingles criteria with grades ranging from 0 to 4. Gingival overgrowth was graded as being present if the grading was 2 and above. Differences between study group (patients on CCBs) and control group (patients not on CCBs) were assessed using chi square test for binary variables and student's t-test for continuous variables. For the primary outcome of gingival overgrowth as a binary variable, logistic regression was performed to assess the relationships with different patient demographic factors, symptoms, dental history and clinical parameters.

Results: The mean age of the pilot study cohort was 58.12±8.38 (40-75) years and there were 39 male and 35 female. Prevalence of the DIGO was 42.3% in our study cohort. Administration of CCBs and bleeding on probing was significantly associated with DIGO ($p<0.001$).

Conclusions: Our study demonstrated significant association of gingival overgrowth with CCBs. Bleeding on probing could be potential markers for underlying inflammation in DIGO in patients on CCBs. Further large scale mechanistic study looking into the relevant biomarkers and risk factors of DIGO is warranted to better manage this complex situation.

S0133

Effect of Preoperative Anxiety on Healing Recovery after Oral Surgery

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Objectives: There has been few research assessing correlation between patient's psychology and wound healing after oral surgery although stress plays a key role in recovery process. The objective of this study was to determine the relationship between anxiety immediately before impacted third molar (ITM) surgery and postoperative complications, including swelling and trismus.

Methods: This prospective study involved 64 patients requiring ITM surgery from March 2016 through June 2016. All treatments were conducted with the same surgical protocol by 2 surgeons from Department of Oral Surgery. The Vietnamese version of State-Trait Anxiety Inventory (STAI) and Dental Fear Survey (DFS) was employed to assess general and dental anxiety, respectively. At the screening day, researcher collected demographic features, Pederson classification, and score of trait part of STAI. Moreover, the baseline diagrams of facial dimension and mouth opening were measured. On the surgery day, state part of STAI (STAI-S) and DFS were fulfilled before treatment. At 48-hours after surgery, all participants returned to have evaluation of swelling and trismus development with the same anatomy landmarks. Correlations of items including demographic features, Pederson classification, duration length and psychological indices with development of swelling and trismus were statistically analyzed using Spearman's rank-order correlation test. Then, the items which demonstrated $p>0.25$ were used as explanatory variables in following multiple linear regression analysis, whereas development of swelling and trismus were used as objective variables.

Results: The linear regression analysis revealed significant relationships between STAI-S score with swelling level ($B=0.138$, $R2=0.122$) and trismus ($B=-2.544$, $R2=0.089$) at 48-hours after surgery ($p<0.05$). On the other hand, DFS only related with trismus ($B=-1.933$, $R2=0.087$), but not swelling level ($p>0.05$).

Conclusions: State anxiety assessed by STAI-S had considerable relationship with the clinical severity of swelling and trismus during healing period. From a practical perspective, patient's stress affects on recovery process stronger even than surgical difficulty and duration length.

S0135

Oral Health, Nutritional Status, and QoL in Indonesian Older People

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Objectives: The aim of this study was to examine oral health status (OHS) and masticatory performance of Indonesian independent older people, and their relationship with nutritional status and quality of life (QoL).

Methods: Independent older people living in Jakarta were recruited in 4 public health centers. OHS was clinically examined using DMFT index and periodontal index, and masticatory performance was recorded using color changing chewing gum. Nutritional status was evaluated using anthropometric measurement (BMI) as well as interview using Mini Nutritional Assessment (MNA). QoL was assessed using Indonesian version of GOHAI questionnaire and several items of WHO oral health questionnaire for adult.

Results: Totally 93 subjects participated in this study. More than half (53.8%) of subjects had 20 or more natural teeth. The mean DMFT index was 15.6 with MT as the main component; on average 9.5 teeth per subject had bleeding on probing (BOP); and mean chewing gum score was 6.9. In addition, 55.9% subjects were categorized as at risk of malnutrition. Mean GOHAI score of the subjects was 51.5 and mean score on WHO oral health questionnaire was 24.3. It was found that number of natural teeth, DT, FT, BOP and chewing score were not significantly correlated with BMI and MNA ($p>0.05$). Number of natural teeth, DT, FT, BOP, chewing score and GOHAI score were significantly correlated ($p<0.05$). Also, significant correlation between number of natural teeth, DT, chewing score and several item of WHO oral health questionnaire score were found ($p<0.05$).

Conclusions: There is significant relationship between OHS and masticatory performance with QoL but no relationship between OHS and masticatory performance with nutritional status in Indonesian independent older people.

S0136

Characterization of Cell-Decellularized Extracellular Matrix on 3D Scaffolds for Tissue Engineering

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Objectives: Currently available orthopedic implants are extremely biocompatible but lack certain extents of biological characteristics that allow further interaction between the biomaterial and the surrounding living tissues at the site of implantation. Cell-derived extracellular matrix (ECM)-coated 3D scaffolds have received considerable interest for bone tissue regeneration due to their ability to enhance cellular behaviors.

Methods: We investigated CS / PCL scaffold would provide a suitable substrate for MG63 cell decellularization. Then, we performed decellularization on MG63 to obtain a dECM-coated scaffold and further studied the biological performance of these dECM hybrid scaffolds.

Results: The results indicated that the amount of dECM attached on scaffolds with higher CS content. The dECM-coated CS / PCL scaffolds displayed excellent biocompatibility and effectively enhanced cellular adhesion, proliferation, and differentiation of human Wharton's Jelly mesenchymal stem cells (WJMSC).

Conclusions: Overall, our results presented a valuable method of producing dECM-coated 3D-printed CS / PCL bioscaffolds that are promising biocomposites for bone tissue engineering in numerous aspects.

S0137

Accelerating Re-Epithelialization of Gingival Wound Healing Using Lamtoro (*Leucaena Leococephala*) Leaf Extract

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Objectives: The aim of this study is to determine the efficacy of lamtoro leaf extract on re-epithelialization of labial gingival wound healing of *Sprague dawley* rats.

Methods: Thirty-six of *Sprague dawley* rats were randomly divided into two groups; treated and control groups. Each group comprised six sub-groups which are 1th, 3rd, 5th, 7th, 10th and 14th observation day. Each observation contains three mice. Labial gingival wounds were created by a punch biopsy Ø2,5mm. Lamtoro leaf extract was applied topically on the gingival wound of the treated group while in the control group hexetidine 0.1% was employed. The mice were sacrificed, processed by paraffin section, and stained with hematoxylin-eosin. The measurement of epithelial tissue thickness was done using the ocular microscope. The data were analyzed using T-Test for treated and control groups based on the observation days.

Results: The epithelial thickness of labial gingival wound from lamtoro group was higher than the hexetidine group. On day 3 and 10, re-epithelialization in lamtoro extract and hexetidine groups exhibited significantly different ($p<0.05$). According to epithelial thickness, the wound in lamtoro-treated animal healed faster than the wound in the control animal.

Conclusions: The topical application of lamtoro leaf extract on labial gingival wound induces rapid re-epithelialization, suggesting that lamtoro leaf extract could accelerate the gingival wound healing.

S0138

The Effects of Biodentine / PCL 3D-Scaffold with Osteogenic Properties on Dental Pulp Cells

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Objectives: The purpose of the present study was to determine the feasibility of the three-dimensional-printed Biodentine / polycaprolactone (BD / PCL) composite scaffold applied for orthopaedic and dental applications. The physicochemical properties and the odontogenic differentiation of human dental pulp cells (hDPCs) were investigated.

