



South East Asia Association  
for Dental Education



International Association  
for Dental Research

IADR  
SEA



คณะทันตแพทยศาสตร์  
FACULTY OF DENTISTRY  
Chulalongkorn University

# 31<sup>st</sup> SEAADE & 34<sup>th</sup> IADR-SEA Scientific Meeting Thailand 2020

## Dental Education and Research during COVID-19 pandemic

November 23<sup>rd</sup> - 27<sup>th</sup>, 2020, Virtual Meeting

*Program and Abstracts*



# Professor Chun Hung Chu

President of SEAADE



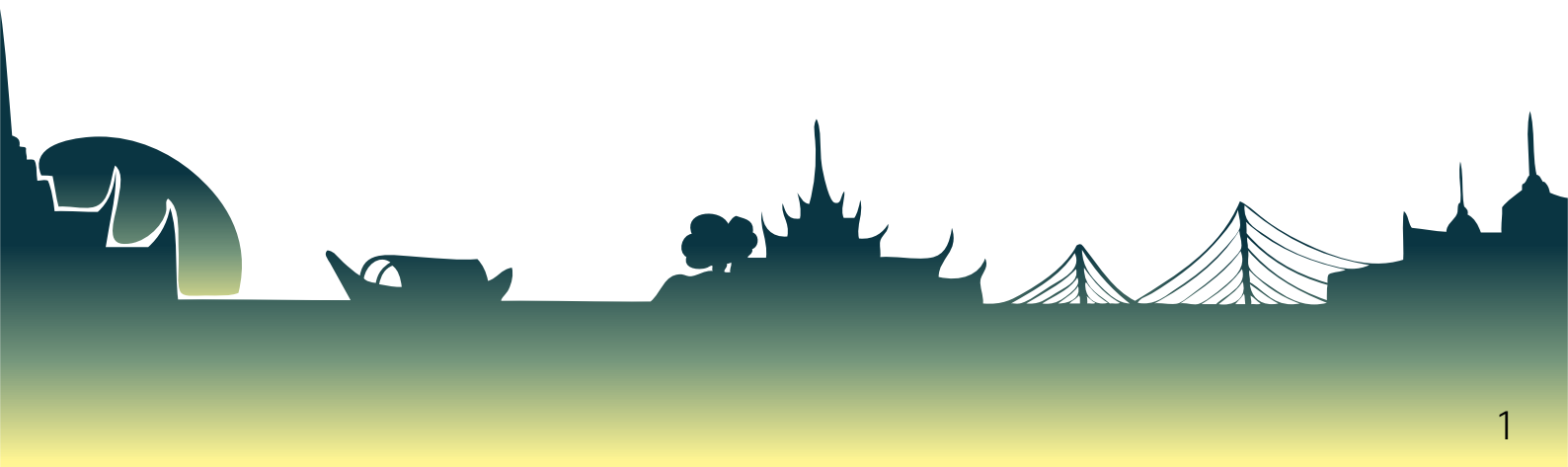
Dear colleagues,

Since founded in 1990, the South East Asia Association for Dental Education (SEAADE) has grown into one of the most influential dental associations in the region. We currently have more than 60 member schools across different countries and regions in Southeast Asia. These include Cambodia, China, Hong Kong, India, Indonesia, Japan, Malaysia, Myanmar, Philippines, Taiwan, Thailand, Singapore, South Korea, Sri Lanka and Vietnam.

The SEAADE meeting is an exceptional event for dental educators, practitioners, and researchers to share their best practices and latest academic insights in dental education. This year conference theme focuses on “Dental Education after Disruption”. All sessions will be aligned to demonstrate changes in dental education after COVID-19 as well as technology disruption. The final goal is to find a consensus on how to move Dental Education toward the new normal.

On behalf of SEAADE, I would like to thank the Chulalongkorn University and the local organizing committee led by Dr Suchit Poolthong for their effort in organizing this online event. We warmly welcome your participation in this online meeting.

Professor Chun Hung Chu  
President of SEAADE





## **Asst. Prof. Suchit Poolthong**

**Chairperson of LOC of SEAADE**

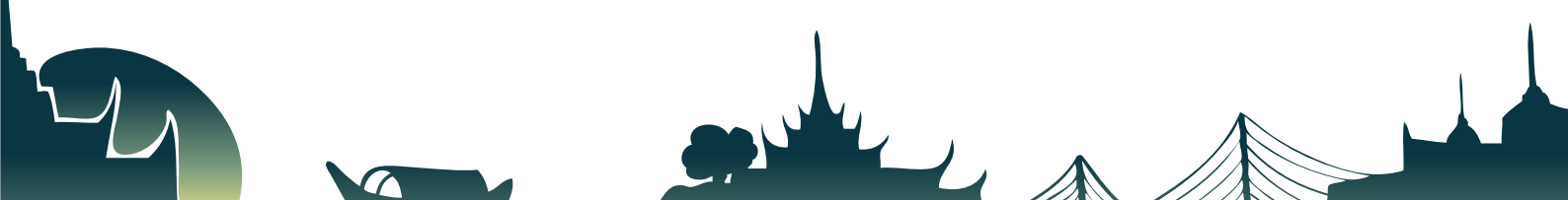
Dear colleagues,

On behalf of the Local Organizing Committee (SEAADE), I warmly welcome you to the 31<sup>st</sup> South East Asian Association for Dental Education (SEAADE) and the 34<sup>th</sup> Annual Scientific Meeting of International Association for Dental Research of Southeast Asian Division (IADR-SEA) virtual meeting on November 23<sup>rd</sup>-27<sup>th</sup>, 2020. Although it is regrettable that we cannot be together for our Annual Meeting this year in Bangkok, the virtual meeting forum will allow us to safely attend the event during the COVID-19 pandemic.

This meeting's theme: "Dental education and research during COVID-19 pandemic", brings together researchers and educators in the field of health science from universities and countries in Asia and around the world to meet and share their knowledge and expertise, to improve not only the quality of dental research, but also focus on new innovating methods of dental education. During three-days meeting, there will be special lectures, workshop, as well as research presentation. I truly believe that this remarkable event will help facilitate members of the dental academic community to develop more researches and inspire researchers to enhance future collaborations.

Asst. Prof. Suchit Poolthong

Chairperson, Local Organizing Committee of SEAADE



## **Assoc. Prof. Risa Chaisuparat**

**Chairperson of LOC and President of IADR-SEA**



Dear colleagues and students,

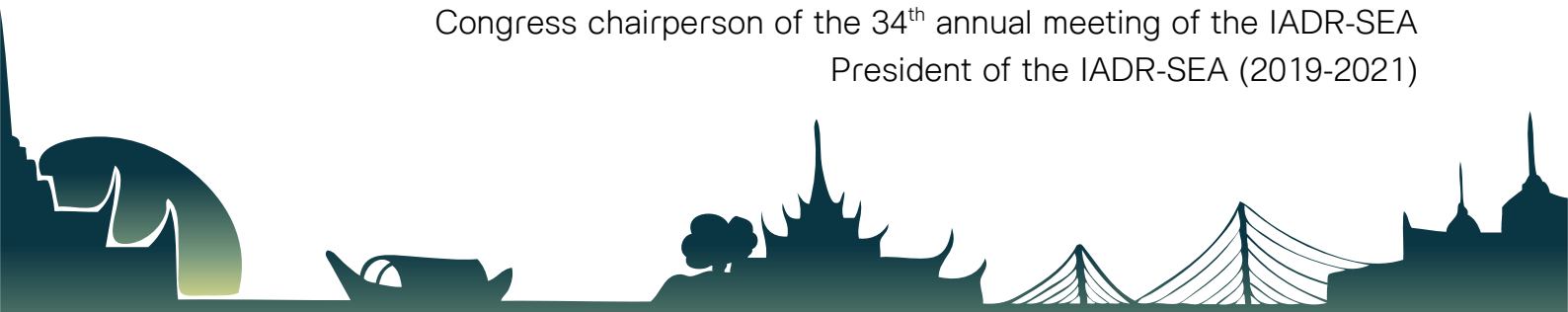
On behalf of the Local Organizing Committee (LOC), we are delighted to welcome you all to the 31<sup>st</sup> Annual scientific meeting of SEAADe and the 34<sup>th</sup> Annual scientific meeting of IADR-SEA, which will be jointly held on virtual platform from 23<sup>rd</sup> to 27<sup>th</sup> November, 2020. Due to the COVID-19 pandemic, it is with great regret that the SEAADe council, the IADR-SEA council and the LOC cannot host a physical meeting in Bangkok, Thailand this year. We believe that the virtual platform will allow people around the world to attend the event during this COVID-19 crisis.

This year, the IADR-SEA meeting theme of “Dental research during COVID-19 pandemic” will cover various research areas in Dentistry. Prof. Pamela Den Besten, President of IADR, who has kindly given us the keynote lecture I on Mineral tissue research, and Prof. Wim Teughels from the University of Leuven, Belgium will provide us the keynote lecture II on Oral microbiology research. Three symposiums focusing on “Oral cancer and lesions”, “Geriatric dentistry” and “Material research in dentistry” will be held at this event.

All abstracts accepted for presenting at the meeting will be conducted in the oral and poster formats as assigned. We have been working day by day to generate the system for online presentation. Please keep looking at our official meeting website ([www.iadr-sea.com](http://www.iadr-sea.com)) for updates.

We thank you for your continued support and look forward to welcoming you to our virtual meeting in November 2020.

Risa Chaisuparat  
Congress chairperson of the 34<sup>th</sup> annual meeting of the IADR-SEA  
President of the IADR-SEA (2019-2021)



# Assoc. Prof. Pornchai Jansisyanont

Dean

Faculty of Dentistry, Chulalongkorn University  
Bangkok, Thailand



Dear colleagues,

The Faculty of Dentistry, Chulalongkorn University has been given the privilege of hosting the 31<sup>st</sup> SEA ADE and 34<sup>th</sup> IADR-SEA virtual meeting. Although we regret that we cannot be physically together, a virtual meeting will allow us to safely continue our knowledge sharing and collaboration.

This virtual Meeting will provide a venue for educators and researchers from the Asian Region to exchange educational and scientific knowledge. The theme of the meeting, "Dental education and research during COVID-19 pandemic", reflects our goal and efforts as dental educators and researchers in facing this devastating COVID-19 outbreak. We are honored to have distinguished speakers from overseas attending this meeting, along oral and poster presenters as well as award competitors. We hope to expand our knowledge and create opportunities with collaborative efforts as we deal with the COVID-19 pandemic together. This year, the Faculty of Dentistry, Chulalongkorn University celebrates her 80th anniversary. Dental Education in Thailand has shifted to competency based, which produces graduates who are intelligent, compassionate, filled with moral, and possess leadership spirit. Moreover, we are aware that dental research is vital in producing new knowledge and innovation that will effectively support dental education and practice. This meeting is truly a unique platform for all dental educators and researchers to share their expertise and experience in the spirit of mutual friendship and commitment to the prosperity of the region. I heartedly welcome all to the 31<sup>st</sup> SEA ADE and 34<sup>th</sup> IADR-SEA virtual meeting, from November 23<sup>rd</sup> to 27<sup>th</sup>, 2020. I truly believe that this virtual meeting will enrich you with the latest advancement in Dentistry and wish all of you a fruitful and memorable day.

Sincerely,

Assoc. Prof. Pornchai Jansisyanont  
Dean, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand



# Local Organizing Committee

**Chairperson (SEAADE):**

Assist. Prof. Suchit Poolthong

**Chairperson (IADR-SEA):**

Assoc. Prof. Risa Chaisuparat

**Secretary (IADR-SEA):**

Dr. Nareudee Limpuangthip

**Assistant secretary (IADR-SEA):**

Somchai Yodsanga

**Academic section (SEAADE):**

Assist. Prof. Supachai Chuenjitwongsa

Assist. Prof. Anjalee Vacharaksa

**Academic section (IADR-SEA):**

Prof. Thanaphum Osathanon

Assist. Prof. Palinee Detsomboonrat

**Public relation and Registration:**

Dr. Kittisak Thotsaporn

**Treasurer:**

Dr. Panatcha Weerapol

Dr. Dusit Nantanapiboon

**Committee:**

Dr. Sirapop Suwankomolkul

Dr. Tanit Arunratanothai

Dr. Thanatchaporn Jindanil

Dr. Kridtapat Sirisereephap

Dr. Itt Assoratgoon

# SEAADE and IADR-SEA councils

## SEAADE councils

Name (Country)	Country or Region	Position
Prof. Chun Hung Chu	Hong Kong	President
Prof. Passiri Nisalak	Thailand	President elected
Dr. James Kit-Hon Tsoi	Hong Kong	Secretary
Prof. Ibrahim Abu Hassan	Malaysia	Treasurer
Prof. Allen Ming-Lun Hsu	Taiwan	Immediate past president
Prof. Allan Kah Heng Pau	Malaysia	Councilor member
Prof. Sri Angky Soekanto	Indonesia	Councilor member
Prof. Arturo P. de Leon	Philippines	Councilor member
Prof. Eddie Hsiang-Hua Lai	Taiwan	Councilor member
Prof. Ngo Thi Quynh Lan	Vietnam	Councilor member
Prof. Chooi Gait Toh	Malaysia	Ex-officio member
Prof. Rahimah Abdul Kadir	Malaysia	Ex-officio member
Prof. Krassanai Wangrangsimakul	Thailand	Ex-officio member

## IADR-SEA councils

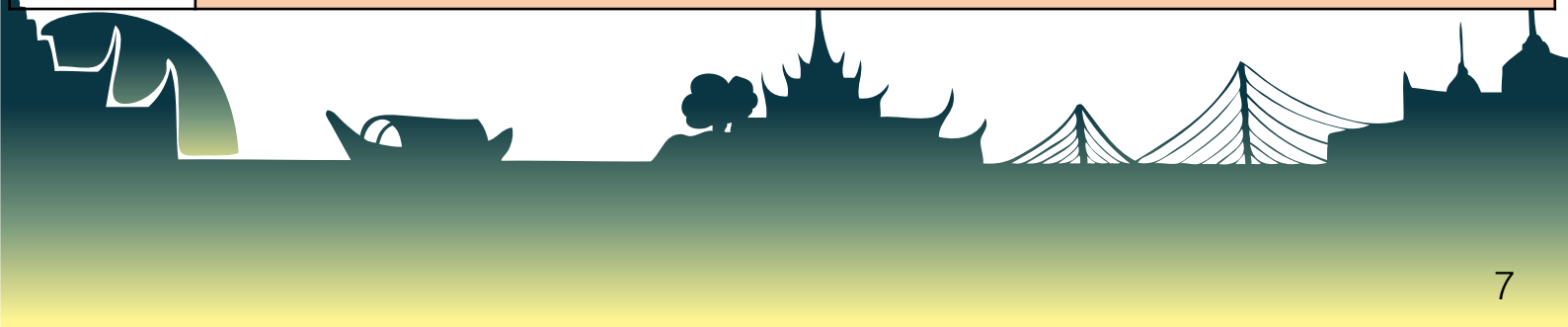
Name (Country)	Country or Region	Position
Assoc.Prof. Risa Chaisuparat	Thailand	President
Prof. May CM Wong	Hong Kong	President elected
Dr. Nareudee Limpuangthip	Thailand	Secretary
Assoc. Prof. Chaminda Jayampath Seneviratne	Singapore	Treasurer
Prof. Chun-Pin Lin	Taiwan	Immediate past president
Dr. Armelia Sari Widyarman	Indonesia	Councilor
Dr. Pearly Lim	Vietnam	Councilor
Prof. Li Deh Lin	Taiwan	Councilor
Dr. Hoang Trong Hung	Vietnam	Councilor

# The 31<sup>st</sup> South East Asian Association for Dental Education (SEAADE) Meeting

## Virtual meeting

### November 24<sup>th</sup>, 2020 (Tuesday)

Thailand time (GMT+7)	Virtual Room 1	Virtual Room 2
07:45 - 8:00	OPENING REMARK (President Prof. Chun Hung Chu/ Dean Assoc.Prof. Pornchai Jansisyanont/ Chair Asst. Prof. Suchit Poolthong)	
08:00 - 09:00	KEYNOTE I : "Dental Education After Disruption : A Conversation" Prof. Ryan Quock Chairperson: Asst. Prof. Suchit Poolthong	
09:00 - 09:30	Break	
09:30 - 11:00	PLENARY SESSION : "What we should be doing for online learning planning, assessment, and research?" Prof. Michael George Botelho (Hong Kong)/ Asst. Prof. Ajiravudh Subarnbhesaj (Thailand) Chairperson: Asst. Prof. Suchit Poolthong	
11:00 - 12:00	Break	
12:00 - 13:30	COMPETITION SESSION 1 Assoc. Prof. Prathip Phantumvanit (Chair) Asst. Prof. Anjalee Vacharaksa (Moderator)	SEAADE ANNUAL GENERAL MEETING Prof. Chun Hung Chu (Chair) Dr. James Kit-Hon Tsoi (Moderator)
13:30 - 14:00	Break	
14:00 - 15:30	COMPETITION SESSION 2 Assoc. Prof. Prathip Phantumvanit (Chair) Asst. Prof. Supachai Chuenjitwongsa (Moderator)	COMPETITION SESSION 3 Prof. Toh Chu Gait (Chair) Asst. Prof. Anjalee Vacharaksa (Moderator)
16:00 - 16:30	"University Rankings and the Performance of South East Asian Institutions" (Mr. Kesh Patel)	
17:00 - 20:00	Reception	



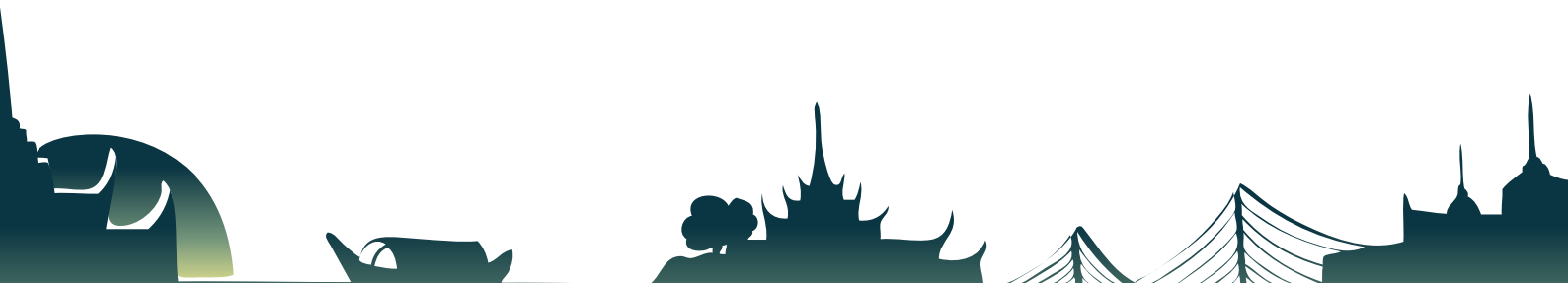


# The 31<sup>st</sup> South East Asian Association for Dental Education (SEAADE) Meeting

## Virtual meeting

### November 25<sup>th</sup>, 2020 (Wednesday)

Thailand time (GMT+7)	Virtual Room 1	Virtual Room 2
08:00 - 10:00	SYMPOSIUM : "Dental education during the COVID -19 pandemic and preparation for future pandemic" Asst. Prof. Suchit Poolthong/ Prof. Tri Emi Astoeti/ Asst. Prof. Duangporn Duangthip	
10:00 - 10:30	Break	
10:30 - 12:00	COMPETITION SESSION 4 Asst. Prof. Yupin Songpaisan (Chair) Asst. Prof. Anjalee Vacharaksa (Moderator)	COMPETITION SESSION 6 Assoc. Prof. Waranuch Pitiphat (Chair) Asst. Prof. Suchit Poolthong (Moderator)
12:00 - 13:00	Break	
13:00 - 14.30	COMPETITION SESSION 5 Asst. Prof. Yupin Songpaisan (Chair) Asst. Prof. Anjalee Vacharaksa (Moderator)	COMPETITION SESSION 6 Assoc. Prof. Waranuch Pitiphat (Chair) Asst. Prof. Suchit Poolthong (Moderator)
14.30 - 15:00	Break	
15.000 - 16:00	COMPETITION JUDGE ONLY FOR THE AWARD DISCUSSION	
16:00 - 17:00	COMPETITION AWARD CEREMONY AND CLOSIND REMARK	
17:00 - 20:00	BUSINESS MEETING WITH IADR-SEA	

