



UNIVERSITI SAINS MALAYSIA



Deciphering the Intricacies in Science

2nd POSTGRADUATE RESEARCH DAY

Date: 22nd February 2018
Venue: School of Dental Sciences,
USM Health Campus

Co-Sponsors



DIRA RESOURCES



*Organised by:
School of Dental Sciences, Universiti Sains Malaysia Health Campus*

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Message from the Director of Health Campus



In the Name of Allah, the Most Gracious and the Most Merciful.

Universiti Sains Malaysia Health Campus (USM) and the organizing committee welcome you to the 2nd Postgraduate Research Day 2018 (PGRD 2018) in conjunction with 15th Annual Students' Scientific Conference 2018 (15th SSC). This event is a platform for both the undergraduates and postgraduates to impart their research findings. The main aim of this conference is to nurture research interest among our undergraduates besides to inculcate good research culture in all researchers including undergraduates, postgraduates as well as lecturers.

It is hoped that through this conference, the knowledge gained and the discoveries made would be shared openly among the participants so that the entire process would be one of learning experience that would be impactful on every participant academically.

The theme **Deciphering the Intricacies in Science** is relevant to future graduates and postgraduates. It has become imperative for all of us, to understand, explore and unfurl the applications of science and harnessing its potentials for our future generations.

I hope this event will be a very fruitful and memorable meeting for all the participants. Let us make this scientific conference as a platform to educate, inspire and connect not only among us in USM Health Campus but also with the scientific community throughout the world.

'Deciphering the Intricacies in Science'

Thank you.

Professor. Dato' Dr. Ahmad Sukari Halim
Director of Health Campus,
Universiti Sains Malaysia

Message from the Dean



Assalamualaikum warrahmatullah dan salam sejahtera.

The School of Dental Sciences, Universiti Sains Malaysia (USM) is proudly welcome all invited speakers, participants and everyone to our 2nd Postgraduate Research Day 2018 (PGRD 2018) which is held in conjunction with 15th Annual Student's Scientific Conference (15th SCC); the annual conference for the undergraduate students of School of Dental Sciences, USM

This annual conference is a platform for researchers to share with others all the innovations and discoveries which of benefits to the mankind. It is widely perceived that academic research and the scientific process is a key driver of innovation, economic growth and social development

The theme of this year's conference, '**Deciphering the Intricacies in Science**', encourages all researchers to succeed in understanding, interpreting, and identifying the qualities in Science. It is crucial that we also yield, develop or improve new findings and knowledge that would help and benefit the future generations to come.

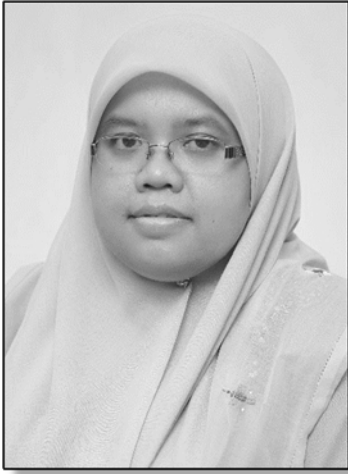
This year marks the second year of 2nd Postgraduate Research Day 2018 which gives our postgraduates an opportunity to display their research and presentation skill besides sharing their knowledge with others. This event serves as a stepping stone for our postgraduates to educate, inspire and connect not only among us in School of Dental Sciences, but also with the world.

Hence, this is the moment to empower your knowledge, enduring collaborations, and utilise all your enthusiasms and proficiencies to advocate the beauty of sciences. As the Dean of the School of Dental Science, USM, I would like to take this opportunity to thank all the participants. On behalf of myself and my colleagues, I wish all our students have a great success in their academic and professional life.

Have a wonderful conference.

Professor Dr. Adam Husein
Advisor, 2nd PGRD/15th SSC
Dean, School of Dental Sciences, USM.

Message from the Deputy Dean (Research)



In the Name of Allah, the Most Gracious and the Most Merciful.

Assalamualaikum and good day

Congratulations to the PGRD Committee members who have been working tirelessly behind the scene to organise this event together with SSC Committee. The conference is the second one and this year again it is only for PPSG Postgraduates.

I hope all the postgraduates will benefit from this event. Please take the chances to learn as much as possible. I wish everyone all the best and may the event be successful.

Thank you very much

Dr. Azlina Ahmad
Deputy Dean
(Research, Postgraduate & Networking)

2nd Postgraduate Research Day / 15th Students Scientific Conference

School of Dental Sciences, Universiti Sains Malaysia
 22nd February 2018

Time	Programme	Venue
8.00 am	Registration	Corridor, 2 nd Floor
8.15 am	Short briefing to Judges	Dean's Meeting Room, 2 nd Floor
8.30 am	Ceremonial procession of VIPs	DK 1, 2 nd Floor
8.45 am	National Anthem /USM Song / Prayer recital	
8.50 am	Welcoming speech by Dean, School of Dental Sciences	
9.00 am	Officiating speech by USM Health Campus Director, Prof. Dato' Paduka Dr Ahmad Sukari Halim	
9.10 am	Multimedia presentation	
9.20 am	Break up session	
9.30 am	<u>Presentations</u> 15th SSC Oral (Basic Sciences) 15th SSC Oral (Clinical Sciences) 15th SSC Oral (Public Health) 2nd PGRD Oral 3-min pitching 15th SSC Poster, 2nd PGRD Poster *(Break for judges 11.00-11.30 am)	DK 1, 2 nd Floor DK 2, 2 nd Floor Conf. Room, 2 nd Floor Auditorium, Ground Floor Seminar Room, 2 nd Floor
1.00 pm	Lunch break	
2.00 pm	Talk by Colgate representative	DK 1, 2 nd Floor
2.30 pm	Talk by Invited Speaker: Prof. Dato' Paduka Dr Ahmad Sukari Halim	DK 1, 2 nd Floor
3.45 pm	Award presentation and closing ceremony	DK 1, 2 nd Floor

DK 1 (Dewan Kuliah 1/Lecture Hall 1)
 DK 2 (Dewan Kuliah 2/Lecture Hall 2)
 Conf. Room – Conference Room

ORAL 3-MIN PITCHING

Venue: Auditorium PPSG

Judges: Assoc. Prof. Dr. Sarina Sulong
 Assoc. Prof. Dr. Noor Hayati Abd. Razak

No.	<u>Presenter / Authors</u>	Title	Time
O01	<u>Wael AB</u> , Norma ABR, Shaifulizan ABR, Norkhafizah S, Ali Habib Hassan, Rozita H	Treatment of Severe Class III Malocclusion in Adolescents with Skeletal Anchorage	9.30
O02	<u>Shifat A Nowrin</u> , Fazal Shahid, Norma Ab Rahman, Saidi Jaafar	Validity and Reliability of External Apical Root Resorption Measurements: A 3D Cone-Beam Computed Tomography Study	9.38
O03	<u>Shamima Easmin Nishi</u> , Norma Ab Rahman, Rehana Basri, Mohammad Khursheed Alam, Adam Husein, Nor Farid Mohd Noor	Surface Electromyographic Activity of Masseter, Temporalis, and Buccinator Muscles in Orthodontic Patients: A Pilot Study	9.46
O04	<u>Sanjida Haque</u> , Mohammad Khursheed Alam, Mohd Fadhli Khamis	Effects of Post-Natal Treatment Factors in the Treatment Outcome of Non-Syndromic Unilateral Cleft Lip and Palate Children: A Multi-Population Study	9.54
O05	<u>Noorshaida Kamaruddin</u> , Zainul Ahmad Rajion, Asilah Yusoff, Firdaus Daud, Mohd Ezane Aziz	Reliability of Different Software in Automatic Airway Analyses	10.02
O06	<u>Mohammad Khan</u> , Zeehaida Mohamed, Saedah Ali, Norkhafizah Saddki, Ninin Sukminingrum	Impact of Oral Hygiene Care on Incidence of Ventilator-Associated Pneumonia in Mechanically Ventilated Patients: A Randomized Controlled Trial	10.10
O07	<u>Mohamad Shafiq Mohd Ibrahim</u> , Wan Muhamad Amir W Ahmad, Ruhaya Hasan, Masitah Hayati Harun	Comparison between Fuzzy Bootstrap Weighted Multiple Linear Regression and Multiple Linear Regression: A Case Study for Oral Cancer Modelling	10.18
O08	<u>Mior Azrizal M. Ibrahim</u> , Zurairah Berahim, Haslina Taib, Ahmad Azlina	Effect of Locally Delivered Tualang Honey on Healing of Periodontal Tissues: A Randomized Controlled Split-Mouth Clinical Trial	10.26
O09	<u>Mera Christina Michael</u> , Nik Rozainah Nik Abdul Ghani, Noor Huda Ismail, Adam Husein	The Effect of Different Restorative Techniques on the Fracture Resistance of Endodontically Treated Teeth: An <i>in vitro</i> Study	10.34
O10	<u>Fazal Shahid</u> , Norma Ab Rahman, Mohd Fadhli Khamis, Adam Husein, Mohammad Khursheed Alam	Perception of Pain with Low-Level Laser Therapy Application Based on Wire Sequences in Self-Ligating and Conventional Systems: A Pilot Study	10.42