Methods: BD was well-suspended in ethanol and dropped slowly into molten PCL with vigorously stirring. Then, the BD / PCL composite scaffolds were fabricated with controlled macropore sizes and structure using an extrusion-based three-dimentional (3D) printer. Mechanical properties and the bioactivity of the scaffolds were evaluated, as well as the cell response on the scaffolds by culturing human dental pulp cells (hDPCs).

Results: The results showed that the BD / PCL scaffold had uniform macropores sized of 550mm with well interconnection and a compressive strength of 6.5MPa. In addition, the composite scaffolds exhibited well apatite-forming ability and were capable of supporting the proliferation and differentiation of hDPCs.

Conclusions: The BD / PCL composite scaffolds fabricated by extrusion-based 3D printing technique showed similar characteristics to BD cement, including bioactivity and ability to promote the differentiation of hDPCs. These results indicated that the composite scaffold would be a candidate biomaterial for the applications in dental and bone regeneration.

S0139

Bonding of Calcium Silicate-Based Restorative Material to Caries-Affected Dentine

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Objectives: to conduct a micromorphological and elemental analysis of the hybrid-like layer at the calcium silicate-based restoration / dentine interface.

Methods: A total of 10 carious molars exhibiting cavitated occlusal dentinal lesions (ICDAS 5) were used. Soft carious tissue was excavated using a papain-based chemomechanical caries removal agent allowing maximum preservation of caries-affected dentine. The excavated cavities were restored with a calcium silicate-based restorative material (Biodentine, Septodont, France). Each restored cavity was sectioned (mesiodistally) into two halves to expose the restoration / dentine interface.

An additional 5 untreated carious molars were utilized to act as a control group. A small notch was prepared at the central part of each carious lesion (control group) to accommodate a thin glass separator that divided the cavity into two zones; unrestored (negative control) and Biodentine covered (positive control) 'caries-infected' dentine (CID) regions.

Each restoration / dentine interface was subjected to an acid / base challenge using 10% ortho-phosphoric acid (5s) and 5% sodium hypochlorite (5 min) respectively. All the specimens were observed using environmental field emission scanning electron microscopy (EFESEM) and energy dispersive x-ray (EDX) elemental analysis.

Results: A hybrid-like layer was identified at the calcium silicate-based restoration (Biodentine) / dentine interface exhibiting an acid-base resistant nature. The elemental analysis showed a marked increase in the calcium level at the hybrid-like layer zone.

Conclusions: Direct placement of calcium silicate-based restorative material (Biodentine) on both CAD and untreated carious tissue regions can result in the formation of an acid-base resistant hybrid-like layer at restoration / dentine interface. This layer may provide a good seal from the oral cavity that may aid in remineralization of remaining demineralized dentine, particularly during atraumatic restorative treatments (ART) or partial caries removal techniques.

S0140

Antiadhesive Activity of Volatile Oil and Extract Borneo's Wild Plant

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Objective: *Scorodocarpus borneensis* Becc. (Olacaceae family) is a plant growing naturally on Borneo and Malay Peninsula, which has been named by natives as "wood garlic" due to its strong garlic-like smell. *Cinnamomum parthenoxylon* (Lauraceae family) is a tree that commonly harvested from the wild as a source of essential oils and flavourings. Their use in medical sector has not been clearly reported. Our previous study showed that both have antibacterial property. In this study, we evaluate the role of S. *Borneensis* and C. *Parthenoxylon* volatile oil vs its N-hexane extract on human oral bacteria.

Methods: Leaves of S. *borneensis* and *Cinnamommun parthenoxylon* were collected and identified with www.theplantlist.org. The leaves were dried and prepared for 1 day. Volatile oil was obtained by the steam distillation method while extracts were obtained by maceration with N-hexane solvent. Human oral bacteria were cultured at a density of 1.5×10^8 cells per well in sterile 96-well microtiter plates. Volatile oil and its N-hexane extract were added at several concentration. At certain time, cell were washed with PBS and stained with 0.1% crystal violet. Optical density were measured and analysed to determine the inhibitory effects.

Results: S. *borneensis* volatile oil at MIC showed higher optical density (0.069±0.005) compare to its N-hexane extract (0.084±0.015) on human oral bacteria. On the contrary, N-hexane extract of C. *parthenoxylon* at MIC yielded higher optical density (0.069±0.008) compare to its volatile oil (0.085±0.008). These inhibitory effects observed at 24 hours after incubation.

Conclusions: The results indicate that, among the volatile oil and N-hexane extract both plants, S. *borneensis* has higher antiadhesive property on human oral bacteria when it is steam-distilled, while C. *parthenoxylon* has the higher antiadhesive property when it is macerated with N-hexane solvent.

S0141

Oral Carriage of *Candida* Species in Patients Seeking Orthodontic Treatment

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Objectives: *Candida* is a commensal fungal species which colonizes the oropharyngeal region of approximately 60% of all healthy individuals. However, under conditions, this is innocuous *Candida* can transform into an opportunities pathogen causing both oral candidiasis and systemic mycoses. Orthodontic appliances are external artificial devices that place in the mouth for clinical purposes. However, introduction of orthodontic appliances can greatly alter oral environment and may affect patient's oral health. In the present study we aimed to evaluate the oral *Candida* carriage of patients seeking orthodontic appliance therapy.

Methods: Patients who attended Department of Orthodontics, University of Dental Medicine, Yangon for orthodontic treatment with no history of smoking , debilitating disease and antifungal therapy or steroid therapy for a period of 6 months prior to the study were selected for the study. The oral rinse samples were collected from the patients using 10ml of PBS phosphate- buffered saline. The samples were analyzed for the *Candida* carriage at the microbiology laboratory using standard culture – dependent CHROMagar method.

Results: Fourteen patient samples were collected (3 males, 11 females). Of these *Candida* species were present in five patients (35.7%). The most prevalent species was *Candida albicans*. In this samples, 6 patients (42.8%) are Angle's Class III malocclusion, 3 patients (21.4%) are Angle's Class II malocclusion and 5 patients (35.7%) are Angle's Class I malocclusion. In the degree of crowding, 6 patients had mild crowding, 3 patients had moderate crowding and 5 patients had severe crowding. 50% of Angle's Class III patients had *Candida albican* isolated.

Conclusions: Considerable number of patients had *Candida* carriage in their mouth prior to orthodontic treatment. Future studies are warranted to examine the effect of orthodontic appliances on the *Candida* carriage of these patients.

S0142

Treponema-Denticola Biofilm Reduction by Reuterin Isolate Probiotic *Lactobacillus-Reuteri* Indonesian Strain

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Objectives: The aim of this study is to investigate the effect of reuterin isolate probiotic *Lactobacillus reuteri* BEA-162823 from Indonesian subject to *Treponema denticola* biofilm in-vitro.

Methods: *T.dentiola* cultured in Brain Heart Infusion (BHI) broth at 37°C for 48-h, anaerob condition. Reuterin production: extraction of reuterin from conversion of glycerol by glycerol dehydratase from *L.reuteri* BEA-162823 in MRS Broth and confirmed with SDS-PAGE. Subsequently followed by the study of reuterin in inhibiting *T.denticola* biofilms using crystal violet biofilm assay. Reuterin was diluted into 5 different concentrations (100%, 50%, 25%, 12.5%, 6.25%) and distributed into *T.denticola* biofilm containing well-plates and incubated for 15minutes, 1hour, 3hours and 24hours. Biofilm without reuterin was used as negative-control and chlorhexidine-gluconate (0.2%) as positive-control. Biofilm mass measured using Microplate-Reader (490nm). All obtained data were statistically analyzed by One-way Anova and level of significance was set at $p<0.05$.