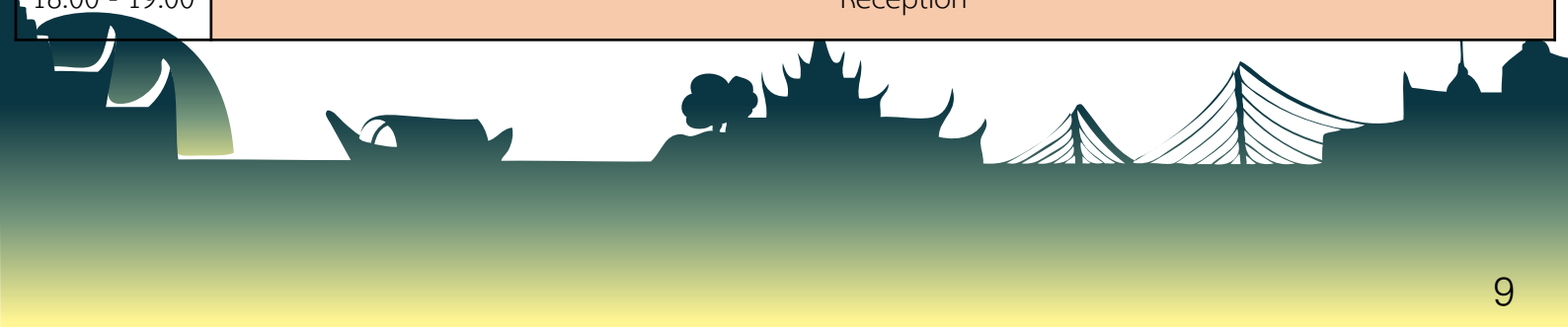


# The 34<sup>th</sup> IADR Southeast Asian Division Annual Meeting

## Virtual meeting

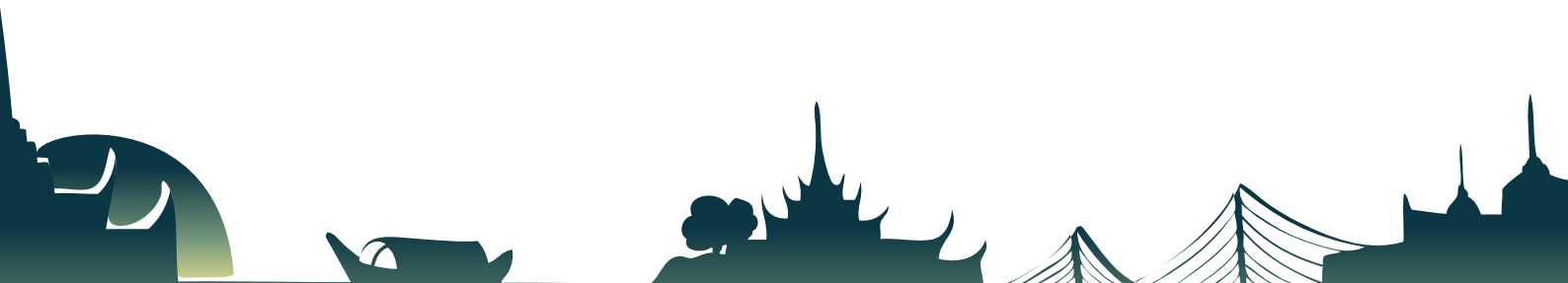
### November 26<sup>th</sup>, 2020 (Thursday)

Thailand time (GMT+7)	Virtual Room 1	Virtual Room 2	Virtual Room 3
8:30 - 9:00	OPENING REMARK (President Prof. Pamela Den Besten/Dean Assoc.Prof. Pornchai Jansisyanont/Chair Assoc.Prof. Risa Chaisuparat Dr. Thanatchaporn Jindanil (Moderator)		
9:00 - 10:00	KEYNOTE I : Environmental effects on tooth enamel formation Prof. Pamela Den Besten (President of IADR) Chairperson: Asst. Prof. Suchit Poolthong		
10:00 - 10:15	Break		
10:15 - 11:45	SYMPOSIUM I : Oral cancer and lesions Assist Prof. Rania Younis (USA), Dr. Sven Otto (Germany), Prof. Nikitakis Nikoloas (Greece) Chairperson: Assoc.Prof. Risa Chaisuparat		
12:00 - 13:00	Break		
13:00 - 14:30	SYMPOSIUM II : Geriatric dentistry Prof. Murray Thomson (New Zealand), Prof. Kazunori Ikebe (Japan), Asst. Prof.Orapin Komin (Thailand) Chairperson: Dr. Nareudee Limpuangthip		
14:30 - 15:00	POSTER Presentation 1 Asst. Prof. Palinee Detsomboonrat (Moderator)	POSTER Presentation 2 Assoc.Prof. Risa Chaisuparat (Moderator)	POSTER Presentation 3 (Hatton Senior) Dr. Nareudee Limpuangthip/ Dr. Tanit Arunratanothai (Moderator)
15:00 - 15:15	Break		
15:15 - 17:00	ORAL Presentation 1 Dr. Nipaporn Urwannachotima (Moderator)	Unilever Hatton Competition Junior Catagory (closed session) Dr. Nareudee Limpuangthip (Moderator)	Unilever Hatton Competition Senior Catagory (closed session) Dr. Tanit Arunratanothai (Moderator)
18:00 - 19:00	Reception		



**The 34<sup>th</sup> IADR Southeast Asian Division Annual Meeting**  
**Virtual meeting**  
**November 27<sup>th</sup>, 2020 (Friday)**

Thailand time (GMT+7)	Virtual Room 1	Virtual Room 2	Virtual Room 3
9:00 - 10:00	KEYNOTE II : Probiotics for oral health: from basic science to clinical application Prof. Wim Teughels (Belgium) Chairperson: Asst.Prof. Pisha Pittayapat		
10:00 - 10:15	Break		
10:15 - 11:45	SYMPOSIUM III : Material research in dentistry Prof. Shinya Murakami (Japan), Assoc.Prof. Oranart Matangkasombut (Thailand), Assist.Prof.Joao Ferreira (Thailand) Chairperson: Prof. Rangini Mahanonda		
12:00 - 13:00	Break		
13:00 - 15:00	ORAL Presentation 2 Assist.Prof. Joao Ferreira (Moderator)	ORAL Presentation 3 Dr. Nareudee Limpuangthip (Moderator)	ORAL Presentation 4 Assoc.Prof. Risa Chaisuparat (Moderator)
15:00 - 15:15	Break		
15:15 - 15:45	POSTER Presentation 4 Assoc.Prof. Risa Chaisuparat (Moderator)		
15:45 - 16:30	AWARD CEREMONY and CLOSING		



# SEAADE pre-conference workshop

## A. Online learning and technology-enhanced learning in dentistry: Toward the new normal

**Date:** November 23<sup>rd</sup>, 2020 (Monday)

**Time:** 8.00 - 11.00

**Speaker:** Associate Professor Dr. Praweenya Suwannatthachote

**Workshop content:** Online learning and digital technology are transforming how we delivery knowledge and skills during the COVID-19 pandemic. Appropriate use of technologies based on instructional design is central to developing learner performance. This workshop will focus on instructional design for online learning and the use of digital tools for teaching and learning. A discussion activity is designed to gain more interaction among participations' experiences related to online teaching and learning during emergency remote learning in March2020 and how to redesign teaching and learning using online learning for the new normal.



Praweenya Suwannatthachote is an Associate Professor at the Faculty of Education, Chulalongkorn University, Thailand. She holds a Ph.D. in Educational Communication and Technology from Chulalongkorn University, Thailand. She has assigned for a temporary duty at Learning Innovation Center, Chulalongkorn University since 2017. She has been involved in many projects especially Thai MOOC national system under the Ministry of Higher Education, Science, Research and Innovation (MHESI). Her research interests include learning design, integration of technology into teaching and learning, teacher education, online learning environments, and MOOCs.

# SEAADE pre-conference workshop

## B. Shifting assessment of knowledge

**Date:** November 23<sup>rd</sup>, 2020 (Monday)

**Time:** 8.00-11.00

**Speaker:** Associate Associate Professor Dr. Cherdsak Iramaneerat

**Workshop content:** Assessment of knowledge is a core element of health science education. The traditional model of knowledge assessment has been challenged by recent changes in technology, economy, and public health policy. COVID-19 pandemic rapidly accelerated the needs to change assessment strategies. Dental teachers, educators, and dental school administrators have been forced to rethink about assessment approaches that have been used for a long time. Adapting to this education disruption requires a paradigm shift on assessment in many aspects: what, when, where, how, why, and by whom. In this workshop, the discussion will be focused on assessment of knowledge. Participants will explore many interesting issues that a dental school needs to adapt in order to provide high quality education in a disruptive world.

- What should we assess? Is fact memorization still important to be a dentist?
- When should we assess learners? Should examination always occur at the end of semester? Are there any benefits for giving examination early?
- Where do we assess learners? Is it possible to assess students online?
- How can we assess learners? What options are available? What are advantages and limitations for various assessment methods for dental students? How can we administer valid assessment in an online format?
- Why do we assess learners? Assessment for feedback or making pass/fail decision
- Who are the persons responsible for student assessment? Should student assessment be restricted to teachers? Should nurses, co-workers, or peer involve with assessment?



Dr. Cherdsak Iramaneerat graduated from Faculty of Medicine Siriraj Hospital, Mahidol University. He continued his training in surgery and received Thai board of general surgery and Thai board of colon and rectal surgery. His passion in teaching brought him to study in United States and earned Master of Health Professions Education and PhD in educational psychology from University of Illinois at Chicago. His main interests are educational psychology, educational measurement, and faculty development. He has involved with several workshops and projects related to improving teaching and assessment in medical schools, dental schools, and several health professional schools.

Dr. Cherdsak is currently working as a colorectal surgeon and an assistant dean in undergraduate education at Faculty of Medicine Siriraj Hospital. He is also a director of Siriraj Health science Education Excellence center and a program director of Master of Science in Health science education.

## C. Re-designing courses for online engagement during COVID-19

**Date:** November 23<sup>rd</sup>, 2020 (Monday)

**Time:** 8.00-10.30

**Speaker:** Associate Professor Dr. Susan Bridges

**Workshop content:** One advantage of the emergency remote teaching pivot to online learning caused by the COVID-19 pandemic has been a re-examination of the role of technologies in our course offerings. Course designs often follow a pattern of presentation of content followed by active learning approaches. In this session, I will share some course design alternatives and explore how we may use these principles to re-design online courses that prioritise student collaboration and deep engagement. I will begin by sharing some of my own course designs which have drawn on inquiry-based approaches. First, I will share my teaching team's experience of adopting design principles from problem-based learning to devise and deliver a fully online asynchronous Certificate course with the LKS Faculty of Medicine at The University of Hong Kong. Second, I will share my 2019-21 Masters level course in the Faculty of Education designed using the principles of case-based learning and my ideas for re-designing this as a fully online course. Workshop participants are asked to bring along the course outline for one of their current courses (face-to-face or online). Your course will form the basis of the workshop activity of re-designing for online engagement.



Dr. Susan Bridges is the Director the Centre for the Enhancement of Teaching and Learning (CETL) and former Assistant Dean (Learning and Teaching/ Curriculum Innovation) in the Faculties of Education and Dentistry at The University of Hong Kong (HKU). Her higher education initiatives focus on curriculum and faculty development projects in professional education most recently chairing the reform of the HKU Postgraduate Diploma in Education (Bridges et al, 2018). She is particularly interested in integrated curriculum designs and inquiry-based learning and how educational technologies can support and enhance these (see QS Wharton Awards). In 2016, she was invited to join the Universitas21 (U21) Steering Group for the Educational Innovation Cluster to support network-wide initiatives (Bridges, Armour et al, 2019). Her HKSAR RGC and internationally-funded research demonstrates a core interest in human interactions exploring the 'how' of effective pedagogies and designs through ethnographic approaches. She serves on the Editorial Board for the Interdisciplinary Journal of Problem-based Learning, is a finalist judge for the QS Wharton Reimagine Education Awards and, in 2020, was elected as Chair of the Problem-based Education SIG of the American Educational Research Association (AERA). Her 2020 co-edited volume (with Rintaro Imafuku) on "Interactional Research into Problem-based Learning" is with Purdue University Press.

# SEAADE pre-conference workshop

## D. Educational tools for online learning

**Date:** November 23<sup>rd</sup>, 2020 (Monday)

**Time:** 12.00-15.00

**Speaker:** Dr. Patrachart Komolkiti

**Workshop content:** Moving classes from classrooms to online is not just about talking to a camera instead of students. While similar outcomes are expected, there are many aspects of online learning that require different approaches. Fortunately, many tools are available to facilitate online learning. Participants will have some hands-on trials to see how technologies can enhance the learning experience.



Patrachart Komolkiti received his Bachelor's degree from Chulalongkorn University, Bangkok, Thailand, in 1997, his Master's degree from Northwestern University, USA, in 1998, and his Doctoral degree from Chulalongkorn University, Bangkok, Thailand, in 2011, all in Electrical Engineering. Currently, he is the director of the Learning Innovation Center and the acting director of the Office of Academic Affairs, Chulalongkorn University.

# SEAADE pre-conference workshop

## E. Student Experiences during the COVID-19 Pandemic

**Date:** November 23<sup>rd</sup>, 2020 (Monday)

**Time:** 12.00-15.00

**Speaker:** Student Representatives from the Asia Pacific Dental Students Association (APDSA)

**Workshop content:** During the COVID-19 pandemic, undergraduate dental education has changed drastically toward the new normal. Teaching and learning moved to online platform while laboratory and clinical practice were postponed. Facilitating for students and educators to adapt to the new way of education was (and now is still) challenging. In this session, student voices from various countries on (1) how educators, dental schools, and universities supported their students during the difficult time and (2) what should be prepared for the future of undergraduate dental education will be presented and discussed



APDSA is the brainchild of the Asia–Pacific Dental Federation (APDF/APRO FDI) and it was established in 1968 in Japan, having its first Annual Congress in 1969. Our members are composed of dental schools in the Asia Pacific region. Currently, we have 16 member countries and have partnerships with various student organizations in the region.

APDSA is an avenue to supplement the holistic growth of dental students within the region by supplementing knowledge from the curriculum with enriching activities.



## F. Supporting clinical skills learning in the classroom and online

**Date:** November 23<sup>rd</sup>, 2020 (Monday)

**Time:** 12.00-15.00

**Speaker:** Professor Dr. Michael George Botelho

**Workshop content:** The acquisition and experience of clinical skills learning is a complex and resource intensive phenomena. The learning of these skills is largely unstructured and the transition from theory to practice creates uncertainties, gaps in knowledge and stresses for the learner. How can we better prepare our learners during their clinical skills learning and practice? Using in-class and online pedagogies we can scaffold specific learning experiences during their transition to clinical practice by providing them with problem solving and clinical decision-making skills. This presentation proposes a framework to help educators plan learning experiences and in particular will explore the Observation of Videoed Expert-student Dialogue (OVED) as well as the use of a novel flipped class model in Simulation Laboratory learning.



Professor Michael Botelho has been at HKU for 25 years and been actively engaged in educational reform pedagogy and innovation. In education, he has over 20 peer reviewed publications and 8 book chapters and participated in 19 education grants. He is an editorial Board Member of the European Journal of Dental Education, a Technology Enhanced Learning committee member of AMEE and a board member of ADEE. He has lectured and consulted in Hong Kong, across South-East Asia and in Europe and North America. His educational research interests are related to video and online learning, PBL, active learning and the flipped class. and student discourse. He has a number of teaching awards including the prestigious UGC Teaching Award in Hong Kong and designed Video Vox which is a dialogic and interactive video platform. He is long-term committed educator and scholar of teaching and learning and still enthusiastic to create improved and novel learning experience for our students.

## SEAADE speakers

### KS1, Professor Ryan Quock



**Current Position:** The University of Texas School of Dentistry at Houston

**Curriculum Vitae:** Professor Ryan Quock is a University of Texas System Distinguished Teaching Professor, whose primary appointment is preclinical restorative teaching. He has won numerous teaching awards at the School of Dentistry at Houston; at the state level he has been recognized with The University of Texas Board of Regents Outstanding Teaching Award and induction into the system-wide Kenneth I. Shine, MD, Academy of Health Science Education. His scholarly interest is the intersection of preventive and operative dentistry, as well as pedagogy associated with these topics; he has authored 43 peer-reviewed articles (published or in press), 5 peer-reviewed educational resources, and numerous invited and local articles. In addition to serving nationally on the Board of the caries management-focused CaMBRA Coalition, Professor Quock currently serves as the Chair of the Board of the American Dental Education Association (ADEA). He is the first person of Asian descent in the nearly hundred-year history of ADEA to be elected to its highest office.

**Program:** November 24<sup>th</sup>, 2020, 8.00-9.00

**Title:** Dental Education After Disruption: A Conversation

**Abstract:** Dental education globally is responding to major disruption. Disruption is almost always inconvenient, but it also presents the opportunity for critical reflection. While the natural reaction amidst disruption is a yearning to return to “normalcy,” is it truly optimal to return to the status quo? Dental educators will have to appraise their own distinct contexts in order to reach appropriate conclusions. We will consider the general effects of the current disruption on dental education globally, and then use a specific context as a case example for critical reflection.