O11	<u>Ayman Jalal AL Oulabi</u> , Noor Huda Ismail, Ismail Ab Rahman, Zuryati Ab Ghani, Nor Aidaniza Abdul Muttlib, Raja Azman Raja Awang	Effect of Reinforcing Alumina in Experimental Nanohybrid Composite using Silica Extracted from Rice Husk on Hardness, Flexural Strength, and Surface Characteristics	10.50
O12	<u>A'attiyah Ab Alim</u> , Wan Afiqah Syahirah Wan Ghazali, Nor Azah Mohd Ali, Thirumulu Ponnuraj Kannan, Suharni Mohamad, Ahmad Azlina	<i>In vitro</i> Antimicrobial Activity of <i>Clinacanthus nutans</i> Leaves against Oral Pathogens	10.58
BREAK 11.00 – 11.30			
O13	<u>Nashid Fareen</u> , Mohammad Khursheed Alam, Mohd Fadhli Khamis, Norehan Mokhtar	Gender Disparities in the Treatment Effect of Reverse Twin-Block and Reverse Pull Face Mask Appliances	11.30
O14	<u>Shamma Salwa Chowdhury</u> , Shaifulizan Ab.Rahman, Wan Muhamad Amir W Ahmad	A Comparative Cross-Sectional Study on Alveolar Bone Resorption and Peri-Implant Soft Tissues of Functioning Implant Supported Cantilevered Bridge and Individual Implant: A Preliminary Result	11.38
O15	<u>Tamzid Ahmed</u> , Norma Ab Rahman, Mohammad Khursheed Alam	Reliability and Validation of a Portable Digital Microscope for Assessing Adhesive Remnant Index Scoring <i>in vivo</i>	11.46
O16	<u>Fatimah Suhaily Abdul Rahman</u> , Hasnah Osman, Habsah Hasan, Dasmawati Mohamad	Mechanism of Inhibition of Coumarin Thiosemicarbazone Incorporated with Resin Modified Glass Ionomer Cement on <i>Streptococcus mutans</i>	11.54
O17	<u>Nur Hafizah Md Ismail</u> , Ahmad Azlina, Nik Aloesnisa Nik Mohd Alwi	Effect of <i>Piper sarmentosum</i> Aqueous Extract on Inflammatory-Related Genes in Sprague Dawley Rats	12.02
O18	<u>Mohamed Kosba</u> , Zuliani Mahmood, Rozita Hassan	Malocclusion and Orthodontic Treatment Needs of Transfusion-Dependent Thalassemia Patients among Malays	12.10
O19	<u>Arbaz Sajjad</u> , Wan Zaripah Wan Bakar, Ismail Ab Rahman, Dasmawati Mohamad, T. P. Kannan	Evaluation of a Glass Ionomer Nano-Zirconia-Silica-Hydroxyapatite Hybrid Material	12.18
O20	<u>Henny Zaliyana Ahmad Kamal</u> , Tuan Nadrah Naim Bt. T. Ismail @ T. Manah, Erry Mochamad Arief	Identification of Chemical Compounds of <i>Cymbopogon nardus</i> by GCMS	12.26
O21	Ahmad Azlina, Suharni Mohamad, <u>Ezany Yusoff</u>	Phytochemical, Cytotoxicity, and Antibacterial Study of Aqueous Extract of <i>Euphorbia tirucalli</i> Stem	12.34

POSTER PRESENTATION

Venue: Seminar Room

Judges: Assoc. Prof. Dr. Abd Aziz Mohamed Yusoff
 Assoc. Prof. Dr. Normastura Ab Rahman

No.	<u>Presenter / Authors</u>	Title	Time
P01	<u>Hii Siew Ching</u> , Norhayati Luddin, Thirumulu Ponnuraj Kannan, Ismail Ab Rahman, Nik Rozainah Nik Abdul Ghani	Odontogenic Differentiation Potential of Dental Pulp Stem Cells Treated with Nanohydroxyapatite-Silica-GIC and Conventional GIC	9.30
P02	<u>Siti Nurnasih Md Hashim</u> , Muhammad Fuad Hilmi Yusof, Wafa' Zahari, Hamshawagini Chandra, Khairul Bariah Ahmad Amin Noordin, Thirumulu Ponnuraj Kannan, Suzina Sheikh Abdul Hamid, Khairani Idah Mokhtar, Ahmad Azlina	Angiogenic Potential of Dental Stem Cells in 3D <i>in vitro</i> Model	9.38
P03	<u>Badr Abdullah Al-Tayar</u> , Masitah Hayati Harun, Mohamad Ezany Yusoff, Siti Fadilah Abdullah, Noor Khairiena Mohamad, Ahmad Azlina	Cytotoxicity of Betel Quid and Areca Nut Aqueous Extracts on Mouse Fibroblast Cell Line	9.46
P04	<u>Hasan Subhi</u> , Adam Husein, Asma Abdullah Nurul, Dasmawati Mohamad	Evaluation of Physical and Chemical Properties of Chitosan-Based Accelerated Portland Cement	9.54
P05	<u>Zul Faizuddin Osman</u> , Khairul Bariah Ahmad Amin Noordin	The Ultrastructure of Odontoblast-Like Cells Differentiated from Stem Cells from Human Exfoliated Deciduous Teeth Cultured on Human Amniotic Membrane	10.02
P06	<u>Imran Alam Moheet</u> , Norhayati Luddin, Ismail Ab Rahman, Thirumulu Ponnuraj Kannan, Nik Rozainah Nik Abdul Ghani	Evaluation Study on Addition of Nano-Hydroxyapatite-Silica into Glass Ionomer Cement	10.10
P07	<u>Abdul Manaf Abdullah</u> , Tuan Noraihan Azila Tuan Rahim, Dasmawati Mohamad, Hazizan Md Akil, Zainul Ahmad Rajion	Mechanical and Morphological Properties of Hybrid ZrO ₂ /B-TCP Filled Polyamide 12 for Craniofacial Reconstruction: 3D Printing and Injection Moulding	10.18
P08	<u>Nor Ain Fatimah Azlisham</u> , Zuliani Mahmood, Dasmawati Mohamad	Effect of Water Sorption and Fluoride Release on Coumarin-GIC	10.26
P09	<u>Wan Nur Fadilla Wan Hamad</u> , Abdul Manaf Abdullah, Dasmawati Mohamad, Nurul Asma Abdullah	Cytotoxicity Evaluation of PMMA Composite on Human Osteoblast Cell	10.34
P10	<u>Mohamed Zahoor</u> , Rozita Hassan, Suhaila Zainal Abidin	Soft Tissue Changes Associated with Orthodontic Treatment and Extraction of Four Premolars	10.42

Abstracts

2nd Postgraduate Research Day (2nd PGRD)

Kota Bharu, Kelantan, Malaysia. 22nd February 2018

Oral Presentations

(O01) Treatment of Severe Class III Malocclusion in Adolescents with Skeletal Anchorage

Wael AB¹, Norma ABR¹, Shaifulizan ABR², Norkhafizah S³, Ali Habib Hassan⁴, Rozita H¹

¹Orthodontic Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ²Maxillofacial Surgery Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ³Dental Public Health Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ⁴Orthodontic Department, School of Dentistry, King Abdelaziz University, 67578 Jeddah, Western Region, Saudi Arabia.

Introduction: There has been growing interest in intraoral appliances with skeletal anchorage for correcting Class III malocclusion in adolescents. Many designs of appliance have been proposed by research in literatures. Non-invasive, simple, and effective methods will be the treatment choice. Active skeletonized suture distractor (ASSD) appliance was designed to meet these criteria.

Objectives: The treatment objectives were: (1) To improve the skeletal jaw relationship by protracting the maxilla anteriorly; (2) to achieve Class I incisor, canine, and molar relationships; (3) to obtain ideal overjet and overbite; and (4) to obtain ideal aesthetic and function.

Methodology: Two Class III malocclusion patients, 15- and 14-year-old girls were treated using ASSD appliance for 5 months. Treatment effects were determined by comparing two lateral cephalometric analyses pre- and post-treatment. In both cases, two mini implants inserted in the paramedian region in the palate at the level of the first premolar and connected to the upper appliance with two looped arm with expansion appliance. Class III elastic was applied bilaterally with force level about 500 g. The patients were asked to do

cycles of expansion and constriction of the maxilla during treatment period with the aim to luxate the circummaxillary suture. **Results:** Class III dental relationship is corrected into Class I, soft tissue profile improved, and skeletal analyses showed more movement of maxilla and mandible as proven by increase in SNA, ANB, and A-FP. **Conclusion:** This case report showed that Class III skeletal malocclusion in adolescent can be successfully managed using ASSD appliance.

Keywords: Class III malocclusion, sutural distractor, adolescent.

(O02) Validity and Reliability of External Apical Root Resorption Measurements: A 3D Cone-Beam Computed Tomography Study

Shifat A Nowrin¹, Fazal Shahid¹, Norma Ab Rahman¹, Saidi Jaafar²

¹Orthodontic Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ²Craniofacial Biology Research Group, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia.

Introduction: Root resorption is a deleterious effect related to orthodontic treatment. Contemporarily, cone-beam computed tomography (CBCT) acquisition has the capacity to explore the root resorption in response to orthodontic tooth movement. **Objectives:** The purpose of this study was to evaluate the validity and reliability of external apical root resorption (EARR) measurements in orthodontic patients made on 3D CBCT with two different software. **Methodology:** The data sources were CBCT high volumetric data acquisition from the Malay ethnic group who are undergoing orthodontic treatment in Specialist Orthodontic Clinic, Universiti Sains Malaysia. A total of 16 CBCT radiographs with 512 variables were measured using the Planmeca

Romexis TM Software 2.3.1.R (Helsinki, Finland) and 3D Slicer v. 4.8.1 (open-source software, <http://www.slicer.org>). Two investigators (A and B) carried out all the measurements of the selected radiographs using the two software. Intraclass correlation (ICC) coefficient test was applied to evaluate the validity of EARR measurements. **Results:** The validity of the 3D EARR measurements for both intra- and inter-examiner showed strong correlations (Examiner A = 0.999 max / 0.819 min, Examiner B = 0.998 max / 0.765 min). The inter-examiner reliability coefficient values were comparable between measurements using Planmeca Romexis (0.998 max / 0.722 min) and 3D Slicer (1.000 max / 0.826 min), respectively. All ICC coefficient values showed positive correlations and statistical significance at $p < 0.001$. **Conclusions:** It can be concluded from this study that the linear measurements of EARR using 3D CBCT are valid and reliable.