Results: Result showed 52kDa band on SDS-PAGE agar confirmed the presence of reuterin. There was a significant reduction in the average scores of negative control with Optical-density (OD)±SD = 1.78±0.09 compared to average scores of biofilm after treatment with reuterin. The best concentration in inhibiting biofilm viability was 50% in 15min, 3hours, 24hours incubation time with OD 0.59±0.03, 0.64±0.08, 0.72±0.18 respectively. For 1hour incubation time, the best concentration to inhibit biofilm was 100% (OD 0.59±0.17). Statistical results show that reuterin brought a significant reduction of *T.denticola* biofilm in all concentration and incubation times to negative control ($p<0.05$). Furthermore, statistically there were no significant difference was observed between reuterin 50% and 100% compared to positive control ($p>0.05$). This evidences that reuterin has an antibiofilm effect as strong as chlorhexidine as positive control.

Conclusions: Reuterin isolate *L.reuteri* Indonesian strain reduces the viability of *T.denticola biofilm*. This antibiofilm effect may be useful for preventing periodontal disease. Future studies are needed to explore this positive effect.

S0143

Stabilizing Effect of Ionic Polymers on Calcium Phosphate Mineralizing Solutions: A Kinetic Study

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Objectives: A significant amount of research has shown that in the presence of polymers, such as polyallylamine hydrochloride (PAH), amorphous calcium phosphate (ACP) can be stable in a supersaturated calcium phosphate solution for an appreciable period of time. However, the effect of varying the concentration of the polymer on the kinetics of ACP's transformation to hydroxyapatite (HA) has not been studied in detail. The aim of our study is therefore to study the effect of different concentrations of PAH on the stability of calcium phosphate solutions by developing a kinetic model to predict changes in ion concentrations.

Methods: Mineralizing solutions were prepared by mixing equal volumes of 9 mM $CaCl_2$ and 4.2 mM K_2HPO_4 solutions, supplemented with 0, 50, 100 and 200 μg / mL of PAH (MW 15 kDa). The mineralizing solutions were placed in an incubator kept at 37°C. Changes in the concentration of Ca^{2+} were measured using a pH meter with a Ca^{2+} electrode. The turbidity of the solutions was measured using a spectrophotometer.

The overall reactions and kinetic equations of the different reactions were assumed to be Fig.1

The concentrations of Ca^{2+}, PO_4^{3-}, Mg^{2+}, ACP and HA were normalized by the initial Ca^{2+} concentration. The rate constants (K) were calibrated by fitting the numerical solutions to the measured changes in Ca^{2+} concentration. The predicted solution turbidity was then compared with the experimental results.

Results: The concentration of Ca^{2+} in the solutions dropped sharply at the beginning of mixing. After the initial drop, the Ca^{2+} concentration quickly returned to a higher value, at which it remained for a period of time before decreasing again. The higher the polymer concentration, the longer the period of stability. Numerical solutions of the calibrated rate equations correctly captured the changes in Ca^{2+} concentration (Fig. 2(a) and (b)). Fig. 3 shows that normolized and actual rate constants. The actual k_1, X and Y increased firstly, then decreased. And the actual k_{-1}, k_2 and k_3 decreased as the PAH concentration increased. The predicted turbidity of the solutions showed similar rates of increase as those measured (Fig. 2(c) and (d)).

Conclusions: A kinetic model has been developed successfully to simulate the concentration-dependent stabilizing effect of PAH on calcium phosphate mineralizing solutions.

S0144

Nano-Hydroxyapatite from Pink Salmon Fish Bone as a Direct Pulp Capping Material

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Objectives: In the contemporary period, patients and dental practitioners are becomingly mindful with preservation of tooth rather than pulp extirpation or tooth extraction. Direct pulp capping (DPC) is a procedure by which a biocompatible medicament is placed over the exposed pulp to induce reparative dentinogenesis. This study aimed to evaluate both the physico-chemical properties and biologic response of the nano-Hydroxyapatite (nHa) from Pink Salmon (*Oncorhynchus gorbuscha*) fish bone as a viable alternative DPC-material, and to compare with Calcium hydroxide ($Ca(OH)_2$).

Methods: The properties that were measured and compared were setting time, pH, solubility and particle size. The protocol for the study was approved by CEU-Institutional Animal Care and Use Committee (CEU-IACUC). The study utilized a combination of completely-randomized block design and single-blinded controlled in-vivo design. Thirty maxillary right first molars of 30 Sprague-dawley rats (n=10 / gp) were selected, prepared using sterile slow-speed ¼ round bur, capped with nHa, $Ca(OH)_2$, and no DPC-material, and restored using light-cured restorative glass ionomer cement. The samples (n=10 / gp) were subjected to histologic evaluation after 2nd and 4th week, and statistically analyzed (Independent t-test, ANOVA, Fisher's Exact test and Bonferroni test, $p<0.05$).

Results: There was no significant difference between the physico-chemical properties of nHa and $Ca(OH)_2$, except on solubility. Histologic evaluation showed that there was a significant difference to the effect of nHa, $Ca(OH)_2$, and group without any DPC-material on inflammatory cells infiltration and presence of necrotic areas after 4 weeks, and tertiary dentin thickness at 2 weeks in favor of nHa. However, there was no significant difference on vascularization, tertiary dentin (bridge) formation and odontoblasts proliferation. n=10 / gp) were subjected to histologic examination after 2nd and 4th week, and statistically analyzed (Independent t-test, ANOVA, Fisher's Exact test and Bonferroni test, $p<0.05$).

Conclusions: It can be concluded that Pink nano-Hydroxyapatite, with its favourable physico-chemical properties, can be used as an alternative direct pulp capping material that is biocompatible with pulp tissues and is capable of remineralization of compromised dentin-pulp complex.

S0145

Time-Course of Endothelial Differentiation by Self-Assembly of Dental Stem Cells

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Objectives: The current study aimed to investigate the time-course effects on endothelial differentiation of dental stem cells, when they are allowed to self-assemble into microtissues.

Methods: Micro-molds purchased from Microtissues, Inc. were used to fabricate agarose three-dimensional (3D) petri-dishes, which contain circular recesses. Dental pulp stem cells (DPSCs) and stem cells from human exfoliated deciduous teeth (SHED) suspensions were poured into these petri-dishes and allowed to self-assemble into 3D microtissue spheroids over 24 hours. After 24 hours, medium was changed to fully supplemented endothelial growth medium -2 (Lonza Biologics Inc.) and subsequently changed in every three days. After 3-, 6- and 9- days, microtissue spheroids were transferred onto the two-dimensional culture dishes and allowed to attach and dissociate into single cells. At confluence, cells were trypsinized and examined for expression of endothelial markers- vWF, CD31, eNOS, VE-cadherin, VEGFR-1 and 2 via qPCR, western blotting and immunofluorescence. The capacity of these cells to form in-vitro capillary-like tubes on basement membrane matrix- Matrigel was assessed.