## SEAADE speakers

### KS2, Professor Michael Botelho



**Current Position:** Clinical Professor in Restorative Dental Sciences, University of Hong Kong

**Curriculum Vitae:** Professor Michael Botelho has been at HKU for 25 years and been actively engaged in educational reform pedagogy and innovation. In education, he has over 20 peer reviewed publications and 8 book chapters and participated in 19 education grants. He is an editorial Board Member of the European Journal of Dental Education, a Technology Enhanced Learning committee member of AMEE and a board member of ADEE. He has lectured and consulted in Hong Kong, across South-East Asia and in Europe and North America. His educational research interests are related to video and online learning, PBL, active learning and the flipped class and student discourse. He has a number of teaching awards including the prestigious UGC Teaching Award in Hong Kong and designed Video Vox which is a dialogic and interactive video platform. He is long-term committed educator and scholar of teaching and learning and still enthusiastic to create improved and novel learning experience for our students.

**Program:** November 24<sup>th</sup>, 2020, 9.30-11.00

**Title:** What we should be doing for online learning – planning, assessment and research

**Abstract:** To achieve meaningful outcomes in online learning a holistic strategy needs to be adopted to support students learning and meet learning outcomes. This needs careful design both from a platform strategy, curriculum and pedagogy design including assessment, evaluation and research. This plenary session and workshop will present ideas for how to tackle these issues and how you can strategize on implementing these in your curricula.

# SEAADE speakers

## KS3, Assistant Professor Dr. Ajiravudh Subarnbhesaj



**Current Position:** Associate Dean for Education, Faculty of Dentistry, Khon Kaen University, Thailand

**Curriculum Vitae:**

- Fellowship of the Royal College of Dental Surgeon of Thailand (Oral Medicine) in 2017
- Ph.D. (Dental Science) at Hiroshima University Graduate School of Biomedical Sciences, Hiroshima University in 2011-2014
- Master of Arts (M.A.) at Faculty of Arts Chulalongkorn University, Thailand in 2005-2007
- Fellowship of the Royal College of Dental Surgeon of Thailand Faculty of Dentistry (Oral Pathology) in 2005
- Master of Dental Science (M.D.Sc.) at Faculty of Dentistry, the University of Sydney, Australia in 2000 - 2002
- Graduate Diploma at Faculty of Dentistry, Mahidol University, Thailand in 1999
- Doctor of Dental Surgery (D.D.S) at Faculty of Dentistry Khon Kaen University, Thailand in 1991 - 1997

**Program:** November 24<sup>th</sup>, 2020, 9.30-11.00

**Title:** What we should be doing for online learning – planning, assessment and research

**Abstract:** The concept of traditional education has been greatly challenged and radically changed, especially during the COVID-19 pandemic. The measures put in place by governments and entities to allow workers and students to do their daily tasks from home confirms that it is possible to carry out these activities from anywhere, with just a computer or smartphone. Therefore, online learning has become an integral part of our current dental education system, whether for comfort, adapting to work hours or just having the freedom to study from anywhere. Studying online teaches vital time management skills. It is also considered as the democratization of education because it is relatively low cost and gives students who are not physically able to go to school access to quality education. Having a common agenda between the student and teacher can also prompt both parties to accept new responsibilities and have more autonomy. However, online learning has both advantages and disadvantages. This talk is aimed at discussing and sharing experience of how academic dental institutions in Thailand have been handling the situation to maintain the quality of both didactic teaching and practical clinical skills by online learning.

## SEAADE speakers

### KS4, Mr. Kesh Patel



**Current Position:** Higher education consultant

**Curriculum Vitae:** Kesh is a higher education consultant with a special focus on converting data and insights into strategy and implementation plans. Kesh has worked within the Higher Education sector for over 12 years and draws upon his experience of working at institutions to advise clients on the best solutions for their needs

**Program:** November 24<sup>th</sup>, 2020, 16.00-16.30

**Title:** University Rankings and the Performance of South East Asian Institutions

**Abstract:** This session will look at the performance of universities in South East Asia in the World University Rankings, Asia Rankings as well as the Dentistry subject rankings. Looking at each of the indicators for the rankings we will be able to identify areas where institutions perform well in comparison to peers and where improvement needs to be made. The short presentation will be followed by a question and answer session.

## SEAADE speakers

### KS5, Assistant Professor Suchit Poolthong



**Current Position:** Former Dean, Faculty of Dentistry, Chulalongkorn University

**Curriculum Vitae:** Dr. Suchit Poolthong is Assistant Professor in Department of Operative Dentistry, Chulalongkorn University. He was the former Dean, Faculty of Dentistry, Chulalongkorn University and director of Dental Material Science, Research Center and director of Dental Biomaterial program. He was conferred Doctor of Philosophy (PhD) and Master of Science in dental material from the University of Sydney. He is board certified in Operative Dentistry and certified in Advanced Security Management Program, National Defense College Association of Thailand. He was an invited speaker in several international conferences such as ASEAN Forum on Dentistry, IADR South East Asia Division, etc. He also received IADR Research in Joseph Lister Award in 2018. Dr. Suchit Poolthong presented his research at many international conferences and had authored 43 peer-reviewed articles. His research interests focus on biomaterials and biomechanics, characteristics and properties of teeth, and biomineralization of teeth. He currently serves as Editorial Board in International Journal of Oral Sciences.

**Program:** November 25<sup>th</sup>, 2020, 9.30-11.00

**Title:** Dental education during the covid-19 pandemic and preparation for a future pandemic

**Abstract:** Dental schools around the world have suffered from the outbreak of the covid-19 virus in the past year and electronic teaching processes have been used, especially to replace classroom teaching. However, dental students require clinical skills and they cannot graduate without demonstrating the dental competencies required by their country. Dental procedures typically generate aerosol from the patients' oral cavity and potential for virus spreading via this route made clinical teaching more difficult. This symposium will discuss possible teaching methods during the covid-19 virus outbreak in classrooms and in dental clinics. Experiences from many countries will be discussed and how to perform safe clinical training if other airborne diseases emerge.

# SEAADE speakers

## KS6, Professor Tri Erri Astoeti



**Current Position:** Dean Faculty of Dentistry Trisakti University (FoD Usakti)

### Curriculum Vitae:

#### *Work History*

- 1986-now: Lecturer in Dental Public Health and Preventive Dentistry Department, Faculty of Dentistry Trisakti University
- 1996: Professional Marketing Officer, PT Unilever Indonesia
- 2005-2013: Executive Director of Teaching Dental Hospital FoD Usakti
- 2006-2014: 4<sup>th</sup> Vice Dean FKG Usakti Collaboration and Development affair
- 2009-2014: Member of Indonesian medical Council Registration Division
- 2012-now: Professor in Faculty of Dentistry Trisakti University
- 2014-now: Dean Faculty of Dentistry Trisakti University

#### *Organization and professional memberships*

- Chairman of External Affair, Indonesian Dental Association at year 1999-2002
- Chairperson of Indonesian Teaching Dental Hospital Association at year 2007-2010
- Vice Secretary of Indonesian Dental Public Health Association
- Member of International Association for Dental Research (ID number: P 4952615)
- Member of Asia Academic of Preventive Dentistry
- Indonesian Clinical Editorial Advisor on Dental Practice News
- Project leader for Project Live, Learn, Laugh/ Brush Day and Night Indonesian project Federation Dental International 2006-now
- Vice Chairman Asia Pacific Dental Congress 29, 2007
- Chairman of International Association for Dental Research, Indonesian Section 2007-now
- Chairperson External Affair Indonesian Dental Association 2014-now
- Chairman of Supervisor Board Indonesian Commission for Hospital Accreditation (KARS) 2014-now
- Vice Chairman Oral Health Committee, Ministry of Health Republic of Indonesia

**Program:** November 25<sup>th</sup>, 2020, 9.30-11.00

**Title:** Dental education during the covid-19 pandemic and preparation for a future pandemic

## SEAADE speakers

### KS7, Assistant Professor Tammy Duangporn Dungthip



**Current Position:** Clinical Assistant Professor in Cariology, The University of Hong Kong.

**Curriculum Vitae:** Dr. Duangthip is Clinical Assistant Professor in Cariology, The University of Hong Kong. She was the former Associate Dean, and Director of Dental Department, Faculty of Dentistry, Thammasat University, Thailand. She was conferred Doctor of Philosophy (PhD) and Master of Science in Dental Public Health from the University of Hong Kong, and Doctor of Dentistry (Dr. med. dent.) from University of Bern, Switzerland, and Doctor of Dental Surgery (DDS) from Chulalongkorn University, Thailand. She is a Fellow of Royal College of Dental Surgeons of Thailand (FRCDT) in Dental Public Health and a Fellow and Chairman of Humanitarian Committee of International College of Dentists (ICD) section XV. She was an invited speaker in several international conferences such as World Congress on Preventive Dentistry, IADR Malaysian Section, etc. She also received IADR Colgate Research in Prevention Travel Award in 2014. Dr. Duangthip presented her research at many international conferences and published more than 45 peer-reviewed journals including first author in Journal of Dental Research with H-index 15 and more than 600 citations (Scopus). Her research interests focus on caries management, fluorides and community dental care. Currently, she is an Associate Editor in BMC Oral Health and an Assistant Specialty Chief Editor of Oral Hygiene and Oral Health Policy Section in Frontiers in Oral Health.

**Program:** November 25<sup>th</sup>, 2020, 9.30-11.00

**Title:** Dental education during the covid-19 pandemic and preparation for a future pandemic



## IADR-SEA speakers

### KS1, Professor Pamela Den Besten



**Current Position:** Professor in Department of Orofacial Sciences, School of Dentistry, University of California San Francisco.

**Curriculum Vitae:** Pamela Den Besten is Professor in the Department of Orofacial Sciences, School of Dentistry, University of California San Francisco. She directs the Center for Children's Oral Health Research, and co-directs the DDS-PhD and PhD programs in Oral and Craniofacial Sciences within the School of Dentistry and the Graduate Division. Dr. Den Besten is President of the International Association for Dental Research (IADR). She is past Chair of the American Association for the Advancement of Science (AAAS) Section on Dentistry & Oral Health Sciences. In 2009, Dr. Den Besten received the IADR Distinguished Scientist Award in Pulp Biology and Regeneration. She is an AAAS honorary Fellow. Dr. Den Besten has published over 125 scientific manuscripts in peer-reviewed journals, along with 18 book chapters. Her research interests are focused on tooth formation, and in particular enamel and dentin regeneration and biomineralization. She is an international leader in enamel fluorosis research, and studies environmental effects on tooth formation.

**Program:** November 26<sup>th</sup>, 2020, 9.00-10.00

**Title:** Environmental effects on tooth enamel formation

## IADR-SEA speakers

### KS2, Assistant Professor Rania Younis



**Current Position:** Department of Oncology and Diagnostic Sciences, the University of Maryland School of Dentistry (UMSOD)

**Curriculum Vitae:** Dr. Younis specializes in Diagnostic Oral and Maxillofacial Pathology. Most of her cases are related to the oral cavity, jawbones, sinuses and salivary glands, that ranges from reactive, inflammatory and autoimmune conditions to benign and malignant tumors. Dr. Younis received her B.D.S. and M.D.S. from the Faculty of Dentistry and Oral Medicine, Alexandria University, Egypt, where she practiced general Dentistry for six years. She received her residency in oral and maxillofacial pathology and her Ph.D. in Oral and Experimental Pathology from the School of Dentistry, University of Maryland Baltimore in 2011. Dr. Younis is a fellow of the American Academy of Oral and Maxillofacial Pathology since 2009 and board certified in oral and maxillofacial pathology since 2011. Dr. Younis was awarded the NIH Ruth L. Kirschstein National Research Service Award (NRSA) for the year 2011-2012 in craniofacial research, and the Sparkathon award from the Society of Immunotherapy for Cancer in 2018. Dr. Younis is an assistant professor in Department of Oncology and Diagnostic Sciences since 2013 and program director of the OMP in UMSOD program since 2015.

**Program:** November 26<sup>th</sup>, 2020, 10.15-11.45 (SYMPOSIUM I – Oral cancer and lesions)

**Title:** Tumor inflammation in head and neck squamous cell carcinoma and clinical implications.

**Abstract:** Inflammation plays an essential role in tumor initiation and progression. Dr. Younis research is focused in investigating tumor inflammation in head and neck squamous cell carcinoma (HNSCC) and response to immunotherapy. In this context, Dr. Younis lab was the first to stratify HNSCC into 4 subgroups according to combined analysis of expression of the 2 inflammatory biomarkers: Semaphorin 4D and Programmed death ligand 1 (PD-L1) in tumor cells, that carries significant implications in the world of personalized cancer treatment for HNSCC patients. Her lab was also the first to demonstrate a novel mechanism of tumor immune suppression: upregulation of myeloid suppressor cells and T regulatory cells, through HNSCC production of Semaphorin 4D (Sema4D). In this presentation, she will summaries her work and recent discoveries in HNSCC in relation to IFN- $\gamma$  signature.

## KS3, Professor Nikitakis Nikoloas



**Current Position:** Professor and Chair in the Department of Oral Medicine and Pathology, School of Dentistry, National and Kapodistrian University of Athens, Greece (NKUA).

**Curriculum Vitae:** Nikolaos G. Nikitakis is currently Professor and Chair in the Department of Oral Medicine and Pathology, School of Dentistry, National and Kapodistrian University of Athens, Greece (NKUA). He also serves as Vice Dean as well as Chair of the Undergraduate Curriculum Committee in the same School. He graduated in Dentistry (DDS, 1996) and Medicine (MD, 2012) from the NKUA, Greece. He completed his specialty training (Specialty Certificate, 2001) in Oral and Maxillofacial Pathology in the University of Maryland, Baltimore (UMB), USA, where he also received his PhD (2002) in Oral and Experimental Pathology and served as Full Time Assistant Professor (2002-2006) and Director of the PhD and Residency Program in Oral and Maxillofacial Pathology, Dental School (2004-2006). He is a Diplomate of the American Board of Oral Maxillofacial Pathology (Diploma ABOMP, 2003), a Fellow of the American Academy of Oral and Maxillofacial Pathology (Fellowship Certificate AAOMP, 2001) and the American Academy of Oral Medicine (Fellowship Certificate AAOM, 2004). Also, in 2016, he completed a sabbatical as a Visiting Scientist in the Department of Diagnostic & Biomedical Sciences, School of Dentistry, The University of Texas Health Science Center at Houston, and in the Department of Pathology, Head and Neck Section, The University of Texas MD Anderson Cancer Center, Houston, Texas, USA. Professor Nikitakis has served as Secretary General (2014-2018) and is currently the President (2018-present) of the European Association of Oral Medicine (EAOM). Further, since 2015, he has been President of the Hellenic Society of Oral Medicine and Oral Pathology (HSOMOP), in which he has also served as Treasurer (2009-2015). He has been member of the Organizing and/or Scientific Committees of several Scientific Conferences, including the 10<sup>th</sup>, 11<sup>th</sup>, 12<sup>th</sup> and 13<sup>th</sup> Biennial EAOM Congresses, co-chair of the International Scientific Committee of the 14<sup>th</sup> Biennial EAOM Congress and is currently the chair of the upcoming 15<sup>th</sup> Biennial EAOM Congress (Porto, Portugal, October 2021). His clinical and research interests primarily focus on oral medicine/clinical oral pathology, diagnostic oral, head and neck histopathology and oral, head and neck oncology/cancer research. His scientific record includes >150 scientific publications in peer reviewed scientific journals with significant recognition (Scopus: citations >2.700, h-index: 31 and Google Scholar: citations >4.500, h-index: 39). He has also written a Research Monograph and several chapters in Textbooks and Scientific Handbooks. He also serves as Editor-in-Chief, Editorial Board member or reviewer of various scientific journals. He has presented numerous scientific papers and invited lectures in national and international meetings, several of which have received honors and awards, including the Gorlin Award and the Waldron Award of the AAOMP, as well as EAOM awards in Orlando 2014, Antalya 2014, and Turin 2016. He has been invited as Visiting Professor/Lecturer in several Universities in USA and Europe.

**Program:** November 26<sup>th</sup>, 2020, 10.15-11.45 (SYMPOSIUM I – Oral cancer and lesions)

**Title:** Oral Potentially Malignant Disorders (PMDs): Predicting and Preventing Transformation to Oral Cancer

**Abstract:** Most oral cancer cases are preceded by premalignant lesions and conditions, collectively referred to as Oral Potentially Malignant Disorders (OPMDs). Early detection of OPMDs and appropriate management, based on accurate assessment of their potential for malignant transformation, can allow prevention of oral squamous cell carcinoma (OSCC), potentially reducing oral cancer morbidity and mortality. However, to date, neither clinical nor histopathologic markers can reliably predict which OPMDs will progress to malignancy, while management of OPMDs remains challenging. A convincing argument can be made that progress in the prevention and treatment of oral premalignancy and cancer will require improved understanding of the underlying molecular mechanisms, facilitating the discovery of diagnostic, prognostic and predictive markers, as well as the identification of novel targeted therapies.

## IADR-SEA speakers

### KS4, Dr. Sven Otto



**Current Position:** Department of Oral and Maxillofacial Surgery, Ludwig-Maximilians-University of Munich

**Curriculum Vitae:** PD Dr. med. Dr. med. dent. Sven Otto has dealt intensively with clinical presentation, pathogenesis, prevention and treatment of medication-related osteonecrosis of the jaw. He has developed a pathogenesis theory putting infection and infection associated pH changes in the centre of the focus and collected cell cultural and clinical evidence for this hypothesis. He has also contributed to the clinical implementation of fluorescence-guided surgery for the treatment of MRONJ. Together with the AO research institute in Davos a minipig large animal model for MRONJ was established which could contribute to the further understanding of MRONJ. Together with Springer publishing he has edited the textbook "Medication-related osteonecrosis of the jaw: Bisphosphonates, Denosumab and New Agents".

**Program:** November 26<sup>th</sup>, 2020, 10.15-11.45 (SYMPOSIUM I – Oral cancer and lesions)

## IADR-SEA speakers

### KS5, Professor Murray Thomson



**Current Position:** Department of Oral Sciences, the University of Otago.

**Curriculum Vitae:** Professor W. Murray Thomson is an experienced dental researcher, scientific journal editor and specialist in dental public health. His oral epidemiological and public health research can be divided into the broad domains of: (1) life-course epidemiology and longitudinal research; (2) Gerodontological research; and (3) dental public health and health services research. To date, he has published 377 peer-reviewed research papers and 5 book chapters in the scientific literature, and his Scopus h index is 50. Thomson has been honored with two IADR Distinguished Scientist Awards (the 2010 H. Trendley Dean Memorial Award and the 2014 Geriatric Oral Research Award), and was a co-recipient of the 2016 Prime Minister's Science Award in NZ. Since 2015, he has been Editor-in-Chief of Community Dentistry and Oral Epidemiology. He is also an Associate Editor for the European Journal of Oral Sciences (since 2012). He was Associate Editor for Gerodontology from 2011 to 2014, and Editor of the New Zealand Dental Journal from 2007 to 2014.

**Program:** November 26<sup>th</sup>, 2020, 13.00-14.30 (SYMPOSIUM II- Geriatric Dentistry)

**Title:** Three decades of xerostomia research: what have I learned

**Abstract:** Dry mouth is a distressing, largely intractable condition which has a considerable impact on sufferers' quality of life. It occurs in adults of all ages. For over three decades, Thomson has been conducting research into its measurement, occurrence, risk factors, and impact. In this presentation, he will summarise what he has learnt from that work and consider the various treatment approaches and their challenges.