Keywords: EARR, 3D CBCT, validity, reliability.

(O03) Surface Electromyographic Activity of Masseter, Temporalis, and Buccinator Muscles in Orthodontic Patients: A Pilot Study

Shamima Easmin Nishi¹, Norma Ab Rahman¹,
Rehana Basri², Mohammad Khursheed Alam³,
Adam Husein⁴, Nor Farid Mohd Noor⁵

¹Orthodontic Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ²Department of Medicine (Neurology), College of Medicine, Al Jouf University, Sakaka, Kingdom of Saudi Arabia; ³Orthodontic Department, College of Dentistry, Al Jouf University, Sakaka, Kingdom of Saudi Arabia; ⁴Prosthodontic Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ⁵Anatomy Unit, School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia.

Introduction: Mastication involves chewing, swallowing, and digestion of food where occlusal surfaces of the teeth are involved in crushing and grinding of solid foods. However, masticatory processes may differ in several types of malocclusion. Surface electromyography (sEMG) is used to assess muscle function by recording muscle activity. **Objectives:** The aim of this pilot study was to investigate the sEMG activity of masseter, temporalis, and buccinator muscles during chewing in Class II Division 1 malocclusion patients before and 1 year after fixed orthodontic treatment. **Methodology:** Seven Class II Division 1 malocclusion patients (6 females and 1 male with the mean age of 19.26 ± 2.43 years) were identified through screening from the Specialist Orthodontic Clinic, Hospital Universiti Sains Malaysia for this prospective study. SEMG of muscles were done by using a two-channel electromyography device, where pre-gelled and self-adhesive electrodes (bilateral) were used. SEMG (frequency 50 Hz) activities (during resting, chewing, and post-chew resting) of masseter, temporalis, and buccinator muscles were recorded for 20 seconds before and 1 year after orthodontic treatment. A non-sticky chewing gum was given during recording, but chewing was only started when a signal was provided. Data were analysed by using non-parametric Wilcoxon pair t-test in IBM SPSS Statistics Version 24.0. **Results:** Statistical analyses of variables showed no significant differences for masseter, temporalis, and buccinator muscles during resting, chewing, and post-chew resting stage in Class II Division 1 malocclusion patients before and 1 year after orthodontic treatment. In this study, root mean square (RMS) value of sEMG were higher in right masseter muscle ($274 \mu\text{V}$) during chewing (before treatment) when comparing with temporalis and buccinator muscle. **Conclusion:** With the limitation of the present study, there were no changes

found during chewing in Class II Division 1 malocclusion patients undergoing 1 year orthodontic treatment.

Keywords: Surface electromyography, chewing, masseter, temporalis, buccinator.

(O04) Effects of Post-Natal Treatment Factors in the Treatment Outcome of Non-Syndromic Unilateral Cleft Lip and Palate Children: A Multi-Population Study

Sanjida Haque¹, Mohammad Khurshed Alam², Mohd Fadhli Khamis¹

¹School of Dental Sciences, Universiti Sains Malaysia Health Campus, 16150 Kota Bharu, Kelantan, Malaysia; ²Orthodontic Department, College of Dentistry, Al Jouf University, Sakakah, KSA.

Introduction: Cleft lip and palate (CLP) remains a significant and interesting challenge for the medical fraternity. WHO recommends promoting CLP as the burden of global initiation because of an increase in life expectancy. Various factors including both congenital (gender, cleft type, cleft side, family history) and post-natal treatment (cheiloplasty, palatoplasty) are responsible for the treatment outcomes of a CLP patient.

Objectives: To evaluate and compare the effects of each post-natal treatment factor on treatment outcome based on dental arch relationship (DAR) of three different populations (Malaysia, Bangladesh, and Pakistan) at a time using Great Ormond Street, London, and Oslo (GOSLON) Yardstick. **Methodology:** In this retrospective study, 292 dental models of unilateral cleft lip and palate (UCLP) children (107, 84, and 101 for Malaysian, Bangladeshi, and Pakistani population, respectively) were taken before orthodontic treatment and alveolar bone grafting. The DAR was assessed by GOSLON Yardstick. According to GOSLON Yardstick, five categories were rated: 1, excellent; 2, good; 3, fair; 4, poor; 5, very poor. Independent t-test was

performed to compare the GOSLON score for each post-natal treatment factors for all populations. A multiple comparison (ANOVA) was also conducted between the GOSLON score of three different populations. **Results:** A significant difference was revealed between two techniques of cheiloplasty in both Malaysian and Pakistani populations ($p=0.038$ and $p<0.001$, respectively). Techniques of palatoplasty also showed significant difference in Pakistani population ($p<0.001$). However, no significant difference was observed between the GOSLON score and the countries. **Conclusion:** Treatment outcome based on DAR in individual population significantly varies [Malaysia (cheiloplasty); Pakistan (cheiloplasty and palatoplasty)].

Keywords: Cleft lip and palate, post-natal treatment factors, treatment outcome, multi-populations study.

(O05) Reliability of Different Software in Automatic Airway Analyses

Noorshaida Kamaruddin¹, Zainul Ahmad Rajion^{1,2}, Asilah Yusoff¹, Firdaus Daud¹, Mohd Ezane Aziz³

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Introduction: The segmentation of airway for airway analysis can be done either manually or automatically. Automatic segmentation of the airway is faster and more practical than manual segmentation, but the reliability and accuracy of the method with commercially available programs have not been tested much.

Objectives: The aim of this study was to assess the reliability of different software to measure the upper airway volume and minimum area using airway analysis

function. **Methodology:** The samples consisted of 11 cone-beam computed tomography (CBCT) scans data, evaluated using the Invivo5 (Anatomage) and Romexis (version 3.8.2.R, Planmeca) software for image reconstruction and airway analysis. The measurement was done twice with one week gap between the two measurements. The measurements were analysed with reliability tests using intraclass correlation coefficient (ICC), and the Bland and Altman agreement tests, with confidence interval (CI) set at 95%. **Results:** Excellent intrarater reliability values were found for the measurements from both software, with ICC values ranging from 0.940 to 0.998. The data demonstrated an agreement between the two measurements of each software and between the measurements of both software, thus confirming the reliability of this methodology (using both software to measure upper airway volume and minimum area). **Conclusion:** The results suggested that both software can be used for further studies to investigate upper airway, thereby contributing to the diagnosis of upper airway obstructions.

Keywords: Cone-beam computed tomography, Invivo5 (Anatomage), Romexis (version 3.8.2.R, Planmeca), airway analysis.

(O06) Impact of Oral Hygiene Care on Incidence of Ventilator-Associated Pneumonia in Mechanically Ventilated Patients: A Randomized Controlled Trial

Mohammad, Khan¹, Zeehaida, Mohamed², Saedah, Ali³, Norkhafizah, Saddki⁴, Ninin, Sukminingrum⁵

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Introduction: There has been considerable evidence to support the role of oropharyngeal colonization in pathogenesis of ventilator-associated pneumonia (VAP) in patients receiving mechanical ventilation. Good oral hygiene care by means of effective plaque control has thus been advocated as an essential nursing care to prevent colonization of dental plaque by respiratory pathogens, and possibly prevent VAP. **Objectives:** This randomized controlled trial aimed to compare the incidence of VAP in mechanically ventilated patients treated with two different oral hygiene care regimes. **Methodology:** A total of 63 mechanically ventilated patients treated at Hospital Universiti Sains Malaysia (USM) Intensive Care Unit (ICU) were randomly assigned into two treatment groups: a positive control group of 32 patients who received the current standard care which is 0.2% chlorhexidine gluconate mouth rinse twice daily and a trial group of 31 patients who received 0.2% chlorhexidine gluconate mouth rinse twice daily plus tooth brushing. This study protocol was approved by the USM Human Research Ethics Committee. **Results:** Of 63 patients, nine developed VAP, making the total incidence of VAP as 14.3%. Of these nine patients who developed VAP, six were from the control group (18.8%), and three were from the trial group (9.7%). Patients treated in the trial group were at lower risk of developing VAP (Relative Risk=0.52). **Conclusion:** In conclusion, VAP was less likely to occur in the trial group than in the control group, indicating

that tooth brushing twice daily in addition to standard care of 0.2% chlorhexidine gluconate mouth rinse was effective in reducing the incidence of VAP in mechanically ventilated patients treated at Hospital USM ICU.

Keywords: Ventilator associated pneumonia, oral care, mechanical ventilation, tooth brushing.