Results: qPCR and immunofluorescence results showed a significantly higher levels of expression of endothelial markers in 3-days induced, microtissue-derived DPSCs and SHED compared to that of 6- and 9- days induced cells. Accordingly, 3-days induced, microtissue-derived SHED were able to form extensive capillary-like tubes on Matrigel, while cells derived from microtissues induced for 6- and 9- days failed to form an extensive tube-network. In contrast, microtissue-derived DPSCs failed to form capillary-like tubes regardless of the duration of induction. Both DPSCs and SHED, when cultured in traditional two-dimensional cultures did not show a significant increase in endothelial marker expression or capillary-like tube formation on Matrigel regardless of the duration of induction.

Conclusions: SHED hold a higher potential for endothelial differentiation, when they were self-assembled into 3D spheroids and induced for 3 days compared to that of DPSCs.

S0146

Adaptation of SHED Expanded in Foetal Bovine and Human Sera

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Objectives: Paracrine factor profile within the patients' body plays an important role in the regeneration process. Hence the adaptation of expanded allogenic MSCs in patients' own serum prior to transplantation is an important phase. This study aimed to determine the viability and paracrine factor profile of stem cells from human extracted deciduous teeth (SHED) when adapted in individual human sera following expansion.

Methods: SHED (n=3) from passage 4 were expanded in foetal bovine serum (FBS-SHED) and pooled human serum (pHS-SHED) supplemented media up till passage 7. During the expansion, the proliferation of SHED was determined. Cells from these passages were then adapted in human serum (iHS) from 4 different male adults (21 to 35 years old) for a total of 120 hours. After 24hrs, cell viability were assessed using Prestoblue and paracrine factors profiled after 24 and 120hrs using Luminex based ProcartaPlex human cytokines 11 Plex immunoassay kit to elucidate the attainment of adaptation.

Results: Proliferation of SHED was significantly higher ($p<.05$), when expanded in pHS supplemented media compared FBS supplemented media. pHS-SHED maintained their higher proliferation rate compared to FBS-SHED, when they were adapted in iHS (n=4) supplemented media after 24hrs. During adaptation in iHS, FBS-SHED expressed significantly higher profile of SDF-1A ($p<0.05$) after 24hrs post-incubation compared to pHS-SHED. Similar observation was also found for HGF ($p<0.01$), LIF ($p<0.05$), PDGF-BB ($p<0.05$), SDF-1A ($p<0.01$) and IL-10 ($p<0.05$) when FBS-SHED was profiled after 120hrs post-incubation. These paracrine factors has been reported to be highly expressed by cells that showed signs of stress in oxygen, glucose and serum deprivation conditions.

Conclusions: The expression of paracrine factors by FBS-SHED during adaptation in iHS after 24 and 120hrs indicated that cells showed signs of stress when compare to pHS-SHED. This preliminary results indicated that 24hrs is sufficient for adaptation of pHS-SHED which could lead to better engraftment when cells at transplantation.

S0147

Neural Differentiation of Dental Pulp Stem Cells on Advanced 2D Materials

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Objectives: To evaluate the neural differentiation efficiency of dental pulp stem cells (DPSC) on 2D graphene (2DG) and hexagonal boron nitride (hBN) substrates.

Methods: Both 2DG and hBN substrates coated on glass coverslip were characterized using Raman spectroscopy and Atomic force microscopy (AFM). DPSC were seeded on both substrates and cultured in growth media (Control; DMEM+10% FBS) and neural induction media with 40ng / ml bFGF and 20ng / ml EGF for 21 days (treated). Cytocompatability was tested using MTS assay at days 1, 3 and 5. Expression of neural gene namely Nestin, beta III tubulin (TUB-3), and neurofilament-heavy (NF-H) were evaluated by RT-PCR at days 1, 7, 14 and 21. Protein expression for nestin, TUB-3, and NF-H was evaluated after 21 days using flow cytometry. All assays were performed in triplicates and statistical analysis was performed with one way ANOVA and t test (α=0.05).

Results: Raman spectroscopy and AFM showed that the glass surface was completely covered with 2DG. Both the substrates were cytocompatible and supported proliferation of DPSC ($p<0.05$; 2DG and hBN vs glass). The neural genes expression was higher for cells on 2DG-treated group than glass and hBN treated groups. Moreover cells on 2DG expressed mature neural gene NF-H by day 14, while cells on hBN did not show higher expression than glass treated group even after 21 days. Similarly, the neural proteins expression was higher for cell on 2DG-treated group than glass and hBN treated groups.

Conclusions: The results suggest that both 2DG and hBN were cytocompatible; 2DG substrate supports neural differentiation while hBN does not yield mature neurons by 21 days which is evident by neural genes and proteins expression.

S0148

EphrinB2 / EphB4 Signaling Mediates HUVECs and DPSCs Assembly into Vascular-Like Structures

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Objectives: This study aimed to investigate the bidirectional EphrinB2 / EphB4 signaling in mediating the interaction between human umbilical vein endothelial cells (HUVECs) and dental pulp stem cells (DPSCs) during postnatal angiogenesis.

Methods: HUVECs, DPSCs were seeded alone or cocultured (at a ratio of 3:1) onto matrigel for in vitro angiogenesis and EphrinB2 / EphB4 phosphorylation assay. The EphrinB2 / EphB4 and VEGF/ VEGFR-2 mRNA expression in HUVECs and DPSCs after coculture were analyzed through using Dynabead® CD31 to isolate HUVECs from DPSCs. EphrinB2 activity was then blocked with TNYL-RAW (EphB4 inhibitor) and SNEW (EphB2 inhibitor) peptides and the capillary-like structures formation within DPSCs-HUVECs coculture was evaluated. Additionally, HUVECs were coated onto Cytodex-3® microcarrier beads with or without pre-clustered EphrinB2-Fc or EphB4-Fc followed by seeding DPSCs or DPSCs pre-incubated with TNYL-RAW plus SNEW peptide onto fibrin gel to assess vessel-like structures formation after 10 days culture.

Results: EphrinB2 / EphB4 was time-dependently activated in matrigel-based DPSCs-HUVECs cocultures that the phosphorylation of EphrinB2 was detected at 1.5h and 2.5h when cord-like structures were actively formed, while undetectable after 5.5h culture. EphB4 was phosphorylated in DPSCs-HUVECs after 2.5h incubation and remained detectable at 5.5h time point. The mixture of TNYL-RAW and SNEW significantly reduced EphrinB2 / EphB4 phosphorylation and blocked matrigel-supported vascular-like structure formation. For fibrin gel assay, there was more direct vessels sprouts with longer vessel segments formed in HUVECs cocultured with DPSCs than in DPSCs pre-incubated with inhibitory peptides, while the addition of EphrinB2-Fc and EphB4-Fc without DPSCs has no significant effects on the formation of vessel-like structures by HUVECs embedded within fibrin gel ($p < 0.05$).

Conclusions: EphrinB2 / EphB4 signaling plays a pivotal role in orchestrating HUVECs-DPSCs assembly into vascular-like structures on matrigel-supported culture.

S0149

Co-Culture of Human Embryonic Stem Cell Derived Osteoprogenitors and Endothelial Cells

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Objectives: Human Embryonic Stem Cells (hESC) are potential unlimted source of Osteoprogenitors (OP) and Endothelial Cells (EC). The differentiation efficiency, homogeneity and use of animal products are challenges that need to be addressed.

The objective was to develop efficient protocols for derivation of hESC-OP and hESC-EC with minimal use of xenogenic products and to see if hESC-OP can be used as supporting cells for EC differentiation.