## IADR-SEA speakers

### KS6, Professor Kazunori Ikebe



**Current Position:** Department of Prosthodontics, Gerodontology and Oral Rehabilitation, Osaka University Graduate School of Dentistry.

**Curriculum Vitae:** Dr Kazunori Ikebe is a Professor and Chair, Department of Prosthodontics, Gerodontology and Oral Rehabilitation, Osaka University Graduate School of Dentistry. He is an experienced dental researcher in geriatric dentistry and prosthodontics. His epidemiological and clinical research on geriatric dentistry encompasses a wide range of oral conditions, such as masticatory disorder and dry mouth, and relationships between oral health and general condition, and oral-health-related quality of life. Ikebe is perhaps best known for his work from the SONIC (Septuagenarians, Octogenarians, Nonagenarians Investigation with Centenarians) Study, with which he has been associated since 2010. This is a multidisciplinary research project focused on the health and longevity of older Japanese; it is conducted not only by dentists but also geriatric physicians, nutritionists, psychologists, and sociologists in Osaka University. Ikebe has been honored with the International Association for Dental Research, Distinguished Scientist Award for Geriatric Oral Research in March, 2015.

**Program:** November 26<sup>th</sup>, 2020, 13.00-14.30 (SYMPOSIUM II- Geriatric Dentistry)

**Title:** Comprehensive approach to health and longevity by the team of psychologists, sociologists, geriatrics physicians, nutritionists and dentists

**Abstract:** Our multidisciplinary project from 2010 focused on the health and longevity of older Japanese conducted not only by dentists, but also nutritionists, psychologists, sociologists, and geriatrics physicians. Therefore, the study was able to evaluate a variety of important factors including variables for dental, dietary, medical, sociological, and psychological domains. Participants were community-dwelling old population identified from the local residential registration. We examine the change of mental and physical health of 70, 80, and 90 years cohorts every 3 year. I will show associations of oral health with physical and cognitive health in older population.

## IADR-SEA speakers

### KS7, Assistant Professor Orapin Komin



**Current Position:** Department of Prosthodontics, faculty of Dentistry, Chulalongkorn University.

**Curriculum Vitae:** Assist.Prof.Orapin Komin, is the full time lecture at the department of Prosthodontics, faculty of Dentistry, Chulalongkorn University. Also she is the course director of the “Geriatric Dentistry and Special Patients Care” the first master course in this field in Thailand founded since 2016. Her research interest is in the field of the Geriatric education, Quality of Life in the dependent elderly people, Oral and Dental care for the dementia elderly and also Prosthodontics treatment in the elderly.

**Program:** November 26<sup>th</sup>, 2020, 13.00-14.30 (SYMPOSIUM II- Geriatric Dentistry)

**Title:** Geriatric Dentistry Education: the next step

**Abstract:** As Thailand is facing with the increasing number of the elderly people, one of the important aspect to prepare for “Longevity age social” is about knowledge, skill and attitude of the health care professional toward the dynamic change of the geriatric group. In 2016, The “Geriatric Dentistry and Special Patients Care” program was first established at faculty of Dentistry, Chulalongkorn University. Up to now, there are 2 generations that graduated from the course. The Information analysis of the patients and students’ evaluation are essential to move from a knowledge-based curriculum to a competency-based curriculum that should be appropriate for the patients’ condition and need, then serve the curriculum requirements. Oral health care in elderly and special patients care requires a multidisciplinary approach, and should encompass oral disease problems, behavior and social context.

# IADR-SEA speakers

## KS8, Professor Wim Teughels



**Current Position:** Professor at the KULeuven and as the vice-head of the Periodontology section of the University Hospitals Leuven

**Curriculum Vitae:** Professor Wim Teughels graduated in 2000 as a dentist at the Katholieke Universiteit Leuven (KULeuven) in Belgium. At the same university, he obtained in 2006 the degree of specialist in Periodontology and he defended successfully his PhD thesis entitled “Microbial Interactions Involved in Bacterial Colonization of Epithelial Cells”. He also received a “European Federation of Periodontology (EFP) certificate in Periodontology”. In 2007, he was a visiting researcher at the University of California at Los Angeles (UCLA) and he was appointed assistant professor at the Faculty of Medicine of the KULeuven. His teaching obligations consist of a variety of subjects within the field of Periodontology and Human Anatomy. Currently, he works as a professor at the KULeuven and as the vice-head of the Periodontology section of the University Hospitals Leuven. His research focuses on Periodontology and oral microbiology with a special emphasis on bacterial adhesion, microbial interactions, antimicrobials and probiotics. His research work has been funded by grants of the KULeuven, Fund for Scientific Research Flanders, NIH (NIDCR) and different companies. This has led to more than 150 publications in international journals and more than 10 chapters in books. He received 5 national and 3 international awards and is frequently invited both nationally as internationally for lectures regarding the concept of “probiotics”. In 2012, Prof. Teughels became an associate editor for the Journal of Periodontal Research and an associate editor for the “Carranza’s Clinical Periodontology” textbook.

**Program:** November 27<sup>th</sup>, 2020, 9.00-10.00

**Title:** Probiotics for oral health: from basic science to clinical application.

**Abstract:** Most oral pathologies originate from dental plaque biofilms. These biofilms are under conditions of oral health in symbiosis with their host. Systemic and environmental factors can drive oral biofilms to a state of dysbiosis resulting in different oral pathologies. Over the recent years, it became clear that next to well known oral pathogens, several members of the oral microbiota are actually protective for oral health. The deliberate clinical application of such beneficial bacteria is known as probiotic therapy. The stimulation of such already present beneficial bacteria is known as prebiotic therapy. This lecture will introduce the concept of probiotics and prebiotics for oral health. It will clarify the rationale behind these therapies, exemplify some modes of action of probiotics and at the end elucidate their clinical effects in periodontal therapy.



## IADR-SEA speakers

### KS9, Professor Shinya Murakami



**Current Position:** Professor and Chair in Department of Periodontology, Osaka University Graduate School of Dentistry and Director of Osaka University Dental Hospital.

**Curriculum Vitae:** Professor Shinya Murakami is Professor and Chair in the Department of Periodontology, Osaka University Graduate School of Dentistry and Director of Osaka University Dental Hospital. Dr. Shinya is a current President of Japanese Society of Periodontology and Director of Japanese Society of Conservative Dentistry. He is a former president of Periodontal Research Group of the IADR: Former president (2012-2013) and a former president of Japanese Division of the IADR (2011-2012). He received several scientific awards including IADR/PRG: Anthony Rizzo Periodontal Research Award (1988), AAP: R. Earl Robinson Periodontal Regeneration Award (2009), IADR/AADR: William J. Gies Award (2012), IADR: Distinguished Scientist Award for Basic Research in Periodontal Disease (2013), IADR/PRG: Award in Regenerative Periodontal Medicine (2018), and AAP honorary membership Award (2019). He serves as an Editor-in-Chief of the J Periodont Res and a member of editorial advisory board of J. Periodontol. And J. Clin. Periodontol.

**Program:** November 27<sup>th</sup>, 2020, 10.15-11.45 (SYMPOSIUM III - Material research in dentistry)

**Title:** New Era of Periodontal Tissue Engineering

# IADR-SEA speakers

## KS10, Associate Professor Oranart Matangkasombut



**Current Position:** Department of Microbiology and Chairperson of Research Unit on Oral Microbiology and Immunology at the Faculty of Dentistry, Chulalongkorn University

**Curriculum Vitae:**

- Associate Professor in Department of Microbiology and Chairperson of Research Unit on Oral Microbiology and Immunology at the Faculty of Dentistry, Chulalongkorn University
- Researcher at Laboratory of Biotechnology, Chulabhorn Research Institute
- PhD (Biological Sciences in Dental Medicine, Harvard University)
- Harvard School of Dental Medicine Dean's scholar award for postdoctoral fellowship at the Whitehead Institute for Biomedical Research
- Fellow of the Royal College of Dental Surgeons of Thailand (Dental Public Health)
- Research interests: oral microbiology, biofilm, Candida, antimicrobial agents for dental applications, chitosan, bacterial toxins, DNA repair, yeast
- Publications: 27 international publications in Scopus

**Program:** November 27<sup>th</sup>, 2020, 10.15-11.45 (SYMPOSIUM III - Material research in dentistry)

**Title:** Exploring Novel Antifungal Strategies for Applications in Dentistry

**Abstract:** Fungal infections, especially that caused by Candida species, are prevalent and systemic infections could be life-threatening in immunocompromised patients. Furthermore, antifungal resistance to current antifungal drugs are increasing worldwide; thus, novel antifungal strategies are in need. Our research explores two promising avenues, ie. the use of chitosan, a natural product with high biocompatibility, and the potential use of DNA repair pathway required for DNA-protein crosslink (DPC) repair as a novel drug target. We showed that certain chitosan derivatives are effective against common oral Candida species and could be used in many dental applications. We employed a chemogenomic approach in the budding yeast *Saccharomyces cerevisiae* to investigate its mechanisms. The results suggest that chitosan may interfere with the functions of the cell membrane. For the repair pathway of DPC, an important DNA damage that could be induced by genotoxic stresses in the hosts, we recently showed that a Wss1 protease in *Candida albicans* is crucial for survival under these stresses. We propose that Wss1 may be a promising novel antifungal target. Further investigation is necessary to examine the role of Wss1 on *Candida* virulence in the hosts.

## KS11, Assistant Professor Joao Ferreira



**Current Position:** Researcher affiliated with Chulalongkorn University and National University of Singapore (on a pro-bono basis).

**Curriculum Vitae:** Dr. Ferreira is a dental clinician and researcher affiliated with Chulalongkorn University and National University of Singapore (on a pro-bono basis). He received his DDS from Portugal in 2001. He then spent 10 years in the USA for clinical and research training in the fields of Orofacial Pain, TMD and Craniofacial Regeneration at the University of Minnesota and UNC-Chapel Hill Schools of Dentistry to complete a residency, Master and PhD programs. While in USA, he spent 3 years at NIDCR/NIH for a postdoctoral fellowship at Dr. Matt Hoffman's laboratory (current NIDCR Scientific Director) to understand the developmental biology of the salivary gland and gene editing approaches for xerostomia treatment; after which, he started his educational and research work in academia in 2014 focusing on bioprinting the salivary gland at the National University of Singapore. In 2018, he moved to Chulalongkorn University Faculty of Dentistry to be the leader of the Exocrine Gland Biology and Regeneration research group at Chulalongkorn University (CU-EGBR) together with Drs. Thanaphum Osathanon, Risa Chaisuparat, Supansa Yodmuang and Nuttha Klincumhom. This is a STAR research group aiming to advance the understanding and treatment of ageing-related disorders that affect salivary glands and other exocrine glands in humans and animals. This group is composed of a multidisciplinary research team based on the One Health concept with expertise in stem cell and developmental biology, pathology, dentistry, veterinary sciences, biomedical engineering and bioprinting. This diverse expertise allows our group to develop sustainable biotechnology platforms of in vitro mini-organs (organoids / organs-on-chips) for drug discovery and to unveil disease mechanisms. The creation of such platforms will also enable researchers to follow the 3Rs principles of Animal Welfare (Replacement, Reduction and Refinement). Our ultimate goal is to improve the understanding and treatment of oral dryness and dry eyes. Dr. Ferreira has received several research awards, including the IADR Wrigley Salivary Research Award for Dental Scientist (2014) and other academic awards from: NUS Office of the Vice-President for Global Relations (2015), the Freedland Advanced Dental Education Fellowship Award and other Research Awards at UNC (2010-2011), the University of Washington (2011), the Karolinska Institute and the University of Minnesota (2007). He is the recipient of more than 10 research grants from the USA, Portuguese Government, Singapore Government, National University of Singapore, Chulalongkorn University and most recently the National Research Council of Thailand. These grants have generated publications in journals such as Biomaterials, Stem Cells, Tissue Engineering, Molecular Therapy, Journal of Dental Research, among others.

**Program:** November 27<sup>th</sup>, 2020, 10.15-11.45 (SYMPOSIUM III - Material research in dentistry)

**Title:** Bioprinting Salivary Gland Organoids: fact or fiction?

**Abstract:** Salivary gland hypofunction is commonly diagnosed in head and neck cancer patients due to salivary gland (SG) epithelial injury in the acinar secretory compartment after radiotherapy. Regenerative medicine has fetched the opportunity to replace or regenerate the SG epithelia and restore its secretory function through facilitating the neuro-epithelial communication. Early adult stem cell transplantation strategies in rodents have recently shown to improve clinical outcomes in radiotherapy-induced xerostomia in Phase 1/2 human trials. Mesenchymal stem cells from adipose tissue are the most promising, although the ones from the labial mucosa, bone marrow, or dental pulp have an attractive therapeutic value after successful findings in ex vivo and in vivo mouse models of SG injury. Emerging approaches using cell-free therapy with cell "extracts", "soups" or secretome components also exhibit favorable outcomes in the same rodent models. When compared to cell-based approaches, extracellular vesicles (EV) from the secretome (i.e., exosomes) can be easily extracted, quantified, and are more stable for long-term storage and use in SG tissue engineering. Additive manufacturing and three-dimensional bioprinting or magnetic bioassembly have an important role on generating mini-organs or organoids for cell transplantation to ameliorate SG injury. In 2017, our lab has generated for the first time bio-printed innervated organoids from human dental pulp stem cells with neural and epithelial functional properties. Moreover, organoids can secrete EV, which may have a therapeutic potential worth to explore in future studies. In this talk, we will describe the technological advancements in 3D bioprinting for the biofabrication of functional innervated SG organoids and challenges of these different cell-based and cell-free EV strategies in SG tissue engineering and regeneration.

# SEAADE 2020 Presentation Schedule

**Tuesday, November 24<sup>th</sup>, 2020**

**12:00 - 13:30**

**Competition Session 1**

**Virtual Room 1**

<b>Presenter</b>	<b>Abstract No.</b>	<b>Title</b>	<b>Page</b>
Mas Suryalis Ahmad	SEA01	Sign language communication training: Impact on students' empathy, learning experiences and attitude	46
Siti Nur Asfarina Khairul Nizam	SEA17	Influence of Multiple Factors on Development of Burnout Syndrome among Clinical Dental Students	61
Lisa Amir	SEA27	Evaluation of Full Distance Learning during COVID-19 Pandemic in the Undergraduate Dentistry Program	69
Gabriel Lee	SEA13	Is the pedagogy of caries risk assessment still appropriate for the millennial dental student?	57
Indriasti Indah Wardhany	SEA37	Identifying diagnostic error using DEER Taxonomy in Indonesian dental student	79
Melissa Adiatman	SEA38	Modifications in Community-Based Dental Education (CBDE) for Dental Students during Covid19	80

**Tuesday, November 24<sup>th</sup>, 2020**

**14:00 - 15:30**

**Competition Session 2**

**Virtual Room 1**

<b>Presenter</b>	<b>Abstract No.</b>	<b>Title</b>	<b>Page</b>
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Friday, November 27<sup>th</sup>, 2020

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## Sign language communication training: Impact on students' empathy, learning experiences and attitude

Mas Suryalis Ahmad, Aida Nur Ashikin Abd Rahman,  
Noor Nazahiah Bakri, Aminda Faizura Omar Khan

Faculty of Dentistry, Universiti Teknologi MARA, Malaysia

**Objectives:** This study investigated the impact of the Sign Language Communication (SLC) training on students' empathy, attitudes towards people with disability (ATDP), and their learning experiences.

**Methods:** 28 students participated in the SLC program. Participants answered the validated Toronto Empathy Questionnaire (TEQ) and the ATDP survey, pre- and post-intervention. Participants also wrote their perceptions of learning experiences in a reflective journal. Data were consecutively analysed via T-test (quantitative) and thematic analysis (qualitative).

**Results:** Participants showed a significant increase in TEQ mean score in total and for 9 individual items, and mean ATDP scores. They perceived that the training improved disability awareness, allowed development of some skills, and enhanced their personal values and beliefs.

**Conclusion:** The SLC training program is effective in enhancing dental students' empathy and ATDP, while providing positive learning experiences in many aspects.

## A multi-centre study of dental curricula: The views and experience from final year dental students

Simon Guan<sup>1</sup>, Peter Mei<sup>1</sup>, May L Mei<sup>1</sup>, John Won<sup>1</sup>, Yvonne Lai<sup>2</sup>,  
Sobia Zafar<sup>3</sup>, Tristan Ma<sup>1</sup>, Murray Thomson<sup>1</sup>

<sup>1</sup>University of Otago

<sup>2</sup>University of Adelaide

<sup>3</sup>University of Queensland

**Objectives:** This study evaluated and compared dental curricula delivered in four universities from different Asia/Pacific countries, including New Zealand, Australia and Hong Kong (China).

**Methods:** The multi-centre cross-sectional design utilised semi-structured interviews.

**Results:** Interviews were conducted with sixty final-year dental students, and five main themes were extracted from the interviews: (1) the definition of an “ideal” dental curriculum, (2) theoretical teaching, (3) transitional tools, (4) assessment, and (5) grading.

**Conclusion:** The findings provide a glimpse into final year students’ views of dental curricula and suggestions on possible areas of reform in the dental curriculum. Further investigations are necessary to provide a curriculum that enables students to become competent, future-ready dental practitioners.







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SEA04

## The student-centered approach for teaching research methodology

Anjalee Vacharaksa

Faculty of Dentistry, Chulalongkorn University, Thailand

Chulalongkorn Dental School has valued adaptive changes and learning innovation. Among many improvements, “Research Methodology for Postgraduate Study” demonstrates a major modification that encourages student-centered learning. Skills in research methodology is mandatory for both undergraduate and graduate level. However, students always have difficulty in understanding how to do research, even after repeated classes. At some extent, this problem is solved by changing the teaching approach and improving the level of understanding according to Bloom’s taxonomy. The presentation describes how we have gradually implemented project-based learning to replace the traditional classroom lectures, and currently implement the full online resources to enhance student-centered learning in the COVID19 situation. Students demonstrate positive behavior changes with better outcomes.



## Obstacles in the Global Citizenship in Dentistry: Students' perspective.

Ollie Yiru Yu, Chun-Hung Chu

The University of Hong Kong (HKU)

**Objectives:** To explore the obstacles in the 'Global Citizenship in Dentistry' program (GCD) from the students' perspective and their suggestions to enhance it.

**Methods:** Year-2 dental students who have completed the GCD in 2018-2019 from the University of Hong Kong were invited to participate in a focus group discussion. Their responses were collated.

**Results:** Nine students joined the discussion. They indicated the obstacles could be the limited period of GCD, the unenthusiastic response from groupmates, delays of the replies from peer students, and no access to other groups' works. Suggestions to remove these obstacles included extending the program span, providing pre-course motivation, and enhancing the website.

**Conclusion:** Students indicated that motivating the students, extending the period of knowledge exchange, enhancing communication between students, and optimizing the website platform were essential to foster learning experiences and learning outcomes of the GCD.