(O07) Comparison between Fuzzy Bootstrap Weighted Multiple Linear Regression and Multiple Linear Regression: A Case Study for Oral Cancer Modelling

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Introduction: Multiple Linear Regression (MLR) is the most common type of linear regression analysis. Current technology advancement and increasing of development of the new or modified methodology building leads to the development of an alternative method for multiple linear regression model calculation. **Objectives:** In this study, multiple linear regression model was calculated by using SAS programming language based on computational statistics which considered combination of robust regression, bootstrap, weighted data, Bayesian, and fuzzy regression method. **Methodology:** Methodology building is based on the SAS algorithm (SAS 9.4 software) which is a robust computational statistic that consists the combination of robust regression, bootstrap, weighted data, Bayesian, and fuzzy regression method. Three different SAS algorithms (i) bootstrap multiple linear regression (BMLR), (ii) bootstrap weighted Bayesian multiple linear regression (BWBMLR), and (iii) fuzzy bootstrap weighted multiple linear

regression (FBWMLR) were compared separately according to their average width of prediction. To illustrate the potential of built-in algorithm, a case study which emphasized on tumour was used. The average width of prediction interval results for all models have been computed and compared. The smallest width was indicated as the best fitting model. **Results:** The result showed that the former MLR model has an average width of 7.4816 and BMLR model has an average width of 3.7098. Meanwhile, the BWBMLR model has an average width of 3.5279 and FBWMLR model has an average width of 0.0058. **Conclusion:** It is shown that the most efficient method to obtain a relationship between response and explanatory variable is to apply FBWMLR method compared to other methods because of the small average width prediction interval.

Keywords: Multiple linear regression, robust regression, bootstrap, weighted, Bayesian, fuzzy regression.

(O08) Effect of Locally Delivered Tualang Honey on Healing of Periodontal Tissues: A Randomized Controlled Split-Mouth Clinical Trial

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Introduction: Honey has been used not only as nutritional source but also for wound healing and to reduce tissue inflammation. The usage of honey in the treatment of periodontitis is not well established. **Objective:** To evaluate the effect of locally delivered tualang honey on periodontal tissue healing. **Methodology:** This was a randomized controlled split-mouth clinical trial involving 20 chronic periodontitis patients with periodontal pocket depth of ≥ 5 mm. Each

quadrant was randomly treated with scaling and root debridement alone (Group A) and scaling and root debridement with locally delivered tualang honey (Group B). Assessment of probing pocket depth (PPD) and clinical attachment level (CAL) were recorded at baseline and after 2 months. Gingival crevicular fluid samples were collected from treated pockets at baseline and at the same visit with periodontal reassessment to evaluate the level of matrix metalloproteinase 8 (MMP-8) and osteoprotegerin (OPG). **Results:** PPD and CAL were significantly reduced after 2 months ($p=0.001$). However, there was no significant difference in the changes of the PPD ($p=0.76$) and CAL ($p=0.56$) between both groups. Similarly, the changes in MMP-8 ($p=0.55$) and OPG ($p=0.70$) levels showed no significant difference. **Conclusion:** Within the limitation of this study, the effect of honey as local application on periodontal tissue healing was not evident. Nevertheless, periodontal tissue healing was achieved in all subjects.

Keywords: Periodontitis, local delivery, honey, root debridement.

(O09) The Effect of Different Restorative Techniques on the Fracture Resistance of Endodontically Treated Teeth: An *in vitro* Study

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Introduction: The success of endodontic therapy depends on the final restoration as such tooth is more susceptible to fracture due to the loss of large amount of tooth structure. Placement of a post has been recommended but there are still disagreements on its use for endodontically treated tooth. **Objective:** This study compared fracture resistance

of endodontically treated teeth restored with different restorative techniques. **Methodology:** Seventy human maxillary central incisors were selected with standardized size and quality and divided into five groups ($n=14$). The teeth were endodontically treated followed by restorations using different restorative techniques: A) control (sound tooth); B) composite; C) composite and crown; D) post and composite; and E) post, composite, and crown. All specimens were thermocycled at 6000 cycles in bath temperatures of 5°C, 37°C, and 55°C with dwelling time of 30 s and transfer time of 10 s. Subsequently, they were loaded until fracture by a static testing device at a static force of 1.0 mm/min at 135° to the long axis of the root. **Results:** The means and standard deviations of the maximum load to fracture for groups A, B, C, D, and E were 1157.64 N (350.68 N), 754.79 N (193.09 N), 595.76 N (175.12 N), 826.95 N (187.70 N), and 805.04 N (231.43 N), respectively. One-way ANOVA showed that there were statistical differences between groups ($p<0.001$). The fracture resistance of specimens restored with all restorative techniques was statistically lower than the natural teeth ($p<0.05$). There were no significant differences among restorative groups ($p>0.05$). **Conclusion:** All types of restorative techniques were significantly weaker than natural teeth. Composite with crown restorations without post showed lowest fracture resistance values. The presence of post did increase the fracture resistance of the endodontically treated teeth, but the results were not statistically significant.

Keywords: Fracture resistance, endodontically treated teeth.

(O10) Perception of Pain with Low-Level Laser Therapy Application Based on Wire Sequences in Self-Ligating and Conventional Systems: A Pilot Study

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Introduction: The low-level laser application is currently used in orthodontics to reduce the pain and acceleration of tooth movement. Since the pain and discomfort are a multifaceted experience with extensive treatment; thus, only an orthodontic patient experiencing the therapy can provide the most reliable information. **Objectives:** This study aimed to explore the pain perception following insertion of orthodontic archwires and to investigate the pain acuity with low-level laser therapy (LLL) application in self-ligating and conventional systems.

Methodology: In this pilot study, a total eight patients were bonded with fixed orthodontic appliances using two different systems. The subject was further grouped based on the respective treatment modalities as a self-ligating laser (SLL), self-ligating non-laser (SLNL), conventional laser (CBL), and conventional no-laser (CBNL). The questionnaire was distributed to record the pain perception for the corresponding seven days. The pain was recorded based on the wire sequences of .014NiTi, .016NiTi, .017x.025NiTi, and .019x.025NiTi, until the levelling and alignment stage of orthodontic treatment. Shapiro–Wilk test was used to assess the normality of the data. The factorial variance (ANOVA) for repeated

measurements analysis was used to evaluate the pain score of different wire sequence in various treatment modalities up to seven days of each wire engaged ($p < 0.05$). **Results:** Pain scores in different wire sequences showed no significant differences ($p > 0.05$) with different treatment modalities. However, mean values of SLL and CBL showed less pain score compared to the CBNL and SLNL. The pain was recorded highest for all wires on day 1, while day 7 was the least. **Conclusions:** This pilot study showed no significant differences between pain perception with LLL application based on the wire sequences in self-ligating and conventional systems. A large randomised clinical trial is required to explore the real effect of LLT in both systems.

Keywords: Pain perception, low level laser therapy, conventional brackets, self-ligating brackets.

(O11) Effect of Reinforcing Alumina in Experimental Nanohybrid Composite using Silica Extracted from Rice Husk on Hardness, Flexural Strength, and Surface Characteristics

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Introduction: A nanohybrid composite (NHC) utilizing silica extracted from rice husk as a filler has been developed by this research group. In this study, alumina was used to enhance the physical and mechanical properties of the composite. **Objectives:** To evaluate the hardness, flexural strength, and surface characteristics of the alumina reinforced experimental nanohybrid composite using silica extracted from rice husk. **Methodology:** The experimental NHC was reinforced with 1, 3, or 5 wt% of alumina, and tested for

physical and mechanical properties. Ten specimens were prepared for each group, as follows: Negative control (without alumina reinforcement), alumina reinforcement A (1 wt%), alumina reinforcement B (3 wt%), alumina reinforcement C (5 wt%), and positive control (Filtek Z250XT, 3M ESPE). Vickers hardness, flexural strength, and surface roughness were analysed using Vickers hardness tester, universal testing machine, and surface profilometer, respectively. Two samples from each group of surface roughness test, with the values close to the mean were selected for atomic force microscopy (AFM) and scanning electron microscopy (SEM) analysis. One-way ANOVA was used for multiple group comparison followed by post-hoc test ($p < 0.05$). **Results:** Vickers hardness number (VHN) values were significantly decreased with the proportion increment of alumina reinforcement (1, 3, and 5 wt%, $p < 0.001$). In contrast, flexural strengths were significantly increased with alumina reinforcement ($p < 0.001$) compared to negative control. Meanwhile, surface roughness values were significantly decreased with alumina reinforcement ($p < 0.001$) compared to negative control, which were confirmed by the AFM data. SEM showed homogeneous surface texture with the surface porosity increased with the increase of alumina. **Conclusion:** The data suggests that alumina reinforcements (1, 3, and 5 wt%) in the experimental NHC are beneficial for the increased flexural strength as well as decreased surface roughness. However, the alumina reinforcement seems to reduce the hardness of the experimental NHC.

Keywords: Alumina, nanohybrid composite, hardness, flexural strength, surface roughness.

(O12) *In vitro* Antimicrobial Activity of *Clinacanthus nutans* Leaves against Oral Pathogens

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Introduction: *Clinacanthus nutans* is a herbal plant used in traditional medicine for the treatment of various diseases in Malaysia. There are limited studies on the antimicrobial activity of *Clinacanthus nutans* against oral pathogens.

Objectives: To evaluate the antimicrobial activities of ethanol and aqueous extracts of *Clinacanthus nutans* leaves against selected oral pathogens.

Methodology: Ethanol and water extracts of finely dried powder of *Clinacanthus nutans* (*C. nutans*) leaves were prepared. The antimicrobial activity of the extracts was evaluated using agar well diffusion assay and broth dilution assay to determine the minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) against *Actinomyces viscosus* (*A. viscosus*), *Staphylococcus aureus* (*S. aureus*), *Enterococcus faecalis* (*E. faecalis*), *Porphyromonas gingivalis* (*P. gingivalis*), and *Candida albicans* (*C. albicans*).