Methods: Under feeder-free and serum-free conditions, hESC were differentiated to hESC-OP through stages encompassing embryoid bodies and embryoid body outgrowth. The differentiation of hESC to hESC-OP was confirmed at transcript and protein levels, and differentiation towards osteogenic lineage under osteogenic conditions. Similarly, hESC were differentiated towards hESC-EC under feeder-free and serum-free conditions, using sequential modulation of Wnt, FGF, BMP and VEGF signaling pathways. The characteristics of hESC-EC were confirmed at transcript and protein levels and tube formation assays. The in-vitro functionality of these hESC-OP and hESC-EC was investigated using 2-dimensional (2d) and 3-dimensional (3d) co-culture systems. To enable visualization of hESC-OP and hESC-EC under co-culture conditions, hESC-OP were labelled with red fluorescent protein (DsRed2) and hESC-EC with green fluorescent protein.

Results: The protocol resulted in greater efficiency in the generation of EC. 2d co-culture of hESC-OP and hESC-EC demonstrated the cell-cell interaction of both cell types resulting in reorganization of hESC-EC into anastomosing network of endothelial cords. Similarly, 3d co-culture of fluorescently labelled hESC-OP and hESC-EC within fibrin-based matrix resulted in formation of an anastomosing network of hESC-EC derived vascular channels supported by hESC-OP.

Conclusions: This is the first instance of successfully using hESC-OP as supporting cells for EC differentiation. From a future prospective, we believe that the 3d co-culture of hESC-OP and hESC-EC within appropriate scaffold will pave the way for generation of in vitro prevascularized bone constructs.

S0150

Label-Free, Biomolecular Imaging of 3D Epithelial Tissue Equivalents Using Multiphoton Microscopy

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Objectives: Drug discovery, tissue engineering and regenerative medicine are entering a new era of biomedical research driven by the demand for three-dimensional (3D) tissue equivalents (TEs) or organoids. Conventional assessment of 3D cultures like histology and confocal microscopy are destructive, time-consuming and / or requires the use of fluorescent tags. Microscopy based on two-photon excitation (TPE) and second harmonic generation (SHG) can be used to address this gap based on their ability to detect endogenous biomolecules like nicotinamide adenine dinucleotide (NAD(P)H), flavin adenine dinucleotide (FAD) and collagen.

Methods: Healthy and hyperproliferative models of 3D epithelial TEs were fabricated using keratinocytes, fibroblast and fibrin-based matrix cultured at air-liquid interface. TPE and SHG imaging were performed using confocal laser scanning microscope equipped with femtosecond pulsed laser excitation source tuned to 740nm for detection of NAD(P)H and 860nm for FAD and collagen. TPE of NAD(P)H and FAD were detected using narrow band pass filters with central wavelengths of 440nm and 628nm respectively, while SHG from collagen detected with 440nm filter.

Results: TPE and SHG imaging revealed the different tissue layers of the epithelial TEs. The different layers of keratinocytes (except the corneal layer) strongly expressed NAD(P)H. The cellular size and shape of keratinocytes within individual epithelial layers was distinguishable based on the pattern of perinuclear expression of NAD(P)H. Similarly, fibroblasts expressed both NAD(P)H and FAD enabling the visualization of their orientation in three dimensions. SHG from collagen was clearly visible in the matrix demonstrating the presence of fine fibrils to bundles of collagen fibres. TPE imaging also demonstrated the presence of thicker epithelium in hyperproliferative models.

Conclusions: We demonstrate the potential of multiphoton microscopy for label-free visualization of 3D organization of live, epithelial TEs. Future studies on quantitative biomophologic, biochemical and metabolic features will aid in development of non-invasive tool for clinical and pathophysiological studies.

S0151

Acemannan Sponges Induced Bone Healing after Periapical Surgery: A Pilot Study

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Objectives: to investigate the effect of acemannan sponges extracted from Aloe vera gel on bone defect healing after periapical surgery using cone beam computed tomography (CBCT) at baseline, 3, 6 and 12 months post-operation.

Methods: 23 patients with lesions at the mandibular and maxillary anterior teeth were indicated for periapical surgery and randomly located into two groups. After operation, the bony defect was received either 10mg acemannan sponges or blood clot. To assess the change in volume of periapical bone defect CBCT scans were performed at baseline, 3, 6 and 12 months post-operation. Independent t-test was used for analysis of bone volume change between two groups. P value <0.05 is considered significance.

Results: The acemannan-treated group showed a faster bone healing in term of change in bone volume than that of control group at 3 months ($p < 0.05$). However, there was no difference between two groups at 6 and 12 months ($p > 0.05$). On clinical examination, no allergy reaction was recorded in both groups.

Conclusions: Acemannan sponge is found to be effective biomaterial for bone healing of periapical lesion.

S0152

Expression of STAT3, IL17, IL23 and IL17 within Lymph Nodes of Oral SCC

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Objectives: The ability to produce a pro-inflammatory response is paramount in eliminating early tumour invasion. We postulate that modulation process by cancer cells occurs early in the process of lymph node metastasis.

The aim of this study is to test the hypothesis that early histological changes appear well before lymph node metastasis by comparing expression of STAT3 and specific cytokines (IL22, IL23, IL17) in positive and negative lymph nodes tissue. Positive lymph nodes are those with histological evidence of metastatic OSCC while negative nodes are those with no sign of metastasis.

Methods: Formalin fixed paraffin embedded (FFPE) tissue blocks were obtained from the Oral Cancer Research Coordinating Centre (OCRCC), University of Malaya. Samples were divided into two groups; 21 blocks diagnosed as positive cervical lymph nodes and another 21 diagnosed as negative. Four copies were prepared from each block, a total of 168 tissue sample. Immunohistochemistry was carried out to detect the protein expression of STAT3, IL17, IL22 and IL23. Data were validated by gene expression analysis (qPCR). Image J were used to count the number of positively stained cells. SPSS was used to analyse the data.

Results: Three cases were excluded from each group due to poor quality tissue preparation, a total of 72 sample were used for each group. Except for IL17, the number of positively stained cells show significant difference between the two group (positive and negative lymph node) which proof our hypothesis.

Conclusions: Evidence of early changes within the lymph nodes before metastasis was provided by this study. However, more studies needed to explore further why the expression of IL17 was low regardless of the level of IL23.

S0153

Decreased CPC / EPC Counts in Type 2 Diabetes Patients with Periodontitis

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Objectives: Reduced counts of circulating progenitor cells (CPCs) / endothelial progenitor cells (EPCs) in type 2 diabetic mellitus (T2DM) may increase the risk of microvascular complications and cardiovascular diseases (CVDs). We previously show for the first time that severity of periodontitis is associated with the levels of EPCs in otherwise healthy subjects. This study extended to investigate the CPC / EPC counts in patients with T2DM and various periodontal conditions.

Methods: A total of 89 subjects (47 males and 42 females, aged 40-80 years) with T2DM were recruited, and they were classified into the group with no or mild periodontitis (MP, n=23) and that of moderate to severe periodontitis (SP, n=66), following full-mouth examination. The medical records were retrieved from the database of Hospital Authority. Six subpopulations of CPCs / EPCs were quantified by flow cytometry on the basis of the surface expression of CD34, CD133, and KDR antigens: $CD34^+$, $CD133^+$, $CD34^+CD133^+$, $CD34^+KDR^+$, $CD133^+KDR^+$, and $CD34^+CD133^+KDR^+$.