## Increased Dental Students' Acceptance of a Sculpting Software Using a Pen Mouse During COVID-19

Junhel Dalanon<sup>1</sup>, Rodivick Docor<sup>1</sup>, Rozzano Locsin<sup>2</sup>,  
Kazuo Okura<sup>2</sup>, Yoshizo Matsuka<sup>2</sup>

<sup>1</sup>School of Dentistry, Southwestern University PHINMA

<sup>2</sup>Tokushima University

**Objectives:** This study compared the level of acceptance of dental students in using a virtual 3D sculpting software (VSS) using a pen mouse (PM) as opposed to using a regular mouse (RM) during the COVID-19 pandemic.

**Methods:** Dental students (n=20) were purposely recruited to participate in this exploratory study. Over a week-long modular program, the participants were introduced to a VSS and used it in sculpting teeth models. Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) were gauged via an online survey based on the Technology Acceptance Model (TAM) questionnaire.

**Results:** This study found that dental students had a higher PU in using a VSS with a PM than an RM,  $t(18)=5.72$ ,  $<0.001$ . The PEOU in using a VSS showed similar results as well. Higher acceptance was seen in participants that used a PM than those that used an RM,  $t(18)=7.49$ ,  $<0.001$ .

**Conclusion:** The dental students perceived greater acceptance in using a VSS with a pen mouse as opposed to using a regular mouse.

## SEA07

# Practice with Evidence: Writing Across Different Academic Cultures Through Dental Wikipedia

David Chieng, Nishyantini, Prof. Allan Pau Kah Heng, Dr. Umer Daood

International Medical University, Malaysia

**Objectives:** Dental Wikipedia projects are managed under “Wikipedia Collaboration of Dental Schools” which is a student-led initiative supported by Cochrane.

**Objectives:** To improve the accessibility of evidence-based information through Dental Wikipedia and enable the online community to work collectively.

**Materials and Methods:** Each of the students (n=1) were allocated to a group of participants (n=41). Each groups were given specific topics of Wikipedia pages which were required for editing within seven months. Non-quantitative systematic reviews and book chapters were used to examine the literature and synthesize all relevant information to formulate the best approach to diagnosis or treatment of Haemophilia A, B and von willebrand disease and its oral manifestations.

**Results:** Following the standardized guideline, the articles published were accurate.

**Conclusion:** Editing for Dental Wikipedia provided accurate updates on selected topics to provide readers with powerful summaries.



## Evidence - based dentistry: A Wikipedia perspective

Nishyantini Ramesh, Dr Umer Daood

Faculty of Dentistry, International Medical University, Malaysia

**Objectives:** Dundee Dental Wikipedia Editing Project was launched by Dundee Dental School with support from Cochrane Collaboration motivated by the lack of updated dental evidence-based information on Wikipedia.

**Objectives:** The aim of this project was to provide new information on glass ionomers and its restorative use as a permanent material, for publishing on Wikipedia. Methods: The article focused on the suitability of glass ionomer cement as a permanent material with evidence from systematic reviews, secondary research, and guidelines. New information was edited into the existing Wiki page.

**Results:** This collaborative project promoted the dissemination of dental information on certain topics with high confidence in evidence. An essential part of the review process was differentiating good research from bad and leaning on the results of the better studies.

**Conclusion:** Wikipedia provided reliable information with recent evidence.



## SEA09

# Clinical Audit Cycle: A Vital Tool in Dental Education

Jacklyn Ng Zhi Ling, Esther Kok Sook Kuan, Sugunadevi Rajendran,  
Michelle Kher Wei Chua, Jenny Fong Yi Ming, Allan Pau, Abhishek Parolia

International Medical University, Malaysia

**Objectives:** To evaluate the effect of clinical audit on record keeping, technical quality of root canal therapy(RCT) and endodontic success performed by dental undergraduates.

**Methods:** Retrospective 6 clinical audits were done by evaluating the record keeping and technical quality of 740 RCT performed by undergraduates from July 2012 to July 2018. These were evaluated against the criteria defined by European Society of Endodontology. Patients were recalled to assess the overall endodontic success. Data were statistically analysed using the chi-square test( $p < 0.05$ ).

**Results:** Compliance with record keeping showed improvement from 44.1%(2012) to 100%(2018)( $p < 0.05$ ). There were significant differences in technical quality of RCT from 44.7%(2012) to 72.7%(2018)( $p < 0.05$ ). Overall endodontic success showed improvement from 50.1% to 66.7%( $p < 0.05$ ).

**Conclusion:** Clinical audit helps improve the quality of record keeping, technical quality of RCT and endodontic outcome performed by dental undergraduates.





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SEA10

## Practice on MOOG Simodont® dental simulator improve psychomotor skills for dental students

Mekkapruet N., Thaweechumpol K., Banyam J, Vacharaksa A.

Faculty of Dentistry, Chulalongkorn University, Thailand

The practice to increase psychomotor skills is important for confident levels in the dental students. This study aims to investigate whether a practice on MOOG Simodont® dental simulator can improve psychomotor skills and self confidence. All participants were pre-tested, then learned how to do tooth preparation and required instruments from the video clip. Some participants practiced on MOOG Simodont® (practice group), but the control group had no practice. Participants then performed class II cavity preparation on a plastic tooth followed by O'connor post-test. The results demonstrated that psychomotor skills improved significantly ( $P < 0.05$ ). Tooth preparation score revealed that the 3rd year student's skill was significantly better after MOOG Simodont® practice ( $P = 0.038$ ). In conclusion, the practice on MOOG Simodont® dental simulator improved preparation skills and confidence score.





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SEA11

## PBL Goes On-line in Cambodia

Rithvitou Horn, Callum Durward

University of Puthisastra

**Background:** students in year 3 at University of Puthisastra (UP) were forced to study online due to the Covid-19 pandemic.

**Objective:** to investigate students' perceptions of studying PBL online.

**Methods:** Year 4 students completed an online survey (Google Forms) about their experiences of doing PBL online.

**Results:** 94.8% agreed that on-line PBL was a positive experience, and 89.7% agreed that they learned a lot during the course. 87.2% agreed they were able to access the resources they needed to research the problems, and 61.6% preferred online PBL to face-to-face PBL. However, 94.8% sometimes had an internet connection problem, and only 25.6% believed that communication and teamwork between group members were good.

**Conclusion:** Overall students found online PBL to be a positive learning experience, however a poor internet connection was identified as being a problem.





## **Evidence Based Dentistry–Knowledge, Practice, Attitude, Confidence among dental students**

Avita Rath, Priyadarshini HR, Bennete Fernandes, Preena Sidhu,  
Ahmed Termizi Bin Zamzuri

SEGi University

**Objective:** This study aimed to explore the knowledge, attitude, practice of dental students in Malaysia, towards Evidence-based dentistry (EBD).

**Methods:** The cross-sectional study was carried out on 645 final year dental students from 13 dental schools in Malaysia. All the students were invited to complete a questionnaire administered electronically. Data was analysed using SPSS ver 22 and expressed as percentage.

**Results:** Of the registered students, 526 completed the questionnaire, yielding a response rate of 81.5%. About 40% of them had conventional curriculum; 60% had integrated curriculum. While about 93% knew about EBD, only 58% had undergone formal training in it. Lack of training in critical appraisal was identified as the barrier for EBD practice (42.6%). More than 90% were willing to have EBD training if provided.

**Conclusions:** Malaysian dental undergraduate students are aware of EBD and are willing to undergo training to learn it better. However, more training is required to make them confident in its application.



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## SEA13

# Is the pedagogy of caries risk assessment still appropriate for the millennial dental student?

Gabriel Lee, Lee Yun Hui, Charlene Goh

Faculty of Dentistry, National University of Singapore

Caries risk assessment (CRA) has been an integral part of NUS Faculty of Dentistry's curriculum since the mid-2000s. However, a comprehensive translation of concepts from didactics to clinical application has been less than expected. All 54 graduates of 2020 were invited for a focus group discussion with ten participating. Data was analysed using thematic analysis. Three major categories were identified: applicability and usefulness of CRA, willingness to utilise Cariogram, concretising concepts via case discussions. Participants expressed that CRA concepts inform treatment planning. They felt Cariogram is easy to administer but do not routinely do so, citing limited clinical time and that the results may not significantly change preventive advice as key barriers. Participants also found that case discussions with staff outside of clinical time help concretise concepts, but were in favour of conducting this in the 3rd year when starting clinics rather than as a final year assessment.



## The Impact of Clinical Teacher: The Dental Students' Perception

Syahirah Mohd Zol, Nur Amni Noor Affendy, Nagham M. Al-Jaf ,  
Mohamed Ibrahim Abu Hassan, Hazlina Abdul Ghani , Indah Yuri  
Noviaranny

Faculty of Dentistry, UiTM

**Objectives:** To evaluate the impact of the clinical teachers and the effectiveness of their supervisory skills in clinical settings from the dental students' perception using the cognitive apprenticeship model.

**Methods:** A total of 273 undergraduate clinical dental students, from Faculty of Dentistry UiTM, were asked to complete the modified and validated Maastricht Clinical Teaching Questionnaire (MCTQ) which consists of twenty-seven questions distributed on seven domains. The responses were descriptively analyzed.

**Results:** 162 students responded. Most students conveyed positive and neutral perceptions of their clinical experience in all seven domains. Articulation domain showed the highest positive feedback (93.5%) while the general learning environment domain showed the highest negative feedback (28.1%).

**Conclusions:** The clinical experience was mostly satisfactory. Further improvements of the clinical environment can be achieved regarding the areas of concern.



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SEA15

## Effect of various e-learning tools for the interpretation of Dental Panoramic Tomography

Swarna Yerebairapura Math, Preena Sidhu, Kirti Saxena,  
Omer Sheriff Sultan

International Medical University

**Objectives:** Evaluation of e-learning tools in the interpretation of Dental Panoramic Tomography (DPTs) among final year dental undergraduates.

**Methods:** Two e-learning tools: Articulate Storyline and Interactive Case-Based Learning module were developed. Knowledge and communication skills were assessed by Objective Structured Radiographic Interpretation and mini- Objective Structured Clinical Examination using Likert scale.

**Results:** Intra group comparison was done using Wilcoxon Signed rank test. The scores of knowledge and communication skills showed statistically highly significant difference between the time intervals ( $p < 0.01$ ) with higher values at post-test than pre-test for all the DPTs, except one DPT where there was a statistically non-significant difference between the time intervals ( $p > 0.05$ ). Student's feedback was analyzed qualitatively.

**Conclusion:** Using these tools, student's DPT interpretation skills advanced from unorganized and inconsistent to systematic and consistent.



## Current and Future Teaching of Direct Posterior Composites: A Survey of Dental Schools in Malaysia

Preena Sidhu<sup>1</sup>, Omer Sultan Sheriff<sup>1</sup>, Swarna Yerebairapura Math<sup>1</sup>,  
Normaliza Ab Malik<sup>2</sup>, Umer Daood<sup>1</sup>, Nairn H F Wilson<sup>3</sup>,  
Christopher D. Lynch<sup>4</sup>, Igor R. Blum<sup>5</sup>

<sup>1</sup>School of Dentistry, International Medical University

<sup>2</sup>Universiti Sains Islam.

<sup>3</sup>College of General Dentistry.

<sup>4</sup>Cork University Dental School & Hospital.

<sup>5</sup>King's College London

**Objectives:** To Investigate teaching of posterior composite restorations in undergraduate curricula in Malaysian dental schools.

**Methods:** A questionnaire relating to teaching of posterior composites was emailed to all 13 dental schools in Malaysia. Responses were analyzed.

**Results:** 43 questionnaires were returned providing a 100% response rate. Didactic teaching time dedicated for composites was greater than amalgam (42% vs 33%). Clinically, most of posterior restorations placed by students are composites (74.1%). 25.9% respondents reported teaching amalgam. Slot-type-cavities are commonly taught (80%) and most schools (67%) teach use of rubber dam isolation. Adverse reaction (77%) was most common contraindication to composite placement.

**Conclusion:** Increasing trend in teaching of posterior composites seen in other countries is echoed by findings from Malaysian dental schools. However, use of amalgam is still taught. Future studies are required to investigate phase down of amalgam.



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## Influence of Multiple Factors on Development of Burnout Syndrome among Clinical Dental Students

Siti Nur Asfarina Khairul Nizam, Nurul Syakirah Bohari,  
Norhasnida Nordin, Nik Rahayyu Nik Zulkifeli

Universiti Teknologi MARA (UiTM), Sungai Buloh Campus

**Objectives:** To study the prevalence & identify the factor contribute to Burnout Syndrome in clinical dental students of UiTM Sungai Buloh.

**Materials & method:** Questionnaire was adapted from Maslach Burnout Inventory-Student Survey which subdivided into emotional exhaustion, depersonalization & personal achievement. Sociodemographic questions was formulated for the study. 238 clinical dental students participated in this study.

**Results:** Response rate was 95.2% & findings showed 78.15% experienced high level of emotional exhaustion, 51.26% experienced severe depersonalization & 65.97% experienced lack of personal achievement. Fifth year students showed high level in emotional exhaustion. Male students showed severe depersonalization.

**Conclusion:** Emotional exhaustion was the factor affecting fifth year students of UiTM Sungai Buloh. Preventive measures focusing on emotional aspect should be proposed to reduce the prevalence of burnout syndrome among clinical dental students.



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SEA18

## Curriculum Crosswalk of the Entrustable Professional Activities for Dental Graduates

Sivakumar Arunachalam, Allan Pau Heng,  
Vishna Devi Nadarajah, Muneer Gohar Babar

International Medical University, Malaysia

**Objectives:** Entrustable professional activities (EPAs) are activities that a professional may be entrusted to perform at specified levels of supervision. This paper aimed to identify EPAs relevant to undergraduate dental training.

**Methods:** A dental faculty task force was convened to draft EPAs statements based on and mapped to the nationally determined minimum (MCE) and expected clinical experience (ECE) in Malaysia. Learning outcomes were formulated and adapted to each EPA and further aligned to 'The Competencies of New Dental Graduates'.

**Results:** Ten EPAs and 41 observable professional activities (OPAs) were identified and mapped to MCE/ECE. Competencies with knowledge, skills and attitude attributes for each EPA that are required of learners in order to demonstrate competence were detailed.

**Conclusion:** An EPA map for dental graduates may be identified from a curriculum crosswalk. EPAs assessment may be investigated for its utility in making judgements on graduate work preparedness.





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SEA19

## Development of an online assessment in dental education- A New normal Experience!!

Priyadarshini HR, Daniel Devaprakash Dicksit,  
Ahmad Termizi bin Zamzuri, Rozaidah binti Talib

Faculty of Dentistry, SEGi University

**Objectives:** To obtain students' feedback on online assessment, designed and implemented by the faculty during COVID-19 lockdown

**Methods:** An online examination for Semester I assessment was formulated and administered online via Blackboard software. About 230 students from Year 1 to Year 5 took up the online assessment. A questionnaire was sent out using Google survey to provide feedback. Results were expressed descriptively as percentage.

**Results:** About 80% of the students felt that sitting for online tests was as smooth as the conventional face to face paper in class. Out of the remaining who did not find the online tests so easy, about 44% felt that they were slow in typing, 30% had problems with internet, and 11% could not get privacy. About 60% of the students felt that they required more time for an online paper.

**Conclusion:** We found that online assessments was a feasible alternative.





## Developing an electronic clinical progress monitoring system for undergraduate dental students

Niekla Survia Andesta, Naveen Njanendrappa, Spoorthi Ravi Banavar, Rohit Kunnath Menon, Muneer Gohar Babar, Zabibah Ibrahim, Allan Pau

School of Dentistry, International Medical University, Malaysia

**Objectives:** To develop an electronic clinical progress monitoring system for dental undergraduates.

**Methods:** A framework for recording students' logged clinical experience, competency tests evaluation and clinical practice assessment was developed by a faculty taskforce. This was translated to an electronic platform using MOODLE, an open-source Learning Management System (LMS). Feedback was obtained on user-friendliness and fit for purpose.

**Results:** The response rate of the survey was 84% (47/56), of whom, 92% preferred the developed electronic system over the paper method. 94% reported the new system to be beneficial and useful. Faculty supported the electronic paperless system as all necessary information can be captured easily and securely.

**Conclusion:** An electronic clinical progress monitoring system was developed using an open-source LMS. Automation of this monitoring process is achievable with little cost and is beneficial to dental schools in low income countries.





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## Online Instructional Video for Skills Acquisition and Self-directed Learning-Tell How to Show How

Liang Lin Seow, Pravinkumar Patil, Mandakini Mohan

International Medical University, Malaysia

**Introduction:** Acquisition of psychomotor skills is essential in attaining clinical competence for dental students. This innovative delivery enables students to acquire prosthodontic skills in crown preparation and provisional crown via online platform.

**Objectives:** To assess the acquisition of practical skills using online videos versus live demonstration.

**Methods:** Third year students were divided into two groups- i) face-to-face live demonstration (F2F), ii) online instructional video (OIV). After the teaching activity, students performed the tasks and conducted self-evaluation. Two prosthodontists evaluated the students' work independently.

**Results:** There was no difference in the student's performance for F2F and OIV group. No difference between the prosthodontists' evaluation and the student's self-evaluation for the tasks.

**Conclusion:** Students were able to acquire advance practical skills via online platform. Students can learn on their own pace and personalized their learning.





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## E-learning in the time of COVID-19 and its future impact: Perspectives of dental educators

Charlene Enhui Goh<sup>1</sup>, Lim Li Zhen<sup>1</sup>, Andre Matthias Mueller<sup>2</sup>,  
Wong Mun Loke<sup>1</sup>, , Gao Xiaoli<sup>1</sup>

<sup>1</sup>Faculty of Dentistry, National University of Singapore

<sup>2</sup>Saw Swee Hock School of Public Health, National University of Singapore

The COVID-19 pandemic has resulted in an unprecedented and rapid shift to e-learning. This qualitative study aimed to investigate the perspectives of dental educators towards e-learning, and to explore the impact of this experience on their future adoption of e-learning. In-depth interviews with 15 dental educators from National University of Singapore were conducted over Zoom. Audio-recordings were transcribed verbatim and subjected to thematic analysis. Challenges faced include the loss of feedback to assess student understanding and inability to adapt their teaching. Self-motivation of the target audience, class size, type of teaching and complexity of the material were identified as factors influencing the suitability of the e-learning format. The COVID-19 experience stimulated educators' reflection on the potential of e-learning and its future adoption, which can be enabled through further investment, institutional support and curriculum redesign.



## The effect of grading scheme determined by a different standard setting method in dental assessment

Aida N. Abd Rahman<sup>1</sup>, Izyan H. Baharuddin<sup>1</sup>, Mohamed-Ibrahim.  
Abu-Hassan<sup>1</sup>, Sally J. Davies<sup>2</sup>

<sup>1</sup>Universiti Teknologi MARA

<sup>2</sup>Faculty of Life Sciences and Education, University of South Wales, Cardiff, Wales, United Kingdom

**Objective:** This study aims to compare the effect of grading scheme modification to suit the passing marks determined by conventional, norm reference and modified Angoff standard-setting methods for a final year dental examination.