Results: The ethanol and aqueous extracts of *C. nutans* leaves exhibited antimicrobial activity against *S. aureus* and *A. viscosus* but not against *E. faecalis*, *P. gingivalis*, and *C. albicans*. Ethanol extract of *C. nutans* leaves was more sensitive than the aqueous extract of *C. nutans* leaves against *A. viscosus*. Ethanol extract of *C. nutans* leaves showed MIC value of 102,400 µg/ml

against *A. viscosus* and 204,800 µg/ml against *S. aureus*. Aqueous extract of *C. nutans* leaves showed MIC value of 204,800 µg/ml against *A. viscosus* and *S. aureus*. Analysis of the MICs and MBCs obtained with respect to ethanol and aqueous extracts of *C. nutans* leaves on *S. aureus* and *A. viscosus* showed that the extracts were bactericidal on *S. aureus* and *A. viscosus*. **Conclusion:** These results support the antimicrobial activity of *C. nutans* against *A. viscosus* and *S. aureus* and thus could be a potential source of antimicrobial agent in combating oral pathogens.

Keywords: *Clinacanthus nutans*, herbal plant, extracts, antimicrobial, oral pathogens.

(O13) Gender Disparities in the Treatment Effect of Reverse Twin-Block and Reverse Pull Face Mask Appliances

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Introduction: The onset of adolescent growth spurt is earlier in females than in males. Since the mixed dentition stage overlaps the adolescent period, there is a chance of having gender disparities in the treatment effects of orthodontic appliances. **Objectives:** To compare dento-facial changes between male and female children for reverse twin-block (RTB) and reverse pull face mask (RPFM) therapies based on pre- and post-treatment lateral cephalograms.

Methodology: Ninety-five (49 RTB and 46 RPFM) mixed dentition Malay children with Class III malocclusion were included in this cross-sectional study. Both groups contained male and female children in their early and late mixed dentition stages. Their pre- and post-treatment lateral cephalograms (total 190) were collected from Hospital USM archives with permission. Each cephalogram was traced with 71 anatomic landmarks using CASSOS software and measurements from Holdaway, Ricketts, Tweed, McNamara, and Steiner analyses were recorded. Multiple linear regression was performed to detect the impact of independent variables (age, gender, type of appliance) on treatment changes.

Results: The treatment change in the upper lip strain was significantly associated with gender disparities. Upper lip was 0.94 mm less strained in female children than in male children indicating a thicker lip in females. The soft tissue change in lips during adolescence is thicker lips in female children and relatively thin lips in male children.

Conclusion: Upper lip strain showed gender disparities in the treatment effects of RTB and RPFM.

Keywords: Treatment effect, gender disparities, reverse twin-block, reverse pull face mask.

(O14) A Comparative Cross-Sectional Study on Alveolar Bone Resorption and Peri-Implant Soft Tissues of Functioning Implant Supported Cantilevered Bridge and Individual Implant: A Preliminary Result

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Introduction: Dental implant is one of preferred treatment options for both partially and completely edentulous patients. When there is requirement for the restoration of multiple missing teeth, implant supported cantilevered bridge is used to reduce the cost of treatment.

Objective: To compare alveolar bone resorption and peri-implant soft tissues in implant supported cantilevered bridge (CI) and individual implant (II).

Methodology: This is a comparative *in vivo* cross-sectional study on 10 patients who have both CI and II inside their mouth which are still functioning, ranging from 1 year and above. The research tools were digital orthopantomogram (OPG) with Planmeca Romexis software for radiographic assessment and periodontal probe for clinical examination. The radiographic evidence of alveolar bone resorption was measured in millimeter (mm) from the implant fixture to the alveolar bone and the difference in measurement was recorded. Data were analysed using SPSS v24.0 using Mann-Whitney test. Patients were examined according to the concept of comprehensive dental care which includes indices of oral hygiene used to assess peri-implant soft tissues for the success of dental implants, namely, plaque index, bleeding on probing, and pocket depth. The knocking sound was used to assess implant stability. **Result:** From the study, it was found that the average crestal bone resorption was 0-0.2 mm for both cases.

For plaque index, one patient had severe bleeding on probing with a score of 3 as he was diabetic. The recorded pocket depth was 0-1 mm. The plaque scoring came out as 1 (mild). Five patients had no bleeding on probing. Four of them had slight bleeding and the score was 1. Two patients had bleeding on the side of implant supported cantilevered bridge and two on the individual implant.

Conclusion: There were no significant difference in alveolar crestal bone resorption and clinical assessment of peri-

implant soft tissue between CI and II. A larger sample size should be obtained to justify the differences seen in this study.

Keywords: Cantilevered bridge, Planmeca Romexis, alveolar bone, alveolar crest, bone resorption.

(O15) Reliability and Validation of a Portable Digital Microscope for Assessing Adhesive Remnant Index Scoring *in vivo*

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Introduction: Adhesive Remnant Index (ARI) is most frequently observed in the studies of orthodontic bracket-adhesive system as it is both qualitative and subjective in nature. Despite that, the scoring is mostly limited to *in-vitro* studies and only a few studies observed ARI clinically. **Objectives:** To assess the reliability and to validate an experimental portable digital microscope for observing ARI clinically *in vivo*. **Methodology:** Twenty-two freshly extracted upper premolar teeth were collected and were bonded with conventional metallic premolar brackets (HKS 3, Ortho Classic, McMinville, USA) by the same clinician. The brackets were bonded with Transbond XT (3M Unitek, California, USA) orthodontic adhesive after surface preparation with Transbond Plus self-etching primer (3M Unitek, California, USA) and light-cured with visible blue light for 20 s. The samples were then stored in distilled water at room temperature and after 24 hours the brackets were debonded by a single clinician with a lift-off debonding plier (3M Unitek, California, USA). After debonding, the tooth samples

were randomly observed for ARI scoring (4-point scale) under a standard stereomicroscope (JVC international Yokohama, Japan) at 30× magnification and under the experimental portable digital microscope (Celestron, Torrance, California, USA), respectively, at similar magnification. The microscopic images were observed and ARI scoring was done by two different investigators. The reliability of ARI scoring between the investigators was evaluated using Cohen's kappa statistic. Validation was done by comparing the ARI scoring ($p < 0.05$) of the samples under two microscopes by the non-parametric Mann-Whitney U test. **Results:** Cohen's kappa value was 0.83, indicating almost perfect agreement of ARI scoring between the investigators. No significant difference ($p = .899$) of ARI scores were found between the images captured by the standard stereomicroscope and the experimental portable digital microscope. **Conclusion:** The experimental portable digital microscope can be used to observe ARI clinically as the device is validated and found to be reliable.

Keywords: Adhesive Remnant Index, *in vivo*, portable digital microscope.

(O16) Mechanism of Inhibition of Coumarin Thiosemicarbazone Incorporated with Resin Modified Glass Ionomer Cement on *Streptococcus mutans*

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Introduction: Coumarin is a chemical compound occurring naturally in many plants and composed of a benzene ring to

α -pyrone ring. The structural diversity of coumarin compound exerts promising biological properties including antibacterial activity. **Objectives:** The aim of this study was to determine the antibacterial activity of synthesised coumarin thiosemicarbazone (CT) incorporated with resin modified glass ionomer cement (RMGIC) on *Streptococcus mutans* (*S. mutans*) and predict their possible mechanism of inhibition. **Methodology:** The fabrication process of CT with RMGIC was performed in triplicates at different fabrications (0.5, 1.0, and 1.5%, w/w) according to the manufacturer's instructions. *S. mutans* was cultured and adjusted to 0.5 McFarland standards followed by bacterial growth assay by incubating for 22 hours. Then, the fabricated material was sent for scanning electron microscopy (SEM) analysis to observe the morphology of treated bacterial cells. **Results:** The fabricated CT at 0.5% was found to be most potent inhibitor against *S. mutans* from the growth curve assay. Therefore, the morphological characteristics were observed which revealed irregular shape and size of bacterial cells, were in non-dividing state, and exhibited a broken chain of *Streptococci*. Thus, there are two possible mechanisms of inhibition of *S. mutans*; initially, the cations of CT probably bind with negatively charged wall teichoic acids (WTAs) which affect the overall structure of bacterial cell and secondly, the hydrophobic molecules of CT presumably target the double lipid area of the membrane by diffusing to cytoplasm via passive transport. In the cell, CT most likely interfered with the enzyme activity leading to inhibition. **Conclusion:** The major alteration of bacterial structure and the disturbance of enzyme activity by CT were assumed to lead to the bacterial death. Therefore, these inhibition routes that are found in CT are important to determine the correct pathway of inhibition in future.

Keywords: Coumarin, *Streptococcus mutans*, resin modified glass ionomer cement, antibacterial, mechanism.

(O17) Effect of *Piper sarmentosum* Aqueous Extract on Inflammatory-Related Genes in Sprague Dawley Rats

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Introduction: Oral ulcer occurs a few times throughout a patient's life and is a global morbidity. Physically, this lesion causes whitish round to oval wound as a result of sloughed epithelium. The process of ulcer healing mainly involves inflammation and tissue repair under influence of several cytokines and growth factors. **Objectives:** This study aims to evaluate oral ulcer healing when treated with aqueous extract of *Piper sarmentosum* (AEPS) by determining the gene expression of *VEGF-A*, *iNOS*, and *SOCS3*. **Methodology:** Ulcers were made on the left buccal mucosa of sixteen week old male Sprague Dawley rats using cotton swab soaked in 99.5% glacial acetic acid by pressing on the mucosa for 40 s. In the negative control group, normal saline was applied whereas, in the experimental group, 5 mg of powdered AEPS was applied topically twice daily using cotton swab. The rats were euthanized on day 2, 6, and 12 post-ulcer induction and the harvested tissue was kept in RNAlater. Total RNA extraction was done on tissues using spin column extraction and reverse transcription real-time PCR was carried out for gene expression analysis of *VEGF-A*, *iNOS*, and *SOCS3*. **Results:** AEPS treated rats showed less *iNOS* expression which indicates release of less pro-oxidant nitric oxide. However, the level increased later on day 12 which might indicate its role in

tissue repair. For anti-inflammatory *SOCS3* gene, its expression was upregulated on day 2 as expected, reduced on day 6 but again upregulated on day 12. Interestingly, proangiogenic *VEGF-A* gene remained downregulated throughout the experiment duration. **Conclusion:** This study shows that in the process of wound healing, the genes *iNOS* and *SOCS3* have dual role; one in inflammation, and the other in tissue repair. The result also exhibits a possible antiangiogenic activity of AEPS.