Results: Overall, the two groups of subjects presented with similar demographic profiles and medical background. Among the six subpopulations of CPCs / EPCs, the SP group had significantly lower counts of $CD133^+$ ($p<0.01$), $CD34^+CD133^+$ ($p<0.01$), $CD133^+KDR^+$ ($p<0.05$), and $CD34^+CD133^+KDR^+$ cells ($p<0.05$), as compared with counterparts. After controlling for various confounders (e.g. age, gender, smoking and DM complications) using analysis of covariates (ANCOVA), moderate to severe periodontitis remained to be correlated with a lower level of $CD133^+$ CPCs (β= -1.89; 95% CI, -0.21 to -3.59; p=0.03), $CD133^+KDR^+$ EPCs (β= -0.17; 95% CI, -0.02 to -0.33; p=0.02), and $CD34^+CD133^+KDR^+$ EPCs (β= -0.08; 95% CI, -0.01 to -0.14; p=0.02).

Conclusions: The present study indicates that moderate to severe periodontitis may independently account for a decreased level of CPCs / EPCs in T2DM subjects. This finding could enhance our understanding on the interactions and underlying trait of periodontal infection and inflammation with T2DM and CVDs.

S0154

Lung Hemorrhage Caused by Lipopolysaccharide Topical Application on Rat's Gingiva

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Objectives: Periodontal disease is known not only to destruct the periodontal tissues but may also to cause some systemic diseases, including respiratory disease. Lipopolysaccharide (LPS) as one of the causes of periodontal disease, may trigger local and systemic immune responses, enter the systemic blood circulation, as well as be directly aspirated through the airway into the lung. The objective of this study is to investigate the effect of the gingival topical application of *Escherichia coli* LPS on the lung.

Methods: Male Wistar rats (12, 6-8 weeks-old, 200-250gm) were used for this research and divided into two, control and treated groups. *Escherichia coli* LPS (1mg) was dissolved in 1ml saline and then sodium carboxymethyl cellulose (2% CMC-Na) were added. Under general anesthesia, 10ml of *E. coli* LPS or saline thick solutions were topically applied onto gingival sulcus area of the upper-right first molar, once per every other day for 19 days. On day 21, under general anesthesia, subjects were sacrificed by intracardiac perfusion using Paraformaldehyde-Lysin-Sodium Periodate (PLP). Lung tissues were collected, histologically processed and stained using Hematoxylin-Eosin. The examination of lung hemorrhage condition was done by a semi-quantitative scoring i.e. 0= no erythrocyte cluster, 1=small, 2=medium, or 3=high of extravasated erythrocyte clusters from five fields of view of the hilar part of the lung. The data was then statistically analyzed (Mann-Whitney $p<0.05$).

Results: The treated group showed a prominent hemorrhage on the lung that was showed by the cluster of erythrocyte extravasation into the airways, around vessels, and into the alveoli, compared to the control group ($p=0.041$).

Conclusions: Topical application of E. coli LPS on the gingiva, as a model of periodontal disease, causes lung hemorrhage. Therefore, periodontal disease may potentially induce lung injury.

S0155

Extract from Aloe Vera Induced Tooth Socket Healing: A 13-Months Evaluation

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Objectives: To investigate the effect of acemannan- a polysaccharide extracted from *Aloe vera* in human tooth socket healing at 3rd, 6th and 13rd month of post-surgical extraction of mandibular impacted third molars, using Cone-Beam Computed Tomography (CBCT)

Methods: 18-25 year-old healthy patients participated in this randomized control trial. After atraumatic surgical removal of mandibular partial impacted third molars, the sockets were randomly treated with blood clot as control group or acemannan sponge. CBCT of the mandible were obtained immediately, after 3, 6, and 13 months post-experiment. The bone formation rate was evaluated by the percentage decrease of the socket volume (ΔV).

Results: 20 patients with 22 mandibular partial impacted third molars (10 control, 12 acemannan treated) were enrolled in this trial. Neither any side-effect nor secondary post-operation infection was recorded within one week. Both acemannan and control group have the significant decrease of total socket volume after 3, 6, and 13 months post-operation compared with immediate post-operation ($p<0.05$). Acemannan-treated group has the percentage decrease of total socket volume greater than that of control group at 3rd, 6th and 13rd months post-experiment about 1.42, 1.14 and 1.12 folds, respectively ($p<0.05$).

Conclusions: Acemannan significantly increased the bone healing after partial impacted, lower third molar after 3, 6 and 13 months post-surgery compared with that of blood clot control group using 3D-evaluation technique.

S0156

An RCT of Molar Two- And Three-Unit RBBs– Initial Findings

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Objectives: The aim of this randomized controlled trial (RCT) is to compare the clinical performance of three-unit fixed-movable (FM3) and two-unit cantilever (CL2) resin-bonded bridges (RBBs) for molar-sized spans (8-10mm).

Methods: This study was registered with Clinicaltrial.gov (NCT02239718) and ethical approval was obtained. Patients with at least one missing molar and who met the inclusion / exclusion criteria were recruited and randomized (ratio 1:1) into CL2 and FM3 groups. Patients were clinically examined before and at 1, 6, 12 months after cementation of RBBs. Abutment teeth mobility and tightness of proximal contacts were recorded by Periotest and digital gauge respectively. Patient's satisfaction with the RBB was recorded by visual analogue scale.

Results: So far 57 patients were enrolled and 72 RBBs were inserted, 32 were CL2 and 40 were FM3. One-month, 6-month and 12-month examinations were conducted on 37, 28 and 5 subjects, respectively. The majority these RBBs were provided by students or junior dentists (38.9%). Two CL2 and one FM3 RBBs were debonded, resulting in retention rates of 93.8% and 97.5% for the groups respectively. The presence of proximal contacts inferred no abutment tooth had drifted. Patients in both groups were satisfied with their RBBs. No adverse outcomes were reported.

Conclusions: These initial findings demonstrate that CL2 RBBs are successful for molar spans with no observable drifting of abutment teeth. Longer term and more comprehensive data will be collected.

S0157

Shape Optimization of Maxillary Anterior Resin-Bonded Fixed Partial Dentures

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Objectives: The aim of this study is to optimize the shape of resin-bonded fixed partial dentures (RBFPD) for maxillary anterior region using an automated manner within the framework of finite element (FE) analysis.

Methods: A 3D geometric model consisting a left central incisor and a canine in the associated maxillary segment was constructed from images of CBCT. A RBFPD which restored missing lateral incisor was designed using Solidworks. The tooth model combining RBFPD was meshed, assigned boundary conditions and loaded (F=500N) at lingual surface of the lateral incisor using Hypermesh. The FE model was then solved using ABAQUS to obtain the tensile stresses at all interfaces. The optimization process based on the genetic algorithm was developed to iterate the above mentioned procedure. Retainer's shape would be adjusted in each iteration for minimizing the total interfacial stress.

Results: Three types of different retainer designs, circular, rectangular and full-covered ones were evaluated. Looking at the upper distal lingual interface between enamel and retainer, the average interfacial tensile stress occurred in the circular one was 2.46MPa, which was significantly smaller than that occurred in the rectangular one (56.1MPa) and in the full-covered one (3.56MPa). Size effect was evaluated for the circular and rectangular designs. Both the maximal von Mises stress and the interfacial average tensile stress decreased when reducing the rectangular retainer's size. On the contrary, reducing the circular retainer's size resulted in increasing of both stresses.

Conclusions: A semi-automatic process was successfully developed and performed to iterate the modeling process of various RBFPD's retainer design. The results suggested the circular retainer would perform better than other designs. Reducing the retainer's size could improve or worsen the stress results depending on which type of shape design is considered. With further development, the framework can iterate toward the optimal retainer design that results in minimum total interfacial stress.