**Methods:** Results of final year dental students consisted of 30 MCQ, 10 SAQ and 10 OSCE were subjected to the norm reference method of standard setting (mean minus 1 SD). A modified Angoff standard-setting was carried out by a panel of ten experienced academicians. Comparison of the grades obtained by students using different standards was made for conventional standard (50%), modified Angoff and norm-referenced standard.

**Results:** Pass score was set at 59.3% using mean minus 1 standard deviation for norm-referenced, 54.61% for modified Angoff and 50% for absolute standard. Conclusion: There were significant differences in the outcomes of student's achievement comparing these three standard-setting methods ( $P < 0.05$ ).



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## Game based Interactive case studies in learning endodontic diagnostic skills - A case study

Sylvia Western J

SEGi University, Malaysia

**Background:** Teaching a diagnostic skill is challenging due to its complex nature. Literature advocates the use of patient simulations in the form of computer-based programs in teaching endodontic diagnosis.

**Objective:** To evaluate students' perceptions and experiences in using computer based interactive case studies in learning endodontic diagnosis using questionnaire method.

**Method:** An interactive gaming platform consisting of six endodontic patient management problems of varied difficulty levels were created. The game was designed to provide constructive feedback at every turn of decisions, till the right diagnosis was reached. At completion, 50 year 4 BDS students were administered a questionnaire to gauge their attitude, acceptability, and perceived benefits.

**Results & Conclusion:** Preliminary results showed that students found it interesting and informative. Perceived benefits related to fidelity of case studies, constructive feedback given and translation to clinical practice.





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## Evaluation of Full Distance Learning during COVID-19 Pandemic in the Undergraduate Dentistry Program

Lisa Amir, Ira Tanti, Diah Ayu Maharani, Yuniardini Wimardhani, Vera  
Julia, Benso Sulijaya, Erik Idrus, Ria Puspitawati

Faculty of Dentistry Universitas Indonesia

**Background:** [1] Evaluate student perception of distance learning (DL) compared to classroom learning (CL); [2] DL impact on first-year student understanding of learning outcomes of basic dental science (BDS) course.

**Methods:** Online questionnaires was given to undergraduate dental students at the Faculty of Dentistry Universitas Indonesia.

**Results:** Three hundred and one dental students participated in the study, with 83.4% response rate. First-year students have a higher preference towards DL compared to their seniors. Challenges during DL were categorized as external factors such as unstable internet connection and internal factors as student readiness to the new learning method. Student understanding of BDS course was lower in DL.

**Conclusion:** Despite some challenges, undergraduate dental students could adapt to the new learning method. This current COVID-19 pandemic, changes not only the utilization of technology in education but the pedagogy strategies in the future.





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## Stigma: Needs to Revisit HIV Education for Dentistry Student?

Yuniardini Septorini Wimardhani,  
Indriasti Indah Wardhany; Lila Fairuz Febriyanty

Department of Oral Medicine, Faculty of Dentistry Universitas Indonesia

Stigma from health professionals would restrain people living with HIV/AIDS (PWLHA) to gain access to treatment and influence their quality of life. We performed a study to identify the stigma towards PWLHA in 1400 students of Faculties of Medicine, Dentistry, and Nursing at the Universitas Indonesia. The level of stigma related to personal or cultural beliefs, knowledge, and clinical interaction with PWLHA were analyzed. Overall, students had low stigma for all domains. Each domain's score was significantly differed by age, year of entry, and faculty. Surprisingly, the level of stigma from students from the Faculty of Dentistry was higher compared to others and it was not differed by all students' characteristics. The results of this study encourage the need to revisit dental curriculum related to HIV education for the dental students. Innovative learning methods to improve student knowledge and to increase clinical exposure should be explored.





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## Pandemic strategies: “Think Aloud” in Small TEAMS to “Think Alike”

Rohit Kunnath Menon, Shekhar Bhatia,  
Shivani Kohli, Ranjeet Bapat, Allan Pau

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

**Objectives:** To develop clinical reasoning skills in undergraduate dental students through an online “Think Aloud” activity.

**Methods:** A “Think Aloud” online synchronous session was conducted by a clinician where the steps for peripheral moulding was demonstrated using images via Microsoft TEAMS. In the second session (1 week later) each student “Thought aloud” and demonstrated one part of the clinical procedure. The second session was conducted in small groups (9/group) by four standardized facilitators. Feedback was collected.

**Results:** The response rate for the feedback survey was 94 % (33/35). Amongst the respondents, 97 % responded that the first session enabled them to gain a clear insight regarding the procedure. 91 % found the method to be effective in learning clinical procedures in an online format.

**Conclusion:** Online “Think Aloud” sessions in small groups may be used to augment other learning activities during the pandemic-induced limitations in face to face teaching.





## Application of removable prosthodontics laboratory training in general dental practice

Shivani Kohli<sup>1</sup>, Ashwin Kumar Sukumar<sup>2</sup>

<sup>1</sup>International Medical University

<sup>2</sup>MAHSA University

**Objectives:** To evaluate the application of removable prosthodontic laboratory training in general dental practice and its relevance in undergraduate curriculum.

**Method:** A descriptive questionnaire was developed to assess practice of taught removable prosthodontic laboratory procedures in the general dental practice. This cross-sectional survey was conducted among general dental practitioners and responses were statistically analyzed using Chi Square test.

**Results:** 357 general dental practitioners participated. 91% with 20 years of dental practice responded positively on the application of prosthodontic training in their practice. 55.7% with two years of training agreed to dedicate more time to clinical prosthodontics training.

**Conclusion:** As 95.8% respondents performed removable prosthodontic procedures in their practice, there is a need for enough clinical exposure to make them good denture service provider. Hence, there is a need to revisit removable prosthodontic curriculum.





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## Innovation of Online Anatomy Practicum Class during the COVID-19 Pandemic

Wita Anggraini, Annisaa Putri A.Nasution, Ary Indrawati

Faculty of Dentistry, Trisakti University

Understanding in the learning resources from human remains plays an essential role in the field of anatomy to support the application of medicine. Cadaver is the 'First Teacher' for medical and dental students to study further about human anatomy. Using Cadaver as a learning tools helps educating and improving student's sensitivity in human values, empathy and professionalism since early stage. However, the outbreak of COVID-19 in Indonesia has changed the way of anatomical teaching practicum which at the beginning, teaching hour was held in anatomy laboratory then now, it was turned into an online practicum class. During learning from home period, we modified the teaching method in online practicum class by combining the theory, video demonstration, animation, structured assignments and quizzes, and photos taken from the prosection of cadaver specimens and anatomy atlas. The innovation in online practicum class was able to be implemented and justified.





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## Online dental wax carving teaching, A challenge in COVID19 pandemic era

Rosalina Tjandrawinata, Deviyanti Pratiwi,  
Dewi Liliany Margareta, Octarina

Faculty of Dentistry Trisakti University

**Objective:** The purpose of this study is to find the results of theory of dental anatomy and practice of dental wax carving through on line education method during covid19 pandemic era.

**Methods:** First grade dentistry students (156) were taught to understand tooth anatomical form, then they were guided to carve tooth form on the wax block. Direct supervision was done through photographs and videos sent through whats app application. The success rate in understanding tooth theory and carving is by achieving a minimum mark of C.

**Results:** The percentage of theoretical scores obtained are A 36%, B 41%, C 13%, Failure 10%; while practical scores are A 7%, B 51%, C 25%, Failure 17%. Paired t test showed significant difference ( $p < 0.05$ ) between theory and practical result, while Pearson correlation showed weak correlation between both result ( $r^2 = 0.43$ ).

**Conclusion:** In the long-distance training of dental wax carving in accordance with guidance and good supervision has demonstrated good result.

## The Correlation between dental environment and perceived stress scale during COVID-19 pandemic

Josephine.H, Astoeti.T.E, Sudhana.W

Faculty of Dentistry, Trisakti University

**Objective:** This study was to analyze the correlation between dental environment and perceived stress in dental students during Covid-19 pandemic.

**Methods:** Respondents were 422 undergraduate dental students. This study used validated Modified Dental Environmental Stress and the Perceived Stress Scale questionnaires.

**Results:** Five dental stressors were noted as greatest stressors with strongest correlation with students' perceived stress scale ( $p > 0.40$ ) which include the items Expectation towards dental school ( $p = 0.431$ ), Lack of confidence to be a successful dentist ( $p = 0.424$ ), Lack of confidence to become a successful dental student ( $p = 0.408$ ), Dental school regulations ( $p = 0.401$ ) and Criticism received regarding school work ( $p = 0.400$ ). Overall, dental students displayed moderate perceived stress score.

**Conclusion:** The overall findings of this study showed a positive correlation between the dental environment with the perceived stress of the dental students ( $p = 0.52; p < 0.01$ ).

## The Imaginary Virtual Case as One of Solution for Oral Medicine Competency during Pandemic Covid-19

Rahmi Amtha, Indrayadi Gunardi, Tri Erri Astoeti

Universitas Trisakti

**Background:** During the Covid-19 pandemic all learning program should be done by online method, thus oral medicine teaching was changed into a real-time virtual patient (PVR), supplemented by case picture and video recording of student's performance.

**Objective:** The aim of this study is to analyse the effectiveness of the imaginary virtual case as one of a solution for competency fulfilment a clinical programme in oral medicine field during pandemic Covid-19.

**Method:** 168 dental students were categorized into three groups (A. using a real patient; B. PVR; C. patients and PVR) are evaluated by validated questionnaire. ANOVA was used to analyse between groups. Result: Mean A group was 72.5+10.1, B 69.3+11.6 and C 74.0+11.5. No significant difference was found between groups ( $p=0.35$ ).

**Conclusion:** The teaching method using online PVR might be an alternative solution, as equal as using a real patient and useful to enhance knowledge and skill in the oral medicine field.



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## Covid-19 and Dental Educational Reform at Prince of Songkla University, Thailand

Supitcha Talungchit<sup>1</sup>, Suchit Poolthong<sup>2</sup>

<sup>1</sup>Faculty of Dentistry, Prince of Songkla University

<sup>2</sup>Chulalongkorn University

Besides economic impact of Covid-19, this crisis has forced dental education to the greatest reform in history. At PSU, all didactic courses were switched from face-to-face lectures to online learning, while laboratory and clinical courses were on hold during the state of emergency. All dental instructors face challenges on getting familiar with online teaching tools. That is when new teaching innovations created to draw students' attention and keep their hand skill. With these great affords and support from the government and private sector, most students prefer online lectures and on demand video recordings of lectures over the traditional teaching. Online learning environment and students' self-study skills are keys to be improved. Limitations of online learning include laboratory, clinical, and community-based practices. To move forward, it is crucial for dental educators to adapt themselves to new era of endless education and prepare the world of tomorrow great for all.



## Comparison of Student's Module Score Before and During COVID-19 Pandemic

Yusra Y, Astoeti TE , Poedjiastoeti W, Gunardi I, Soesanto S

Faculty of Dentistry Trisakti University

**Background:** Covid-19 pandemic has changed almost all of the teaching methods from offline to online.

**Objectives:** To compare student's module scores before and during the covid-19 pandemic in Faculty of Dentistry Trisakti University.

**Method:** Two years of a retrospective study, using a set data of 1540 undergraduate student's scores (1st-term, 2nd-term, skill's lab) from 5 modules were categorized into two groups (A. offline; B. online). Data were analyzed using the T-test.

**Result:** A significant difference was found in B group compared to A group for the 1st-term (77.0+9.6 vs. 71.0+8.8;  $P<0.01$ ) and 2nd-term (77.9+10.2 vs. 69.2+9.8;  $P<0.01$ ). Meanwhile, the skill's lab score was similar in both groups (67.2+15.2 vs. 75.4+12.7;  $P=0.24$ ).

**Conclusion:** Higher student's module score for 1st and 2nd terms are more effectively shown in an online rather than an offline method. Skill's lab score is shown equally between both teaching methods.



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## Identifying diagnostic error using DEER Taxonomy in Indonesian dental student

Indriasti Indah Wardhany, Anton Rahardjo, Gus Permana Subita

Universitas Indonesia

The cause of diagnostic error is combination of cognitive errors and system failures that are interdependent but might not interact perfectly. Data on diagnostic error in Indonesian dental student as well as instruments to measure dental students' diagnostic process is scarce. Objectives and Methods: This cross-sectional study aimed to identify the diagnostic process fault using DEER taxonomy. Three standardized examiners was filled the evaluation sheet which covered seven aspect of diagnostic process and has been translated and approved by the author. Result: Inter- examiner agreement shows an almost perfect agreement (Kappa 0.81-1). Of the 102 eligible students, 188 patients with oral soft tissue lesion was evaluate. Failure or delay in producing critical physical examination findings was the most frequent findings (43.1%) causing diagnostic error in dental student. Conclusion: DEER taxonomy can evaluate the specific fault in diagnostic process of Indonesian dental student.





## Modifications in Community-Based Dental Education (CBDE) for Dental Students during Covid19 Pandemic

Iwany Badruddin, Gita A Sjarkawi, Atik Ramadhani, Melissa Adiatman

Faculty of Dentistry, Universitas Indonesia

**Objectives:** To discuss the modifications in Community-Based Dental Education (CBDE) module during pandemic, and to explore the students' reflections on these modifications.

**Method:** We assigned students into different Public Health Centers (PHCs) and conducted FGD with supervising dentists from all PHCs, evidence searching to determine the online activities possible for the students to reach out to the community and fulfill the competencies intended. At the end of the module, students write individual reflections on their experience.

**Results:** CBDE module conducted used various approach to discuss basic theories related oral health services in PHCs and evidence-based program planning. Students conducted tele-survey to diagnose oral health problems in the community, presented their online community intervention, write reports and reflections.

**Conclusions:** CBDE module were successfully conducted online and the students gave valuable inputs for the betterment of the module



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Chulalongkorn University

SEA39

## Basic science curriculum content required in the undergraduate dental curriculum: A case study

Punnita Chotcomwongse, Karnwasita Thumasujarit,  
Laksika Suwannachot, Supachai Chuenjitwongsa

Faculty of Dentistry, Chulalongkorn University

Competency-based education has been implemented at Faculty of Dentistry, Chulalongkorn University (FDCU) since 2007. Currently, basic science content taught in the curriculum is incongruent with dental competencies. This research project aims to identify basic science curriculum content related to dental competencies of FDCU. Adopting critical theory, qualitative content analysis of basic science and dental textbooks was implemented. Dental contents deemed connecting to basic sciences were identified. Physics contents are related to instruments and working environment in dentistry. Chemistry is fundamental to dental materials. Biology is a foundation of biomedical and oral sciences. Chemistry and biology knowledge is regularly used while physics knowledge is intrinsic. Basic science contents are essential for clinical dentistry. They should be taught using active learning strategies with explicit linkages to dental contexts enabling students to develop deep learning of basic sciences.



## Clinical and Microbial Evaluation of Dental Caries among Myanmar Schoolchildren

K. Thwin<sup>1</sup>, W. Lin<sup>2</sup>, K. Nohno<sup>1</sup>, H. Ogawa<sup>1</sup>

<sup>1</sup>Division of Preventive Dentistry, Niigata University, Niigata-shi, Niigata, Japan.

<sup>2</sup>Royal Yuki Oral Health Care Centre, Yangon, Myanmar.

**Objectives:** The purposes of this study were to investigate dental caries status on primary teeth, and to evaluate the cariogenic bacteria in dental plaque and saliva among Myanmar schoolchildren.

**Methods:** A cross-sectional epidemiological study consisted of 264 schoolchildren (5-6 years) who were from three primary schools of Yangon city in 2019. A clinical oral examination and caries risk tests such as Dentocult<sup>®</sup> SM plaque (DentSM-P), Dentocult<sup>®</sup> SM saliva (DentSM-S) and Cariostat<sup>®</sup> (Cario) were conducted.

**Results:** Overall caries prevalence of primary teeth was 84.1% with mean dmft of  $5.84 \pm 4.57$ . The mean debris score for all children was  $1.53 \pm 0.39$ . The mean caries risk test scores were  $0.92 \pm 0.42$  in DentSM-P,  $1.29 \pm 0.85$  in DentSM-S, and  $1.23 \pm 0.56$  in Cario. The DentSM-P, DentSM-S and Cario by debris score 1; 2; and 3 were  $0.50 \pm 0.31$ ,  $0.38 \pm 0.51$  and  $0.69 \pm 0.48$ ;  $0.92 \pm 0.41$ ,  $1.32 \pm 0.83$  and  $1.24 \pm 0.54$ ; and  $1.08 \pm 0.44$ ,  $1.45 \pm 0.89$  and  $1.34 \pm 0.58$ , respectively.

The debris scores were significantly related with all caries risk test scores ( $p=0.005$  in DentSM-P,  $p=0.009$  in DentSM-S and  $p=0.018$  in Cario). Children with higher caries experience had significantly higher caries risk test scores than those with lower caries experience ( $p<0.001$ ).

**Conclusions:** A serious burden of dental caries on primary teeth was found among Myanmar schoolchildren. Effective preventive measures such as use of fluoride and behavioral changes should be promptly implemented.



## Number of teeth and quality of life in older people

S. Sasakul<sup>1</sup>, S. Tanya<sup>2</sup>, P. Srisilapanan<sup>3</sup>

<sup>1</sup>Dentistry, Western University, Lumlooka, Pathumthani, Thailand.

<sup>2</sup>Dentistry, Chiangmai University, Muang, Chiangmai, Thailand.

<sup>3</sup>Dentistry, Nation University, Muang, Chiangmai, Thailand.

**Objectives:** To assess the impact of having teeth on related dimensions of quality of life in rural older people.

**Methods:** A cross-sectional study of 427 older people aged 60 years and above residing in rural area in Northern Thailand. Data were collected using clinical examination and a face-to face interview using a questionnaire. Clinical examination was the assessment of number of remaining teeth and the number of posterior occluding pair (POPs). Data on oral health-related quality of life (OHRQoL) were collected using Thai version of the Oral Impacts on Daily Performance (OIDP). Descriptive statistics and Logistic regression were performed.

**Results:** Mean age of subjects was  $70.3 \pm 7.9$ . Mean number of remaining teeth was  $18.8 \pm 9.1$ . 64.8% had more than 20 remaining teeth. 40% had POPs more than 3 pairs. Overall, 39.8 % of subjects had experiences at least one oral impacts in the last 6 months. There were no statistically significant differences in the perception of the impact in quality of life between genders nor age ( $p > 0.05$ ). Oral health's influence on quality of life was perceived to be largely physical rather than social or psychological. Eating was reported as the highest oral impact (35.6%). Subjects who had more than 20 teeth had significantly lesser impact than the group with 1 –10 teeth and 11-20 teeth ( $p=0.022$ ). Those who had more than three POPs had significantly lesser oral impacts than those who had three or less POPs ( $p=0.002$ )

**Conclusions:** Oral health related quality of life in rural older people significantly influenced by number of remaining teeth and posterior occluding pairs. Oral rehabilitation to replace tooth loss should be provided to improve their quality of life.