Keywords: Anti-inflammation, *Piper sarmentosum*, ulcer healing, water extract, Sprague Dawley rats.

(O18) Malocclusion and Orthodontic Treatment Needs of Transfusion-Dependent Thalassemia Patients among Malays

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Introduction: The life expectancy for transfusion-dependent thalassemia patients has increased dramatically with iron-chelation therapy and other modern management modalities. In these patients, the most dominant maxillofacial manifestations are protrusion of zygomatic bones and premaxillae due to bone marrow hyperplasia. **Objectives:** To evaluate the frequency of malocclusion and assess the orthodontic treatment needs in transfusion-dependent thalassemia patients among Malay ethnic group. **Methodology:** Forty-three transfusion-dependent thalassemia patients, 20 females and 23 males, aged 12-26 years old, mean age 15.9 years, without previous orthodontic treatment

from Hospital Sultanah Bahiyah, Kedah, and Hospital Universiti Sains Malaysia, Kelantan were selected. Alginate impressions were taken and poured using dental stone type IV for maxillary and mandibular casts. The occlusal traits were studied using Dental Aesthetic Index (DAI), and cumulative scores were categorized according to the severity of malocclusion and orthodontic treatment needs. The prevalence of malocclusions in term of Angle's classification were measured. Data were analyzed using SPSS version 22.0 and Mann-Whitney U test was set at level of significance of $p < 0.05$. **Results:** The differences in types of malocclusion and DAI were not statistically significant between gender. About half of the sample (51.1%) were in Class II Angle's classification, while 27.9% and 20.9% were in Class I and Class III, respectively. For DAI, 51.1% of the patients fall into the normal (minor) category need, 20.9% have definite needs for orthodontic treatment, 14% are in the severe, and another 14% are in the handicapped category. **Conclusion:** In transfusion-dependent thalassemia patients, there is a tendency towards Class II malocclusion, and half of them have favorable orthodontic treatment needs according to DAI.

Keywords: Malocclusion, orthodontic treatment needs, transfusion-dependent thalassemia.

(O19) Evaluation of a Glass Ionomer Nano-Zirconia-Silica-Hydroxyapatite Hybrid Material

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Introduction: Many materials have been used in dentistry over the decades. Glass-ionomer cements (GIC) were first introduced to dentistry in the early 1970s. They are known for their relative ease of use, chemical bonding to tooth substrate, fluoride ion release, low coefficient of thermal expansion, and acceptable aesthetics. In the clinic, however, the use of GIC is limited due to its relatively inferior mechanical properties and sensitivity to initial moisture. Recently, there have been significant changes and modifications in the formulations of GICs, in attempts to enhance their mechanical and handling properties. **Objectives:** To synthesize, characterize, and evaluate the physico-mechanical properties of the GIC nano-zirconia (ZrO_2)-silica (SiO_2)-hydroxyapatite (HA) hybrid material in the first phase of this study. **Methodology:** The nano- ZrO_2 - SiO_2 -HA was synthesized using sol-gel technique. After synthesis, the nano- ZrO_2 - SiO_2 -HA powder was characterized. The powder was then added at varying percentages by weight, into the conventional GIC to prepare four experimental groups. The mechanical properties of the new GIC nano- ZrO_2 - SiO_2 -HA hybrid material were analyzed in the first phase of the study. **Results:** SEM morphology of the newly synthesized powder revealed that the one-pot technique can produce highly homogeneous nanopowder with less agglomeration. FTIR confirmed the presence of functional groups corresponding to each element. The incorporation of nano ZrO_2 - SiO_2 -HA to the GIC resulted in significant improvements in the mechanical properties of conventional glass ionomer cement. The highest mean compressive and flexural strengths were achieved at 5% addition of nano-25 ZrO_2 - SiO_2 -HA to GIC (144.12 MPa and 18.12 MPa), respectively. **Conclusion:** With further experimentations of the GIC nano- ZrO_2 - SiO_2 -HA, it is hoped that the hybrid can be used in the future as a material of choice

for atraumatic restorative therapy (ART), permanent restorations, and as a bone cement.

Keywords: Glass ionomer, hydroxyapatite, zirconia, nanomaterials, sol-gel synthesis.

(O20) Identification of Chemical Compounds of *Cymbopogon nardus* by GCMS

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Introduction: Citronella or its scientific name *Cymbopogon nardus*, is locally known as 'serai wangi'. It is widely available in tropical Asia such as India, Burma, Peninsular Malaysia, Sri Lanka, and Indonesia. It is well known to have various biological activities such as antibacterial, antiviral, and antifungal due to its valuable chemical compounds. The chemical compounds of *Cymbopogon nardus* depends on a few factors such as soil, season, and region. At present, there is lack of study to analyse the chemical constituents in essential oil of *Cymbopogon nardus* cultivated in Malaysia. **Objective:** This study aims to identify the chemical compounds of *Cymbopogon nardus* using gas chromatography-mass spectrometry (GCMS). **Methodology:** GCMS was carried out using Hewlett Packard 6890 Gas Chromatography with 5973N mass selective detector. The computer library of mass spectra was used to identify the unknown chemical components in the sample mixture. The *Cymbopogon nardus* compounds were identified by matching their mass spectra with National Institute of Standards and Technology (NIST02) and Wiley275 libraries ($\geq 80\%$ matching). The percentage compound was calculated from the summation of the peak areas of

the *Cymbopogon nardus* compounds.

Results: A total of 35 volatile compounds were successfully identified, including 13 monoterpenes, 2 diterpenes, 9 sesquiterpenes, 2 phenolic compounds, and 9 others. The major constituents of the *Cymbopogon nardus* oil were cis-Citral (12.49%), citronellal (11.35%), β -Myrcene (6.70%), β -trans-Ocimene (6.03%), Geranyl acetate (3.82%), (\tilde{n})-Limonene (3.50%), and Citronellol (3.22%).

Conclusion: The high amount of terpenoids found in the tested samples indicated that *Cymbopogon nardus* from Malaysia has the potential activity of antimicrobial agent and may play a central role in the discovery and development of modern drug.

Keywords: *Cymbopogon nardus*, citronella, GCMS.

(O21) Phytochemical, Cytotoxicity, and Antibacterial Study of Aqueous Extract of *Euphorbia tirucalli* Stem

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Introduction: *Euphorbia tirucalli* Linn (*Et*) is reported to possess antibacterial activity against various microorganisms. However, phytochemical, cytotoxicity, and antimicrobial properties of *Et* against *Streptococcus mutans* (*S. mutans*), which is one of the etiological agents that causes dental caries, have not been extensively tested. **Objectives:** The aim of this study was to evaluate the phytochemical, cytotoxicity, and effect of aqueous extract of *Et* stem on *S. mutans*. **Methodology:** Initially, *Et* stem was extracted with water and the possible bioactive compounds

were determined using **gas chromatography mass spectrometry** (GC-MS). Then, the aqueous extract of *Et* stem was prepared in different concentrations (1.50, 3.10, 6.30, 12.50, 25.00, 50.00, and 100.00 mg/ml) and each of these was applied on mouse fibroblast L929 cell culture. After incubation for 24, 48, and 72 hours, cytotoxicity measurement was carried out using 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT) assay. The minimum inhibitory concentration (MIC) was then determined using resazurin-based microtiter dilution assay and followed by minimum bactericidal concentration (MBC). **Results:** Most of the active compounds present in aqueous extract of *Et* stem have antibacterial properties such as vinegar acid, pyrogallol, and palmitic acid. The MTT assay of the treatment at 24, 48, and 72 hours revealed that only cells treated with 1.30 mg/ml was not toxic compared to the negative control. MIC and MBC testing demonstrated that the aqueous extract of *Et* stem inhibited the growth of *S. mutans* at 12.5 mg/ml and killed the *S. mutans* at 25 mg/ml. **Conclusion:** The present study concluded that there were 27 active compounds in *Et* stem extract which contribute to antimicrobial effects against *S. mutans*. Further studies should determine the bioactive compound which is toxic to the cell.

Keywords: *Euphorbia tirucalli* Linn, phytochemical, cytotoxicity, antibacterial, dental caries.