R01

鈣基骨取代物之材料特性及牙科臨床案例
Material Properties and Dental Case Report of Ca-Based Bone Substitute Granule

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“鈣基類型”骨取代物於外科醫療領域使用逾百年歷史，從用來修補骨缺損的巴黎石膏至化身醫療等級鈣化物獨自或合併其他自體或異體骨取代物一起使用，甚至化為先端骨生長因子的載體，其功能與特性並未因年代久遠而消逝，反而隨科技演進被淬鍊改良而更有廣泛的應用範圍與形式。如今，牙科醫療對於骨替代物需求不遑於其他醫療科別。從顏面重建、人工植體周圍骨增生手術到牙周缺損的組織誘導再生，骨替代物的使用方式與品質影響著治療結果。本報告將深入介紹國人自製鈣基骨的進程，並且呈獻多例鈣基骨化物在醫、牙科的臨床應用情形及多年追蹤結果。

R02

成功大學／喜樂醫材產學研發之可吸收性鈣基骨取代物性質簡介

A Bioresorbable Calcium-Based Bone Substitute Material Developed by a NCKU / JMD Joint Project

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A series of all-synthetic, all-inorganic, highly osteoconductive and fully resorbable calcium phosphate / calcium sulfate composite bone substitute materials (Ezechbone®) has been developed by a joint research project of National Cheng Kung University and Joy Medical Devices Corp. of Taiwan. Reported in this presentation include some results of bench performance tests and animal implantation/ histology of this Ca-based material.

Among the Ezechbone® series, Ezechbone® Granule is a highly porous (>70% porosity) granular product characterized by its high resorption rate (totally resorbed and replaced by new bone in 3-6 months), while Ezechbone® Cement is featured by its unique non-dispersive behavior upon contact with blood/body fluid without need of any polymeric or other binder additives. This cement can be applied directly after forming a paste or injected into bone void via a minimally invasive procedure. The safety and efficacy of these medical devices are confirmed by a series of chemical / physical characterization and biocompatibility tests such as cytotoxicity, sub-chronic toxicity, intracutaneous reactivity, skin sensitization, ocular irritation, endotoxin test, hemolysis test, genotoxicity and implantation. Animal models for implantation tests include SD rat femur body, New Zealand white rabbit femur condyle and mandible, Lanyu pig mandible, and goat spine. Clinical indications of this series of Ca-based bone substitute materials include sinus lift, ridge augmentation, frontal bone augmentation and treatment for various types of fractures. The histopathologic examination indicates that both granular and cement type implants are intimately integrated with surrounding bone tissues without foreign body or other undesirable tissue reactions throughout all implantation durations.

R03

雙磷酸鹽類與單株抗體使用後引發顎骨壞死治療之臨床效果的探討

Investigate of Clinical Treatment Outcomes between Bisphosphonate- and Denosumab-Related Osteonecrosis of The Jaws

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Bisphosphonates (BPs) act as osteoclast inhibitors to manage osteoporosis, osteolytic bone metastases and anticancers. Denosumab is a fully human monoclonal antibody for treatment of osteoporosis designed to inhibit RANKL (RANK ligand), a protein that acts as the primary signal for bone removal, for treatment of in giant cell tumors, multiple myeloma with bone metastases and prostate cancer. This study collected 20 patients, included 13 patients of bisphosphate-related osteonecrosis of the jaws (BRONJ) administrated zometa, and 7 patients denosumab-related osteonecrosis of the jaws (DRONJ), administrated Prolia (X-geva). Both extraction and prosthesis are two risk factors were induced BRONJ and DRONJ in this study. Adopting conservative treatment, including antibiotic coverage (Augmentin 1 gram or Unasyn 375 milligrams, 1 tablet twice per day) for 2 to 4 weeks, antibacterial solution irrigation daily 30cc of 0.1% chlorhexidine solution for 5-7 times with the total amount of solution being 200cc. Minor surgical debridement was performed by removed with a cotton plier or by a high speed hand piece with a diamond bur if they attached to the adjacent bone. The mean duration to achieve complete remission of BRONJ lesion was 14.9±2.1, 17.4±1.8 months for patients of BRONJ and DRONJ respectively, student's t-test showed no significant differences (p=0.442). Conservative treatment can result in successful treatment of BRONJ and DRONJ lesions. Treated for patients with DRONJ didn't needs a shorter mean duration to achieve complete remission than patients with BRONJ by conservative treatment.

R04

上頷骨周邊性骨瘤 - 病例報告
Peripheral Osteoma of the Maxilla: A Rare Case Report

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周邊性骨瘤極少發生在上頷骨。本篇病例報告患者為57歲女性，因為發現右上第二小臼齒極度搖晃，亦發現一腫塊在上頷骨，且此腫塊有變大的趨勢，故求診尋求幫忙，經檢查後可以看見一個 5cm x 5cm 的腫塊在硬顎上，x光片上顯示唯一不通透性的物質，觸診並無不適感，在初步切片檢查後，病理報告為齒源性纖維瘤，經手術切除後，其病理報告則是周邊性骨瘤，經過半年追蹤後，無疼痛或是復發情況。

骨瘤是一個良性骨源性的腫瘤，可能來自緻密骨亦或是海綿骨的增生，好發處可能是在中央性、周邊性、或是長在骨頭之外，臨床上來說周邊性骨瘤通常是沒有症狀但會導致外觀腫脹或不對襯，此腫瘤的生長速率通常是相當緩慢，從x光片上來看通常為良好邊界的白色不透明影像，若是使用電腦斷層則能夠輔助我們來幫忙鑑別診斷該病兆。

R05

成功以手術治療藥物相關顎骨壞死 臨床病例報告

Successful Treatment of Medication-Related Osteonecrosis of the Jaws

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藥物相關顎骨壞死實際機轉仍在探討。但感染、外傷以及嗜骨細胞活性的降低，在其中扮演了關鍵角色。治療方針從2003年至今，也有了明顯轉變，從保守性治療轉為早期手術介入。

67歲女性病患，因乳癌於2012至2015年3月接受癌骨瓦 (Xgeva@, Denosumab) 注射。因右下臉部腫脹及疼痛轉診至本院就醫，經臨床與環口X光片檢查，診斷為右下第二大臼齒殘根併發蜂窩性組織炎及膿瘍，且懷疑有顎骨壞死。投予抗生素後，拔除右下第二大臼齒殘根及切開引流，後續進行傷口沖洗及照護。但拔牙傷口並未癒合造成骨頭持續暴露，確診為藥物相關顎骨壞死。故安排手術介入治療並於術前進行錐狀射束電腦斷層掃描 (cone-beam computed tomography, CBCT) 確認骨壞死範圍。手術過程中拔除右下第一及第二小臼齒，腐骨清創併造碟術，並直接縫合傷口。後續兩個月追蹤，傷口癒合良好，再無骨暴露，亦無臉部麻木等後遺症。因此當臨床與影像學檢查上確診為藥物相關顎骨壞死時，早期手術介入確實能成功治癒，大幅提高病患生活品質。

R06

下顎阻生第三大臼齒以手術移除後其骨缺損處置入鈣基骨取代物之效果 - 初期報告

Effect about Placement of Calcium-Based Bone Substitute after Surgical Removal of Impacted Lower Third Molars- a Preliminary Cases Report