## Dental Practices in Hong Kong under the Outbreak of COVID-19

K. Leung, H. Chan, C. Chie, K. Lau, L. Leung,  
A. Look, K. Wong, H. Yim, M. Wong

Faculty of Dentistry, University of Hong Kong, Hong Kong SAR

**Objectives:** This study aimed to investigate the impacts of COVID-19 outbreak on Hong Kong dentists, including the challenges faced and the protective measures adopted by the profession, as well as the effects on the utilisation of local dental services.

**Methods:** A cross-sectional online questionnaire was conducted during 11-27 March 2020. Total population sampling was employed, reaching out to 2014 registered private dentists in Hong Kong through mails. Demographic information, clinic suspension, change in operating hours, challenges faced, and infection control measures during the outbreak of COVID-19 were collected.

**Results:** The response rate was 19.1% (n=378). Challenges experienced by dentists were in general the inadequacy of personal protective equipment (PPE) (92.2%), worry over cross-transmission in practice (94.2%) and business hardship. High level of compliance to locally suggested infection control protocols was noted in terms of patient- and clinic-oriented measures, while staff-oriented measures were relatively less practised. Dentists with >20 years of practice were found to be less worried about the risk of infection when compared to those with less experiences (p=0.013). The use of health questionnaires, measurement of patients' body temperature and pre-procedural rinses were found to be more significantly adopted by dentists who were more worried (p<0.001). Utilisation of dental service during this period was largely reduced, where 75.2% of dentists had reduced operating hours due to fewer appointments. 30.5% had suspended clinic operation and 8.5% had not yet resumed their operation at the time of survey, mostly due to worries of infection (>80%).

**Conclusion:** Hong Kong dentists have good compliance to local infection control protocols suggested for COVID-19. Dentists' years of practice and level of worry appear to have impacts on the implementation. Challenges faced from the epidemic reflect that the profession is in need of more resources sharing, security from a safe working environment, and financial aid.

## Knowledge Regarding Management of Tooth Avulsion among Dental-students in Karachi

T. Rasool, S. Khan, W. Siddiqui

Karachi Medical and Dental College, Karachi, Sindh, Pakistan

**Objectives:** This study aimed to assess the awareness and level of educational knowledge related to emergency management of dental trauma among dental students in Karachi, Pakistan.

**Methods:** This study consists of a cross-sectional survey involving undergraduate dental students of three different local dental colleges in Karachi, Pakistan. A total of 208 pre-tested questionnaires was used, comprising students' demographic data, previous training in traumatic dental injury, and knowledge assessment regarding tooth avulsion and its emergency management.

**Results:** The result shows that there was a significant association between educational level and knowledge of the students regarding training in dental trauma and exposure to a dental emergency, with an overall 96.2% response rate. First-year students have significantly less training and exposure to tooth avulsed trauma accidents when compared to final-year students. Even though final-year students were far better in answering correctly still significantly higher number of students answered incorrectly to scenario-based questions when compared to first-year students.

**Conclusions:** These study results show that the education regarding first aid training for dental traumas occurring outside the vicinity of dental clinics and hospitals in Karachi are inadequate, emphasising towards the implementation of guidelines for dental injury and its management using a variety of learning methods like problem-based education and powering the curriculum regarding the dental trauma.

P005

## Patient Satisfaction For Complete Dentures Delivered By Undergraduate Dental Students

A. Barazanchi, J. Park, N. Pande

Oral Rehabilitation, University of Otago, Dunedin, New Zealand

**SUBMITTER (NAME ONLY):** Abdullah Barazanchi (proxy)

**Objectives:** To assess the satisfaction levels of patients who received complete dentures delivered by fourth and fifth- year dental students at the University of Otago's Faculty of Dentistry between the years 2010-2018

**Methods:** Participants' attitude toward dentures was measured via a 16-item questionnaire. The questionnaire was developed through a validated Patient's Denture Assessment (PDA) questionnaire comprising of items that assessed factors related to dentures and was quantified on a four-point scale. A total of 60 edentulous patients wearing maxillary and mandibular dentures were recruited using a list of patients whose treatment were carried out and completed in the undergraduate clinic from 2010-2018. The identified patients were then contacted, using their home or cell phone, to see if they are willing to participate in the survey. All patients who agreed to take part and met the inclusion criteria were sent an explanatory letter, an informed consent form, and a self-administered questionnaire in a return envelope to the University of Otago Faculty of Dentistry.

**Results:** 97% experienced "no pain" or "occasional pain", with 91% finding it "very easy" or "easy" to eat and swallow. 88% enjoyed their meals "well" or "very well", and 85% of the participants felt like their jaw was "not worn" or "slightly worn" regardless of function, speech and aesthetics, 97% of respondents felt their denture was important to them.

**Conclusions:** Overall, the participants expressed satisfaction over the sub-groups of function, speech/aesthetics, upper denture, lower denture, and considered the denture to be of high importance. Thus, indicating that the quality of treatment carried out by the undergraduate students at the faculty was highly satisfactory.

## Perceived sources of stress among Asian Oral Health Therapy students

A.W. Leong<sup>1</sup>, A.S. Neo<sup>1</sup>, E.X. Mah<sup>1</sup>, A.U. Yap<sup>1, 2</sup>

<sup>1</sup>School of Health Science, Nanyang Polytechnic, Singapore.

<sup>2</sup>Department of Dentistry, Ng Teng Fong General Hospital, Singapore.

**Objectives:** This cross-sectional study identified the perceived sources of stress among Asian Oral Health Therapy (OHT) students and compared the stress levels between gender and year-of-study for the different stressor domains.

**Methods:** First-to-third year students, aged 17 to 33 years, from the Oral Health Therapy Diploma programme of a local polytechnic were invited to participate in the study. Perceived sources of stress were assessed with the Dental Environment Stress (DES) questionnaire. Demographic information and DES responses were acquired with an electronic data capture system (CDRSS). Data were subsequently analysed using independent samples T-test and One-Way ANOVA/Tukey's post-hoc test with the significance level set at 0.05.

**Results:** A response rate of 98.48% was attained and data from a total of 65 students were collated and examined. The study sample consisted of 11 males (16.9%) and 54 females (83.1%) with a mean age  $19.2 \pm 2.89$  years. Ranking of mean domain scores were as follows: academic factors ( $3.07 \pm 0.52$ ) > clinical factors ( $2.89 \pm 0.53$ ) > personal factor ( $2.37 \pm 0.61$ ) > educational environment ( $2.23 \pm 0.58$ ) > living accommodation ( $1.34 \pm 1.15$ ). No significant differences in stressor domain scores were observed between the two genders and the three years-of-study.

**Conclusions:** Asian OHT students were more affected by academics than non-academic stressors. Overall stress levels ( $2.38 \pm 0.53$ ) were slightly elevated but comparable to those of Asian and other dental students.



P007

## Knowledge, Attitudes and Practices of Health Science Students on Dental Caries and Periodontal Disease

B.V. Murjani

Clinical Dental Health Sciences, University of the Philippines Manila, Manila, Philippines

**Objectives:** The study determined the knowledge, attitudes and practices of a sample of health science students from the University of the Philippines Manila toward dental caries and periodontal disease and associated systemic conditions.

**Methods:** Using a cross-sectional research design with stratified random sampling, a self-administered questionnaire for knowledge, attitude, and practices was given to 218 graduating students enrolled in various health professional courses.

**Results:** Among the participants, 86.32% associated dental caries with presence of pain; 43.6% believed that untreated decay will result in the tooth being exfoliated; 88.5% were aware of the primary indicator for gingivitis but could not differentiate gingivitis from periodontitis; and 31.2% claimed that they were not aware of periodontitis. Systemic conditions that participants associated with dental caries were oral cancers (85.7%) and diabetes (73.8%), and those they associated with periodontitis were oral cancers (48.6%) and Diabetes Mellitus (18.8%). 46.3% claimed they were unaware of any relationship between periodontitis and systemic health. Majority were aware and practiced regular brushing, flossing and dental visits. 68.8% believed that their overall systemic health was influenced by their oral health. Most identified their dentist, the internet and other media as sources of information on oral health. Only 28.8% claimed that oral health information was acquired from a course in school.

**Conclusions:** Dental caries seemed to be a clearer concept than periodontal disease, and the association between oral health and systemic conditions was not established. The educational institution was not a frequent source of oral health information. These results may provide insights for strengthening the foundation of basic oral health concepts through curriculum enhancement, as it is necessary that health professionals include oral health as part of patient education. Since the University aims to produce professionals empowered to educate and advocate change, basic oral health concept should be incorporated in the educational process.

P008

## Masticatory Performance, TNF-a Serum Level and Score MoCA-INA in elderly with Alzheimer's Disease

K. I. Sari

Biology Oral/ Physiology, Faculty of Dentistry, Bandung, West Java, Indonesia

**Objectives:** The masticatory function is a risk factor for altering cognitive function. This study was to examine the differentiation frequency of mastication, time per cycle, masticatory efficiency, serum TNF-a and MoCA-INA between the elderly with AD and normal. Subsequently, to evaluate the correlation between variables.

**Methods:** the cross-sectional study design to explore correlation within components of masticatory performance, TNF-a serum level, and MoCA-INA score. The participants asked to chew the color-changeable chewing gum for 2 minutes.

The blood test to examine TNF-a serum. MoCA test was performed to screening cognitive function. The Mann Whitney test and Spearman's rho correlation for a nonparametric correlation test with a significant p-value < 0.05

**Results:** Fifty-one elderly as participants in this study (23 Alzheimer and 28 healthy subjects; mean age  $\pm$  SD 73.52  $\pm$  8.339 and 72.39  $\pm$  7.420; mean the present teeth  $\pm$  SD 20.26  $\pm$  6.099 dan 21.18  $\pm$  4.722). Frequency of mastication ( $p > 0.05$ ), time per cycle ( $p > 0.05$ ), masticatory efficiency ( $p < 0.05$ ), TNF-a serum level ( $p < 0.05$ ) and MoCA-INA score ( $p < 0.05$ ) were different between groups. In this study, it has been observed that frequency of mastication,  $r = 0.344$  ( $p < 0.05$ ); time per cycle,  $r = -0.347$  ( $p < 0.05$ ); masticatory efficiency,  $r = 0.360$  ( $p < 0.05$ ) and TNF-a serum level,  $r = 0.343$  ( $P < 0.05$ ) correlated with score of < MoCA-INA.

**Conclusions:** The frequency, time per cycle, masticatory efficiency, and serum TNF-a play the role of mastication pattern in the elderly, especially elderly with dementia Alzheimer.

## Remaining Tooth Numbers and Falls in the Community-dwelling Japanese Elderly

M. Watanabe<sup>1</sup>, K. Nohno<sup>1</sup>, T. Hoshino<sup>1</sup>, K. Tamura<sup>1</sup>, H. Ogawa<sup>1,5</sup>, Kakuta<sup>2</sup>,  
M. Iwasaki<sup>3</sup>, Y. Ishimoto<sup>4</sup>, Y. Kimura<sup>5</sup>, T. Wada<sup>6</sup>, R. Sakamoto<sup>6</sup>, M.  
Fujisawa<sup>6</sup>, K. Okumiya<sup>6</sup>, K. Matsubayashi<sup>6</sup>

<sup>1</sup>Faculty of Dentistry & Graduate School of Medical and Dental Sciences, Niigata University, Niigata City, Japan.

<sup>2</sup>Division of Community Oral Health Development, Kyushu Dental University, Kitakyushu, Japan.

<sup>3</sup>Tokyo Metropolitan Institute of Gerontology, Tokyo, Japan.

<sup>4</sup>Faculty of Health Science and Technology, Kawasaki University of Medical Welfare, Kurashiki, Japan.

<sup>5</sup>Graduate School of Human Sciences, Osaka University, Osaka, Japan.

<sup>6</sup>Center for Southeast Asian Studies, Kyoto University, Kyoto, Japan.

**Objectives:** To assess the relationship between remaining tooth numbers and incidences of falls in two prospective years

**Methods:** The participants of this 2-year longitudinal study were 124 Japanese older people (42 males and 82 females, average age 81.3 years). At baseline in 2017, dental and physical fitness examinations, including Timed Up & Go test (TUG), walking speed, handgrip strength, were conducted. Mini-Mental State Examination (MMSE) and the Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC) were also used to assess cognitive function and higher-level functional capacity, respectively. At follow-ups in 2018 and 2019, we ascertained the history of falls by questionnaires. We divided dental status into three groups: (I) subjects with at least 20 remaining teeth, (II) subjects with less than 20 remaining teeth, (III) edentulous subjects. In the multiple logistic regression models, dependent variables are a history of falls at a 1-year follow-up, and a history of falls throughout the study period, while an independent variable is dental status (group I-III). Confounders are age, gender, TUG, walking speed, handgrip strength, MMSE, and TMIG-IC. A significant level was set at 0.05.

**Results:** Twenty participants (16.1%) reported falls during the first year of follow-up. Seven participants (5.6%) reported falls every year (2017 and 2018). Multiple logistic regression analyses, adjusted for all covariates, show that subjects with less than 20 remaining teeth (group II) have a significantly increased risk of falls at the 1-year follow-up (OR: 4.46, 95% CI: 1.10,18.1), and edentulous subjects (group III) has a significantly increased risk of continuous falls in two consecutive years (OR:16.49, 95% CI: 1.06-256.7) compared with subjects with at least 20 remaining teeth (group I).

**Conclusions:** The reduced number of teeth may increase the risk of falls, and fall prevention efforts possibly be especially helpful to edentulous older people.

## Oral Health and Nutritional Intake in the 90-year-old Elderly

R. Karawekpanyawong<sup>1, 2</sup>, K. Nohno<sup>1</sup>, Y. Kubota<sup>1</sup>, H. Ogawa<sup>1</sup>

<sup>1</sup>Division of Preventive Dentistry, Graduate School of Medical and Dental Sciences, Niigata University, Niigata City, Niigata, Japan.

<sup>2</sup>Department of Community Dentistry, Faculty of Dentistry, Mahidol University, Bangkok, Thailand.

**Objectives:** To examine relationships between oral health and nutritional intake in the 90-year-old Japanese elderly

**Methods:** The study uses data from the Niigata Cohort Study. In 2018, 84 subjects (39 males and 45 females) aged 90 years old participated in this study. We collected demographic data, nutritional intake, and higher-level functional capacity by questionnaires. The nutritional intake was assessed by a Brief-type self-administered Diet History Questionnaire (BDHQ), and the higher-level functional capacity was assessed by the Tokyo Metropolitan Institute of Gerontology Index of Competence (TMIG-IC). Oral examination, masticatory performance test, saliva test, and body measurement were conducted. Cross-sectional analyses using univariate and multivariate linear regression were then performed at  $\alpha=0.05$ .

**Results:** Multivariate linear regression analyses, adjusting for genders, years of education, undernutrition (BMI20), and TMIG-IC, show that masticatory performance positively correlates with the intake of folic acid, vitamin A, B2, calcium, and iron. Stimulated salivary flow positively correlates with the intake of vitamin A, B2,  $\gamma$ -tocopherols, and n-6 fatty acids, but negatively correlates with carbohydrate consumption. The number of remaining teeth positively correlates with the intake of folic acid, calcium,  $\beta$ -carotene, iron, vitamin A, B2, C, and K. We did not find any significant relationships between oral variables and total energy intake, the intake of protein, fat, dietary fiber, zinc, vitamin D, B6, and B12.

**Conclusions:** Our results suggest that maintaining masticatory performance, salivation, and tooth numbers may facilitate the higher intake of several micronutrients in oldest-old Japanese people.

## A comparison of OIDP and PDA-T for evaluate complete denture treatment

O. Komin, S. Namano

Chulalongkorn University, Bangkok, Thailand

**Objectives:** To evaluate the complete denture (CD) treatment using different questionnaires: The Oral Impacts on Daily Performance (OIDP) and the Patient's Denture Assessment Thai version (PDA-T).

**Methods:** Cross-sectional study was performed from March 2019 to March 2020 at undergraduate and postgraduate Prosthodontic clinic, and Geriatric Dentistry and Special Patients Care Clinic, Faculty of Dentistry, Chulalongkorn University. The sample of 54 edentulous patients comprised of 20 (37%) males and 34 (63%) females (average age 70 years) were randomly selected. The demographic information of each subject was obtained, then both indexes were used to evaluate each patient at two times; t0 (any time before the completion of treatment) and t1 (the final follow-up visit).

**Results:** The impacts of tooth loss and prosthesis treatment of both indexes were related to the function and mobility of the lower CD. The mean total scores in OIDP were t0, 23.41 and t1, 2.48, and t0, 1538.76 and t1, 2155.24 of PDA-T. Pearson correlation between OIDP and PDA-T is significantly negatively correlated to each time point at p-value of 0.05.

**Conclusions:** The OIDP only evaluates general experiences of denture treatment aspects, while the PDA-T allows for in- depth evaluation particularly from patients who worn CD over a long period.

## Effect of cement types and restoration surface treatments on the retention of hybrid ceramic molar endocrown: an in vitro study

S. Sultan<sup>1, 2</sup>

<sup>1</sup>Jouf university, Sakaka, Saudi Arabia.

<sup>2</sup>Tanta university, Tanta, Egypt.

**Objectives:** The objective of this study was to compare two treatments of the inner surface of endocrowns made of hybrid ceramic (VITA ennamic) and two types of cements in terms of crown retention in molar preparations representing the worst clinical condition (only 1mm remaining tooth structure above the CEJ). The hypotheses were that 1) the two cements would lead to similar crown retention values; 2) the surface treatment would improve retention regardless of the cement used.

**Methods:** The crowns of extracted first molar teeth were removed by a horizontal section 1 mm above the CEJ. standardized CAD / CAM endocrown restorations were fabricated. 6 groups (n=12) were tested involving two types of cements (Multilink; Self cured resin cement, HEMA based and Rely X ARC; Dual-cured, Bis-GMA based resin cement) and three surface treatments (no treatment as a control, air borne particle abrasion AA and hydroflouric acid HF). After cementation, the specimens were stored in water at 37 °C for one week and then thermocycled. Retention test was performed at a crosshead speed of 0.5 mm/min until bond failure occurred. (fig. 1).

**Results:** - Mean  $\pm$  standard deviation of endocrown retention values (kgf) are shown below:-  
For Multilink, control was  $18.4 \pm (2)$  Aa, AA was  $27.8 \pm (11.6)$  A Ba and HF was  $36.7 \pm (18.1)$  Ba  
For RelyX ARC, control was  $20.7 \pm (3.8)$  Aa, AA was  $23.1 \pm (6.3)$  and HF was Aa  $23.8 \pm (3.8)$  Aa  
N.B: - For the same cement; Different capital letters indicate a significant difference ( $p < 0.05$ ) between surface treatment types. -For the same surface treatment; Different lowercase letters indicate a significant difference ( $p < 0.05$ ) between the cement types.

**Conclusions:** 1- The type of resin cement (BIS-GMA- or HEMA based) did not affect the endocrown retention values. 2- The conditioning of the hybrid ceramic endocrown inner surface by hydroflouric acid plus silanization was capable of improving the retention force for the HEMA based cement.