Poster Presentations

(P01) Odontogenic Differentiation Potential of Dental Pulp Stem Cells Treated with Nanohydroxyapatite-Silica-GIC and Conventional GIC

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Introduction: Nanohydroxyapatite-silica incorporated glass ionomer cement (HA-Silica-GIC) has demonstrated improvement in hardness and biocompatibility compared to conventional GIC (cGIC). However, gene expression studies of odontogenic markers on dental pulp stem cells (DPSCs) treated with HA-Silica-GIC is still lacking. **Objectives:** To evaluate the effect of HA-Silica-GIC and cGIC on the odontogenic differentiation potential of DPSCs. **Methodology:** Extracts of HA-Silica-GIC and cGIC (experimental groups), and untreated DPSCs (control) were prepared. The concentration of 3.125 mg/ml and 6.25 mg/ml were used to prepare HA-Silica-GIC extract, whereas, the concentration of 6.25 mg/ml and 12.5 mg/ml were used to prepare the cGIC extract. Flasks (25 cm²) seeded with DPSCs were treated with both material extracts for 1, 7, 10, 14, and 21 days. RNA was extracted and the expression of odontogenic genes (*DSPP*, *DMP1*, *OCN*) and *GAPDH* (housekeeping gene) were examined using real-time PCR. One-way ANOVA was used for statistical analysis followed by Tukey's post-hoc comparison ($p < 0.05$). **Results:** The expression of *DSPP* increased on day 7 and 10 followed by a decline. HA-Silica-GIC group showed significant difference in *DSPP* expression (6.25 mg/ml compared to 3.125 mg/ml) and 12.5 mg/ml and 6.25 mg/ml of cGIC. *DMP1* expression was highest on day 10 (6.25 mg/ml) for both HA-Silica-GIC and cGIC though not significant. However,

6.25 mg/ml of HA-Silica-GIC showed a significant difference in expression of *DMP1* compared to the rest of the groups on day 7. The late marker of mineralisation for odontogenic differentiation, *OCN* gradually increased from day 1 to day 10 followed by a decreasing trend in the expression on day 14 and 21. HA-Silica-GIC (6.25 mg/ml) showed significant difference on day 10 compared to cGIC (6.25 mg/ml). **Conclusion:** HA-Silica-GIC showed an up-regulation of *DSPP*, *DMP1*, and *OCN* gene on DPSCs, thus exhibiting the potential to be a restorative material with improved odontogenic properties.

Keywords: Nanohydroxyapatite-silica-GIC, odontogenesis, gene expression, dental pulp stem cells.

(P02) Angiogenic Potential of Dental Stem Cells in 3D *in vitro* Model

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Introduction: Angiogenesis allows oxygen and nutrients transportation in human body, which serves an important role in tissue regeneration process. Such idea can be manipulated for a successful implementation in tissue regenerative strategies. In tissue engineering, there are three main components needed including the cells, scaffold, and growth factor. Therefore, a 3D model is proposed to create angiogenic microenvironment,

which consists of stem cells from exfoliated deciduous teeth (SHED), human amniotic membrane (HAM), and addition of vascular endothelial growth factor (VEGF). The proposed 3D model potentially allows differentiation of SHED into endothelial-like cells. Endothelial cells are important as they line the interior surface of blood vessel wall. **Objectives:** To investigate the angiogenic potential of SHED cultured on HAM with the addition of VEGF. **Methodology:** SHED was cultured in alpha-minimum essential medium (α -MEM), supplemented with 15% foetal bovine serum (FBS) and 50 U/ml penicillin-streptomycin. De-epithelialised glycerol-preserved HAM was used as scaffold while VEGF was added to induce angiogenesis. Cells were cultured in three different groups, namely, SHED treated with VEGF (SV), SHED cultured on HAM (SA), and SHED cultured on HAM treated with VEGF (SAV). The angiogenic differentiation was assessed microscopically by scanning electron microscope (SEM), followed by haematoxylin and eosin (H&E) staining. One-step reverse transcription-polymerase chain reaction (RT-PCR) was performed to analyse the angiogenic gene expression. **Results:** SEM analysis revealed that SHED successfully differentiated into endothelial-like cells. H&E staining showed a formation of monolayer structure on the stromal side of HAM starting from day 1 to 14, which further infiltrated into HAM structure at day 21. Meanwhile, gene expression analysis showed that treated SHED was able to retain its stemness alongside the expression of angiogenic markers. **Conclusion:** The present HAM-based 3D model with supplementation of VEGF is identified to provide sufficient angiogenic microenvironment for SHED differentiation, a vital process in tissue engineering.

Keywords: Angiogenesis, cell differentiation, human amniotic membrane, SHED, VEGF.

(P03) Cytotoxicity of Betel Quid and Areca Nut Aqueous Extracts on Mouse Fibroblast Cell Line

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Introduction: Betel quid chewing is a traditional habit associated with oral cancer. The composition of betel quid varies but typically consists of areca nut and slaked lime wrapped in betel leaf. Although betel quid is associated with oral cancer, its role in the initiation and promotion stages of carcinogenesis is not fully understood. **Objective:** This study aimed to investigate the cytotoxicity of crude betel quid and areca nut aqueous extracts on the mouse fibroblast cell line (L929). **Methodology:** Selected concentrations of betel quid (0.1 g/ml, 0.2 g/ml, 0.4 g/ml) and areca nut (0.05 g/ml, 0.1 g/ml, 0.2 g/ml) were used in the study. Cytotoxicity analysis using MTT assay was performed in triplicates, whereby L929 was treated with each of the extracts for 24 hours, 48 hours, and 72 hours, respectively. The results were analysed using one-way ANOVA with Games-Howell post-hoc test and Kruskal-Wallis complemented by Mann-Whitney U-test for comparison of means at $p < 0.05$. **Results:** Both betel quid and areca nut extracts at all concentrations significantly resulted in cell death, in comparison to the control group ($p < 0.05$). For betel quid extract treatment, cell viability decreased to below 40% for all concentrations. Notably, 0.4 g/ml concentration resulted in significantly higher cell viability compared to the lower concentrations, at 48 hours and 72 hours incubation ($p < 0.05$). For areca nut treatment, cell viability decreased to below 50% for all concentrations. Concentration of 0.2 g/ml significantly resulted in reduced cell viability in comparison to 0.05 g/ml

($p < 0.05$). **Conclusion:** Betel quid and areca nut extracts at the selected concentrations demonstrated cytotoxic effects on the growth and proliferation of L929 cells. Further ongoing work has now focused on investigating the exact mechanism of cytotoxic action of the extracts.

Keywords: Areca nut, betel quid, cytotoxicity, L929, oral cancer.

(P04) Evaluation of Physical and Chemical Properties of Chitosan-Based Accelerated Portland Cement

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Introduction: After its approval by FDA in 1998, mineral trioxide aggregate (MTA) has shown excellent clinical and laboratory results and gained worldwide use. Accelerated Portland cement (APC) was studied as an alternative material to overcome the major limitations of MTA and PC such as delayed setting time and high cost of MTA. Chitosan (CHT) has been applied in numerous medical applications due to possession of desirable biological properties and ability to improve mechanical properties of materials. Thus, in the present study, CHT was incorporated to APC to fabricate a material with better physical and chemical properties for endodontic applications. **Objectives:** This study aimed to assess the physical and chemical properties of the material with various concentrations of CHT. **Methodology:** The setting times and pH were examined using an indentation technique and digital pH meter, respectively. Solubility was examined according to ISO 6876 specification. Surface morphology and elemental analysis were examined by field emission scanning electron microscope

(FESEM) and energy dispersive X-ray microanalysis (EDX), respectively. **Results:** The setting time, pH, and solubility obtained ranged between 40-48 min, 10.87-11.04, and 2.96–2.44%, respectively. EDX showed that the major components of APC and APC-2.5%CHT were Ca, C, O, Cl, N, Na, Al, Mg, Si, and K. The surface morphology of APC was characterized by amorphous, globular, and crystalline particles with spaces. Whereas, APC-2.5%CHT showed CHT crystallites spread on the material surface and fill the spaces. **Conclusion:** The addition of 2.5% CHT to APC produces a new endodontic material with acceptable physical and chemical properties.

Keywords: Accelerated Portland cement, chitosan, endodontic, physical properties, chemical properties.

(P05) The Ultrastructure of Odontoblast-Like Cells Differentiated from Stem Cells from Human Exfoliated Deciduous Teeth Cultured on Human Amniotic Membrane

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Introduction: Stem cell from human exfoliated deciduous teeth (SHED) is a postnatal stem cell capable of extensive proliferation and multi-potential differentiation. Growing evidences show that SHED differentiation can be directed into odontoblast-like cells under stimulation of various growth factors and scaffolds. Nevertheless, such potential using human amniotic membrane (AM) and bone morphogenetic protein 2 (BMP-2) is yet to be elucidated. **Objective:** To visualise the ultrastructure of odontoblast-like cells differentiated from SHED cultured on AM with BMP-2 using scanning electron microscope (SEM). **Methodology:** SHED was cultured on AM

containing α -MEM with BMP-2 supplementation for 14 days. At each time point of day 1, 7, 10, and 14, AM were washed with PBS and fixed in 4% paraformaldehyde for 2 hours at room temperature. AM were washed with PBS and immersed in 8% of formaldehyde at 4°C. After 48 hours, the membranes were dehydrated in a series of alcohol for 10 min. The membranes were incubated in hexamethyldisilazane (HMDS) and dried. The samples were gold-coated with sputter coating machine SCD0005 and viewed under SEM. SHED cultured on AM without BMP-2 was included as a experimental control. **Results:**

Observation made on the morphological structures of BMP-2 treated SHED after 24 hours displayed formation of cell extensions with small finger-like or web-like projections. Following 48 hours of culture, SHED started to lose the fibroblast-like morphology, forming smaller round-shaped cells. The emergence of phenotypic characteristics of odontoblast-like cell and a columnar cell body with several processes were detected at day 7. On day 14, increase mineralisation on the cell body was observed, suggesting the transformation of cells into mature odontoblast. In the untreated group, SHED fibroblastic-like morphology remained until day 14 of culture. **Conclusion:** Morphological evaluation via SEM confirmed complete differentiation of SHED into odontoblast-like cells by day 14 of culture.

Keywords: SHED, scaffold, odontoblast differentiation, stem cells, SEM.