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因手術移除第三大臼齒或第三大臼齒本身病理性的因素而導致的骨缺損，在術後可能影響第二大臼齒遠心端牙周組織的健康程度。以膠原蛋白栓（collagen plug）、自體骨、異體骨或異種骨來修補骨缺損，在臨床上並未常規性地被施行。本報告使用商品化並已核准上市的鈣基骨取代物（EZEC HBONE & reg; Granule 甦骨粒 & reg;; JMD，南科高雄）做為骨填充材料，其體外（in vitro）、體內（in vivo）的報告皆顯示，此產品具有高生物活性且植入動物體後組織觀察也無異物反應，其吸收速率與新骨生成相當。選取術前第二大臼齒的遠心端牙周囊袋大於 5mm 之患者且須手術移除第三大臼齒者共32例，所有傷口皆徹底清創且於第二大臼齒的遠心端施行牙根平整術，其中，置入鈣基骨取代物有14例，其餘18例不填補任何材料。一般而言，在口腔手術中，植入物越多越容易引起感染及異物反應。本研究顯示，植入甦骨粒 & reg; 鈣基骨取代物並不會造成感染，其對齒槽骨生成及第二大臼齒的遠心端牙周囊袋的影響，初期結果發現牙周囊袋有變淺現象，顯示在手術移除第三大臼齒後，用甦骨粒 & reg; 填補其骨缺損，對於生成齒槽骨並進而使第二大臼齒的遠心端周圍牙周囊袋變淺有其一定貢獻。

R07

以牙根覆蓋術合併牙釉基質衍生物於牙齦萎縮之治療-病例報告

Root Coverage Combined with Enamel Matrix Derivatives in Treatment of Gingival Recession- a Case Report

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牙齦萎縮為臨床上常見的牙周問題。以冠向位移皮瓣及游離結締組織移植進行牙根覆蓋術目前被認為能提供米勒第一及第二型牙齦萎縮較可預期之臨床結果。但對範圍較大之牙齦萎縮，需考慮是否有其他治療選項。本文目的為提出一個以 V.I.S.T.A. 合併游離結締組織移植及牙釉基質衍生物進行牙根覆蓋術之案例，並探討牙釉基質衍生物在牙根覆蓋術中扮演之角色。患者為24歲女性，因交通事故導致牙齒喪失及牙齦萎縮而求診。檢查後，診斷為左上犬齒及左上正中門齒寬 10mm 之米勒第一型牙齦萎縮、左上側門齒喪失、右上犬齒殘餘齒根、右上正中門齒牙冠斷裂、右上側門齒固定牙冠陶瓷斷裂。治療流程為左上正中門齒及左上犬齒牙根覆蓋術、右上犬齒及左上側門齒植牙合併固定牙冠、右上側門齒及右上正中門齒固定牙冠。術後追蹤1年半，癒合良好。此病例以 V.I.S.T.A. 合併游離結締組織移植及牙釉基質衍生物進行牙根覆蓋術，得到良好結果可做為臨床參考。面對較大的牙齦萎縮缺損，需考慮移植物血流供應不佳之情況，牙根覆蓋術合併牙釉基質衍伸物可以增加移植物的存活率，進而達成較佳之結果。

R08

以減壓術合併根尖手術於上顎骨大型根尖囊腫之治療 - 病例報告

Decompression Combined Apical Surgery in Treatment of Large Maxillary Cyst- Case Report

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大型的根尖囊腫在臨床上是十分棘手的問題。本文目的提出一個大型囊腫經減壓術後，合併手術及骨粉重建，並長期追蹤之案例。患者44歲女性因上顎前牙不適求診。檢查發現左上中門齒至犬齒區牙齦腫脹，有觸診、敲診及自發性疼痛。右上前牙區正常。右上犬齒、側門齒及左上犬齒、第一小臼齒牙髓活性正常；X光片發現兩側正中門齒及左上側門齒為已根管治療牙齒，在右上正中門齒、側門齒和左上正中門齒至第一小臼齒區分別有直徑7和21毫米的病灶。診斷為右上正中門齒為已根管治療牙齒、無症狀型根尖周圍炎；左上正中門齒、側門齒為已根管治療牙齒、症狀型根尖周圍炎，疑有根尖囊腫。治療計畫為兩側中門齒拆除假牙後和左上側門齒接受根管治療，並進行減壓術，7個月後施以根尖切除、根管逆充填及囊腫摘除，並補以骨粉。術後持續追蹤4年半，癒合良好。此病例以根管治療、減壓術縮小病灶，再以根尖手術移除病灶，得到良好結果可以做為臨床參考。面對大型根尖囊腫，直接摘除囊腫組織不只手術難度高、易造成周遭組織結構強度的下降，以減壓術減小囊腫大小後再進行手術，可以達成良好臨床效果。

R09

未完成根管治療牙齒呈現根尖病灶癒合之病例報告

Healing of Apical Lesion on an Unfinished Endodontic Treated Tooth: a Case Report

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[1]成大醫院

冠部密封（coronal sealing）是保留根管治療成效相當重要的步驟。本病例為一下顎第一大臼齒因病人未配合而中斷治療八個月，再次回診時即呈現根尖病灶的癒合，證明冠部密封在根管治療的重要性。

病患為十八歲女性，初次來到診間為右下第一大臼齒填補物脫落及疼痛，臨床敲觸診疼痛，放射影像顯示近心牙根根尖病灶，診斷為繼發性齲齒、曾根管治療、有症狀根尖牙周炎；移除齲齒後安排根管重新治療，在大部份根管充填物移除後，病患自行中斷治療八個月，後續回診時根尖病灶即呈現癒合，後續安排完成根管治療，病患又自行中斷治療五個月後完成右下第一大臼齒之根管治療。透過以上案例，討論冠部密封之重要性及冠部密封于臨床上之考量，以文獻回顧歸納現今冠部密封之要點：臨時填補材料以4毫米以上之 Caviton 最能提供足夠的防滲透能力、齒質缺損較大時建議搭配抗磨耗之材料、臨時填補材料若放置超過三星期需考慮較永久之材料，若為非預期性間隔過長則需再次進行根管清創。

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老人牙醫學概論
Overview of Geriatric Dentistry

賴志毅 (Lai CY)[1]
[1]牙醫診所

老人牙醫學的目的，在於預防疾病的發生，預防疾病不適用於健保。其二在於治療疾病，高齡者齒科學大致以活動假牙（有床義齒科）為主體， 包括活動假牙、固定假牙、植體假牙、混合式假牙等。

目的或理論根據：

本文為老人牙醫學概述，依序為老人牙醫學的目的，社會學的角度，老化的生物學，口腔顎顏面之生物學的老化，老年患者的臨床評價與診療方針的決定，老人牙科的臨床，牙科治療時的全身管理，口腔保健管理與社會保障…

臨床重要性 技術及注意事項：

老人牙醫學有成為未來牙醫診所的主要業務之趨勢。

老人牙醫學的特色之一，須先了解老年人的心理學及社會學的角色。此外，老年人往往服用藥物。術者必需注意到適當地瞭解藥理學，作為診治老年人的重要參考。此外，對於口腔顎顏面之生物學的老化應該有適當地認識。此外也提及念珠球菌的感染，吞嚥困難等。作為老人牙醫學爾後著墨的目標。

討論及結論：

希望老人牙醫學能夠從心理學及社會學的角度出發，充分把握住老年人的每一細微之處，然後給予牙醫學專業服務。達到老年牙醫學的總體目標 well-being.