(P06) Evaluation Study on Addition of Nano-Hydroxyapatite-Silica into Glass Ionomer Cement

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Introduction: Glass ionomer cements are used for many clinical applications in dentistry due to their self-adhesive, anti-carries, and good biocompatibility properties. Despite the advantages, their main disadvantage is that it has low strength. **Objectives:** To evaluate and compare material characterisation, surface hardness, compressive strength, and flexural strength of material following addition of nano-hydroxyapatite-silica into conventional glass ionomer cement (GIC) matrix. **Methodology:**

Nano-hydroxyapatite-silica was synthesized using one-pot sol-gel with different concentration of tetraethyl orthosilicate (TEOS). It was then characterised using Fourier transform infrared spectroscopy (FTIR), X-ray diffraction (XRD), scanning electron microscope (SEM), and transmission electron microscope (TEM). GIC specimens were fabricated according to the instructions from manufacturer. Nano-hydroxyapatite-silica was added at different percentage of weight. Reinforced GIC specimens were stored for 24 hours in distilled water at 37°C. Surface hardness, compressive and flexural strength of the conventional and nano-HA-Si-GIC were evaluated. The mechanical properties results were analysed using one-way ANOVA and Tukey's test. Level of significance was set at $p < 0.05$. **Results:** FTIR and XRD analyses confirmed the formation of hydroxyapatite-silica nano-particles. SEM and TEM images showed all hydroxyapatite crystals were elongated and covered by smaller silica particles. The nano-powder consisted of mixture of

spherical silica particles (50 nm) and elongated hydroxyapatite particles in the range between 100-200 nm. The hardness, compressive strength, and flexural strength of nano-HA–35SiO₂–GIC was statistically higher than nano-HA–21SiO₂–GIC and nano-HA–11SiO₂–GIC. The highest value for hardness (64.77±6.18), compressive strength (143.42±13.94 MPa), and flexural strength (17.68±1.81 MPa) was recorded upon addition of 10% nano-HA–35SiO₂ to GIC, an increase of ~36%, ~19.7%, and ~53.34%, respectively, as compared to conventional GIC. **Conclusions:** Addition of nano HA-silica to conventional GIC significantly enhanced the mechanical properties of the material. Hence, it can be suggested as a potential dental restorative material in dentistry.

Keywords: Glass ionomer cement, nano-Si, nano-HA, adhesive dentistry, biomaterials.

(P07) Mechanical and Morphological Properties of Hybrid ZrO₂/B-TCP Filled Polyamide 12 for Craniofacial Reconstruction: 3D Printing and Injection Moulding

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Introduction: Craniofacial deformity is unique and complex which requires patient specific implant (PSI) for treatment management. The emergence of 3D printing technology could be an alternative for rapid and accurate PSI fabrication. However, the developed material needs to possess adequate mechanical integrity.

Objectives: To compare the impact and morphological properties of hybrid ZrO₂/β-TCP filled Polyamide 12 (PA 12) fabricated using 3D printing and the gold

standard of injection moulding techniques.

Methodology: PA 12 was compounded with 15 wt% of ZrO₂ together with 15, 20, and 25 wt% of β-TCP. The obtained pellets were injection moulded (Boy 22M, Dr.Boy GmbH) to form impact specimens. The remaining pellets were used to fabricate filament feedstock for 3D printing (Makerbot Replicator 2X, Makerbot) of impact specimens (n=5/composition). The impact properties were determined using Izod impact tester (5101, Zwick) equipped with a 7.5 J pendulum. The morphological properties of fillers and selected filament feedstock, and their broken impact specimens were observed using field emission scanning electron microscope (Quanta FEG 450, Fei). Independent t-test ($p<0.05$) was employed using IBM SPSS software ver 22.0. **Results:** The impact strength of 30 and 35 wt% 3D printed hybrid ZrO₂/β-TCP were 12.44 and 20.43 kJ/m², respectively. The data exhibited an increase of 18~95% as compared to injection moulding (10.48 and 10.49 kJ/m²). Whereas, the fillers were homogenously dispersed in PA 12 matrix. **Conclusion:** Sufficient mechanical integrity provided by the novel composition integrated using advanced processing techniques implied that hybrid ZrO₂/β-TCP filled Polyamide 12 has potential to be used for craniofacial reconstruction.

Keywords: 3D printing, injection moulding, impact strength, ZrO₂, β-TCP.

(P08) Effect of Water Sorption and Fluoride Release on Coumarin-GIC

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Introduction: Glass ionomer cement (GIC) is regarded as a fluoride reservoir for being able to maintain a steady flow of fluoride ions to the tooth structure.

However, the amount of fluoride released from GIC is still insufficient to combat the cariogenic bacterial challenge for a longer period of time. **Objectives:** To evaluate the effect of incorporating antibacterial agent, hydrazinyl coumarin derivative (HCD), on water sorption and fluoride release of GICs. **Methodology:** Two commercial GICs, resin-modified Fuji II LC and a high fluoride Fuji VII (GC Corporation, Tokyo, Japan) were used in this study and act as control groups. HCD was locally synthesized and incorporated into both types of GICs (GIC-HCD) during its manipulation at weight percentages of 1% and 2%. The water sorption was evaluated for 7 days. The fluoride release was observed in deionized water for the duration of 21 days using pH/ISE benchtop meter equipped with fluoride selective electrode (Thermo Orion, USA). All data were subjected to one-way ANOVA with post-hoc Bonferroni test at significant level of $p < 0.05$. **Results:** The incorporation of HCD into both GICs at 1% and 2% increased the water sorption. Similarly, higher amount of fluoride release was also detected in both GIC-HCD compared to their respective control groups. **Conclusion:** The incorporation of HCD affects the properties of GIC by increasing water sorption and enhancing fluoride release.

Keywords: GIC, coumarin derivative, water sorption, fluoride release.

(P09) Cytotoxicity Evaluation of PMMA Composite on Human Osteoblast Cell

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Introduction: Traumatic injuries in the craniofacial areas may result in disfiguring defects and compromise the protection of the underlying brain. Reconstruction is

necessary for the functional and aesthetic reasons. In this study, polymethyl methacrylate (PMMA) was used due to its excellent properties where there it is biocompatible, biologically inert, and rigid for cranial bone reconstruction. However, many patients these days were exposed to infection after craniofacial reconstruction using PMMA. Therefore, incorporation of antibacterial agents to the PMMA is desirable to eliminate infection. **Objectives:** The objectives of this study were to prepare antibacterial PMMA composites incorporated with fillers beta-tricalcium phosphate (β -TCP) and zinc oxide (ZnO) with different composition and to investigate the biocompatibility of the PMMA composites. **Methodology:** β -TCP and ZnO were purchased from Sigma-Aldrich (USA) and Nacalai Tesque (Japan), respectively. Pure PMMA (as control), 5%, 10%, and 15% β -TCP filled, 15% β -TCP with 2.5% ZnO filled, and 15% β -TCP with 5% ZnO filled PMMA were prepared. PMMA were manually mixed with β -TCP and ZnO according to these percentages until it has reached the homogeneous state. Specimens were prepared by casting the paste in silicone mould which has been fabricated using 3D printed flexural template. Then, cytotoxicity evaluation was carried out on human fetal osteoblast cells (HFOB). HFOB were incubated at different concentrations (100, 50, 25, 12.5, and 6.25 mg/ml) ($n=3$) of PMMA composites extracts at 37°C. After three days of incubation, MTT solution (3-(4, 5-dimethylthiazoyl)-2-5 diphenyl-tetrazolium bromide) was added to each well and left for 4 hours in the incubator. The culture medium and MTT solution then were removed. Formazon crystals of viable cells were dissolved in DMSO (dimethyl sulfoxide). Lastly, ELISA reader was utilized to obtain the data and cell viability of HFOB was calculated. **Results:** For HPOB with 100 mg/ml PMMA composites, the highest percentage of cell viability was 96.53% (filled 10% β -TCP) and the lowest

was 64.47% (filled 15% β -TCP and 2.5% ZnO). Additionally, HPOB cultured with 25 mg/ml PMMA filled 15% β -TCP and 5% ZnO demonstrated the highest cell viability (132.73%). **Conclusion:** It can be concluded that there was no toxicity effect of PMMA composites on human fetal osteoblast cell.

Keywords: Antibacterial, human fetal osteoblast cell, PMMA composites.

(P10) Soft Tissue Changes Associated with Orthodontic Treatment and Extraction of Four Premolars

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Introduction: Extraction of premolars in orthodontic treatment has been suggested in different malocclusions; however, soft tissue changes following extraction are still controversial. **Objectives:** The objective of this retrospective study was to quantify the amount of soft tissue changes in Malaysian female patients treated with extractions of the first four premolars. **Methodology:** The data was obtained from pre- and post-treatment lateral cephalometric radiographs of 24 orthodontic patients who met the following criteria: (i) Malaysian females, aged between 18-35 years old; (ii) orthodontically treated utilizing 0.22 x 0.28 standard edgewise technique; (iii) Class 1 malocclusion pre-orthodontic treatment (incisor and molar relationship); and (iv) four premolars extracted for orthodontic treatment. The mean of treatment duration was 24 ± 6 months. Pre-and post-treatment lateral cephalograms of patients were traced on a cephalometric tracing software CASSOS (Soft Enable Technology Limited, Hong Kong). Linear and angular measurements were made. Data was analyzed using non-parametric

Wilcoxon sign-rank test with $p < 0.05$ considered statistically significant.

Results: All linear and angular measurements of hard and soft tissue changes showed no significant differences except 'Ls-Sn-Pog' ($p < 0.05$), with the mean change has decreased to 1.0 mm post-treatment. **Conclusion:** This study concludes that in Malaysian female patients, significant upper lip retraction occurred post-orthodontic treatment with the retraction of incisors. Further investigations with larger sample size will be required to assess the soft tissue profile following extraction in order to improve the facial aesthetics.

Keywords: Bimaxillary protrusion, facial changes, facial profile, premolar extraction.