## Occlusal surface accuracy of complete dentures fabricated with CAD/CAM technology

F. Tsai, T. Yang, L. Lin

School of Dentistry, National Taiwan University, Taipei, Taiwan

**Objectives:** This study was to compare the reproducibility of the occlusal surface and dimensional accuracy of complete dentures fabricated with different digital fabricated techniques.

**Methods:** Two maxillary and mandibular edentulous models (Nissin) were mounted on an articulator (Stratos 200) based upon average values. The models and wax rims were then scanned by optical scanner (3Shape E3) and designed with software (Exocad DentalCAD). The complete dentures were fabricated by milled technique (CORITEC 250i) and 3D printing technique (NextDent). Additionally, the 3D printing group was divided into 4 sub-groups according to printing angles (45 and 90 degrees) and post-curing modifications (post curing on cast or not). The dimensional accuracy was evaluated by: 1) intercanine width 2) intermolar width 3) anteroposterior plane 4) Vertical plane. All the specimens were scanned, and the intaglio and cameo surfaces of each specimen was superimposed with the corresponding pre-processing cast using surface matching software (Geomagic Control 2014) at 40 selected points.

**Results:** In both arches, the milled group had the least deviation on reference areas. Meanwhile, the 3D printing group showed larger deviation than the milled group. According to digital superimposition, the overall results showed the significant difference in the accuracy and reproducibility of the occlusal surface between milled and 3D printing groups. In the 3D printing groups, printing angle at 90 degrees and post cured on the cast showed the greater accuracy.

**Conclusions:** Within the limitation of the study: The milled denture process presented with higher dimensional accuracy and occlusal reproducibility. For 3D printing technique, the building orientation affected the dimensional accuracy. Post-processing with curing on the cast improves the adaptation of tissue surface of the denture and presented less distortion on occlusal surface

## Clinical features and radiotherapy in head and neck cancer patients

T. T. Do

Oral Pathology and Periodontology, Can Tho University of Medicine and Pharmacy, Can Tho  
Can Tho, Viet Nam.

**Objectives:** The aim of the study was to investigate the clinical characteristics and radiation therapy in head and neck cancer patients.

**Methods:** The study was performed in 52 head and neck cancer patients at Can Tho Oncology Hospital from January to May 2020. Information collected included age, gender, clinical symptoms, diagnosis, TNM classification, radiotherapy. Data were analyzed using SPSS 22.0 software.

**Results:** The majority of the 52 patients were male (n=40; 76.9%). The mean age was 57.77 years, with a standard deviation of 13.45 years (range, 20-90 years). The majority of the patients were diagnosed with pharynx carcinoma (n=34; 65.5%), followed by 13 (25.0%) patients with oral cancer. A total of 3 patients (3.8%) had carcinoma of larynx and nasal cavity. T4 tumors accounted for the highest proportion (40.4%), T2 and T3 were equal (28.8%), the lowest was T1 (1.9%). The most common nodal status was N2 (44.2%), followed by N0 (40.4%). The majority of the patients had local metastases (n= 31; 59.6%). Patients in stage IV accounted for the highest proportion (55.8%), stage II was the least (13.5%), there was no stage I. The average of total radiation dose was  $67.23 \pm 9.515$  (Gy). The highest radiation dose was 70 Gy accounting for 88.5% (46 cases), the lowest was 30 Gy accounting for 5.8% (3 cases). Chemoradiation accounted for the highest proportion (73.1%), surgery combined with radiation (3.8%) and surgery combined with chemoradiation (3.8%) accounted for the lowest proportion.

**Conclusions:** Head and neck cancer happened in patients 40-60 years old, males more than females. More than 90% of head and neck cancers was pharynx carcinoma with local metastases. Chemoradiation was the most popular therapy for treatment in head and neck cancer patients with T4, N2 and stage IV.



## CBCT Analysis of Greater Palatine Canal in Cleft Patients:

O. Silkosessak<sup>1</sup>, I. Rojanahusdin<sup>2</sup>, P. Tangviroon<sup>2</sup>,  
S. Tubkruo<sup>2</sup>, K. subbalekha<sup>3</sup>

<sup>1</sup>Radiology, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

<sup>2</sup>Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

<sup>3</sup>Oral Surgery, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** To measure the distance from piriform rim to descending palatine canal (DPP) and diameters of the canal (CD) in cleft and non-cleft groups, and to determine their affecting factors.

**Methods:** All fifty-seven cleft subjects that fit study inclusion and exclusion criteria were enlisted, then age and gender- matched non-cleft pairs were randomly sampling from Faculty of Dentistry, Chulalongkorn University's database during 2010-2020. Demographic details and possible affecting factors were retrospectively recorded. Three-calibrated observers analyzed CBCT images based on 3D standardized planes. DPP and CD on both sides were assessed by at least 2 observers in axial plane at Le-fort I incisional position. Forty cases were repeatedly measured after 3 weeks interval. ANOVA, regression analysis and intraclass correlation (ICC) was calculated.

**Results:** Subject sexual distribution is 22:35 (F:M) with mean age of 16.49±5.8 years (range 8-32 years). Intra-observer and inter-observers are excellent (ICC = 0.994 to 0.999). In bilateral-cleft cases, the mean DPP in cleft and non-cleft subjects are 31.88 & 36.51 mm on the right side and 32.33 & 36.30 on the left side, respectively. The mean CD in cleft and non-cleft subjects are 2.57 & 2.99 mm on the right side and 2.45 & 2.96 mm on the left side, respectively. In unilateral-cleft group, the mean DPP in cleft and non-cleft groups are 34.33 & 36.41 mm on the ipsilateral side and 35.13 & 36.23 mm on the contra-lateral side, respectively. The mean CD in cleft and non-cleft subjects are 2.53 & 3.03 mm on the ipsilateral side and 2.55 and 2.82 mm on the contra-lateral side. There are significantly differences in DPP ( $p < 0.00$  to 0.007) and CD ( $p = 0.002$  and 0.01) in both sides of bilateral cases and ipsilateral side of unilateral cases. The contra- lateral measurements are not statistically significant at  $p = 0.97$  and 0.54 with 0.382 and 0.488 observed power for DPP and CD, respectively.

**Conclusions:** Separated safe distance in cleft patients should be employed.

## Does Maxillary Expansion Treat Nocturnal Enuresis in Children? A Systematic Review

K. Poorsattar Bejehmir<sup>1</sup>, A. Poursattar Bejehmir<sup>2</sup>

<sup>1</sup>Pediatrics, NICU, Amir Mazandarani Hospital, Sari, Mazandaran, Iran (the Islamic Republic of).

<sup>2</sup>Private Section, Toronto, ON, Canada.

**Objectives:** A portion of nocturnal enuretic children remains unresponsive despite medical treatment that leads to low self-esteem and diminished quality of life. There is a body of evidence supports using an orthodontic palatal expander in this group.

**Methods:** A critical evaluation of literature conducted by searching MEDLINE (through PubMed), Scopus, Cochrane review, and CENTRAL with no restrictions except for languages other than English. An additional grey literature search was done using Google Scholar and bibliographic reference review. The Newcastle-Ottawa-Scale (NOS) used for non-randomized clinical studies and GRADE tool was applied for the randomized controlled clinical trial (RCT). Data regarding study type, gender, age, device type, amount of expansion, outcome, and duration of follow-ups were extracted.

**Results:** Published papers up to May 2020 included 5 non-randomized non-controlled cohorts, 4 non-randomized controlled cohorts, and 1 RCT. Included patients aged between 6-15 years with a total number of 209 children. Both primary and secondary enuretic children were recruited with either slow or rapid maxillary expansion ranged from 3- 10mm by either a removable or fixed appliance. Follow-ups' duration was between 3 and 120 months. The existing heterogeneity of several parameters between studies did not justify running a meta-analysis. Compliance with the appliances was generally well with no significant adverse events. Response rate differed from complete dryness to no effect among various studies. Patients with more severe baseline frequency of enuresis and who aged older than 8 years were generally experienced less dry nights. Nasal volumes and resistance were improved and children with more severe maxillary constriction tended to respond more unfavorably. RCT postulated larger baseline voiding volume contributed to a more favorable outcome.

**Conclusions:** This orthodontic appliance may be tried when all other medical treatment fails. (Low level of evidence, weak level of recommendation). More severe initial enuresis, older age, and less initial maxillary and nasal dimensional width were negative predictors (low level of evidence). Further large-scale randomized controlled clinical trials are needed to answer the study question with more certainty.

## Effectiveness of Presurgical Nasoalveolar Molding Appliance among Oral Clefts Infants

T. T. Dinh<sup>1</sup>, D. V. Nguyen<sup>1</sup>, T. K. Dong<sup>2</sup>, V. H. Dien<sup>2</sup>

<sup>1</sup>P1Children's Hospital N1, Ho Chi Minh, Viet Nam.

<sup>2</sup>University of Medicine and Pharmacy at Ho Chi Minh city, Vietnam, Ho Chi Minh, Viet Nam.

**Objectives:** To assess the effectiveness of the presurgical nasoalveolar molding appliance among infants with unilateral complete cleft lip and palate.

**Methods:** A retrospective study was conducted from 2017 to 2019. A total of 95 pairs of casts of unilateral complete cleft lip and palate patients treated by presurgical nasoalveolar molding was selected. The average time of treatment was 3 months. All casts were scanned and measured with using three-dimensional technology before and after treatments. Paired t-test were applied.

**Results:** There was a statistically significant increase in the nostril height in cleft side and decrease in the nostril width and columella angle after treatment with presurgical nasoalveolar molding appliance ( $p < 0.05$ ). Moreover, it helped to narrow the gap and increased the width of the posterior maxillary arch, the growth of both sides toward the midline and adjust the midline deviation of the maxillary.

**Conclusions:** Nasoalveolar molding appliance has effective in improving the morphology of nostril and maxillary alveolar. Understanding this helps orthodontics and surgeons in treatment outcome expectations.

# Vertical or Horizontal Placement of TAD May Preserve Bone in Tooth Agenesis Area: A Radiographic and Histomorphometric Lesson from Animal and Human Studies: A Systematic Review Article

A. Poursattar Bejehmir<sup>1</sup>, R. Ciarlantini<sup>2</sup>, P. Biglari<sup>3</sup>

<sup>1</sup>Private Section, Toronto, ON, Canada.

<sup>2</sup>Private Practice, Recanati, Italy.

<sup>3</sup>Private Practice, Ardebil, Ardebil, Iran (the Islamic Republic of).

**Objectives:** Tooth agenesis has been always a challenging topic in contemporary orthodontics in terms of providing esthetic and bone preservation in growing adolescent patients. It has been hypothesized that vertical and more recently horizontal placement of miniscrew implants (MSI) may retain alveolar bone of tooth agenesis region till definite prosthetic or implant replacement treatment is available in early adulthood in young growing patients.

**Methods:** A critical evaluation of literature conducted by searching MEDLINE, Scopus, Cochrane review, CENTRAL and Google Scholar till June 2020 including both human and animal studies without any restriction on article type and in English. Inclusion criteria were edentulous area due to agenesis or avulsion, temporary anchorage placement in the edentulous area and radiographic and/or histologic follow up.

**Results:** Final included studies were a total of 10 case reports and case series (low level of evidence, heterogenous methods and follow-ups). Included patients aged between 10.10 - 16 years and 4 dogs. Edentulous areas were maxillary incisors, mandibular incisors and premolars. The majority of MSIs were placed perpendicular to the crestal bone of the edentulous area with a few inserted horizontally with or without raising a flap, unilaterally or bilaterally. The length was 8 - 13 mm and the diameter was 1.4 - 2.2 mm. Pontics were either subjected to occlusal force or kept unloaded (one left in place without pontic). Bone morphology was assessed by 2D periapical radiography, CT, CBCT, and micro CT (a maximum of 96 months follow-up). Inconsistent results reported including possible minimal inhibitory effect (resorption), lack of development, alveolar bone preservation and minimal 1.2 mm coronal bone development. Histologic assessment showed increased turnover and activity. No significant adverse effect was recorded except for MSI loosening, pontic discoloration, and gingival impingement.

**Conclusions:** The aforementioned technique of MSI insertion in patients with congenital missing teeth may help to preserve the alveolar bone and could be considered as a safe method (Low level of evidence, low level of recommendation). Further quality clinical trials are needed to answer the study question with more certainty.

## Accuracy of CBCT Volumetric and Linear Measurement of Cleft-Simulated Lesions in Different Anteroposterior Head Positions (Pitch)

E. Moudi<sup>1</sup>, A. Poursattar Bejehmir<sup>2</sup>, M. Poursattar Bejehmir<sup>2</sup>

<sup>1</sup>Oral Radiology, Babol University of Medical Sciences, Babol, Mazandaran, Iran (the Islamic Republic of).

<sup>2</sup>Private Section, Toronto, ON, Canada.

**Objectives:** Despite meticulous attention to proper head positioning before image acquisition, patients may tilt their heads. It has been hypothesized whether different head positions without further reorientation of the captured image before 3D multiplanar reconstruction (MPR) could affect the volumetric and 3D distance measurements of CBCT.

**Methods:** 8 cylindrical holes with two different diameters and various depths created into two 4-column containers filled with opaque paste simulating cleft lesions. Image Acquisitions were performed in three different head positions: normal (G0), +20° head flexion (G1), -20 degrees extension with a 5G Newton device (100 $\mu$  voxel size, 16x18mm FOV, denture mode). MPR was done without image reorientation and 3D measurements including lesion volumes and diameters were recorded and compared with a General linear model repeated measure measurements ANOVA and post hoc Bonferroni 2x2 comparisons.

**Results:** G0, G1, and G2 volumes were 739.97 $\pm$ 300.90mm<sup>3</sup>, 837.82 $\pm$ 317.92mm<sup>3</sup>, and 872.84 $\pm$ 322.02mm<sup>3</sup> respectively with a significant difference (F(2,14)=19.57, P<0.001). Volumetric measures in the normal head position were smaller in comparison to G1 (P=0.002) and, G2 (P=0.001). Head position was not a contributory cause to a significant difference in 3D measurements in G0, G1, and G2 groups: 13.42  $\pm$  2.11mm, 13.31 $\pm$  2.15mm, 13.2 $\pm$  2.09mm (F(2,14)=1.04, P=0.38).

**Conclusions:** 3D volumetric measurement in different head anteroposterior tilt may be misleading if left uncorrected before CBCT MPR, however, the linear measurement was proved reliable even when treated uncorrected for head positions with pitch.

## Temporomandibular Disorders In Prospective Orthodontic Patients

A. U. Yap<sup>2</sup>, C. Chen<sup>1</sup>, H. Wong<sup>3</sup>, M. Yow<sup>1</sup>, E. Tan<sup>1</sup>

<sup>1</sup>Orthodontics, National Dental Centre Singapore, Singapore, Singapore.

<sup>2</sup>Dentistry, Ng Teng Fong General Hospital, Singapore, Singapore.

<sup>3</sup>National University of Singapore, Singapore, Singapore.

**Objectives:** This study determined the prevalence and severity of Temporomandibular disorders (TMDs) in prospective Southeast Asian orthodontic patients. It also examined the association between TMDs and malocclusion severity as well as the impact of TMDs on oral health-related quality of life (OHRQoL).

**Methods:** Three hundred and fifty consecutive patients seeking orthodontic treatment were invited to participate in the study. Presence of TMDs was established with the Fonseca Anamnestic Index (FAI), whilst malocclusion severity and OHRQoL was evaluated with the Peer Assessment Rating (PAR) index and Oral Health Impact Profile-14 (OHIP-14) respectively. Data were analysed using Chi-square, Kruskal-Wallis, Mann-Whitney U tests, and Spearman's rho correlation ( $p < 0.05$ ).

**Results:** Of the 350 consecutive patients, 164 (46.86%) consented to participation. Data from 26 participants were excluded due to incomplete entries, and that from 138 subjects (mean age  $21.02 \pm 5.45$  years) were examined. TMD-related symptoms were present in two-thirds of the subjects with 20.3% experiencing moderate/severe TMDs. While no significant difference in PAR scores were observed between the "no TMDs" and "with TMDs" groups, subjects with TMDs had significantly higher OHIP-14 summary/domain scores than those without. Although a moderately strong correlation was observed between FAI and summary OHIP-14 scores ( $r_s = 0.57$ ), no affiliation was observed between FAI and PAR scores.

**Conclusions:** The prevalence of TMD-related symptoms in prospective orthodontic patients was high, emphasizing the importance of screening the masticatory system before initiating orthodontic therapy. Though the presence of TMDs was not associated with malocclusion severity, it had a significant negative impact on OHRQoL.

## Microhardness of light- and dual-cured resin cements after light activation through various translucencies of monolithic zirconia

S. Pechteewang, P. Salimee

Department of Prosthodontics, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** This study aimed to investigate the Vickers Hardness Number (VHN) of light- and dual-cured resin cements cured through monolithic zirconia of various translucencies: translucent (T); super translucent (ST); high translucent (HT); and extra translucent (XT), at 0, 24, and 48 h.

**Methods:** Four zirconia specimens from four translucencies were prepared. Two light-cured resin cements; Variolink N LC (VL-LC) and RelyX Veneer (RX-LC), and two dual-cured resin cements; Variolink N DC (VL-DC) and RelyX U200 (RX-DC) were used. The cement was mixed and loaded in a mold and cured for 20 s through the zirconia specimen. The upper surface of resin cements was tested for VHN using a microhardness tester. The VHN were analyzed using two-way repeated ANOVA, Brown-Forsythe ANOVA with Games Howell, and independent t-tests.

**Results:** At 48 h, VL-LC and RX-LC were significantly lower when cured under T groups than under XT groups. At each post curing time of each translucency, VL-DC showed higher VHN than VL-LC, and RX-DC also showed higher VHN than RX-LC ( $p < 0.05$ ). All groups showed significantly higher VHN from 0 to 24 h ( $p < 0.05$ ), but not significantly higher from 24 to 48 h, except in VL-LC and RX-DC under T groups.

**Conclusions:** The translucency of zirconia had an effect on the VHN for light-cured resin cements, but had no effect on dual-cured resin cements. Dual-cured resin cement exhibited higher VHN than light-cured resin cement from the same manufacturer.

## Water Sorption and Solubility of an Experimental Bonding Resin

M. Islam, A. Alam, M. Yamauti, A. Chowdhury, H. Sano

Department of Restorative Dentistry, Hokkaido University Graduate School of Dental Medicine,  
Sapporo, Japan.

**Objectives:** This study evaluated the water sorption and solubility of the bonding resins of an experimental two-step self-etch adhesive and compared with the bonding resin of a commercial two-step self-etch adhesive.

**Methods:** Water sorption and solubility tests were performed following the ISO 4049:2019 (E) specification. Five bonded specimens were prepared from the experimental two-step self-etch adhesive BZF-29 (BZF, GC Corporation, Tokyo, Japan) and the commercial two-step self-etch adhesive Clearfil Megabond 2 (MB2, Kuraray Noritake Dental Corporation, Niigata, Japan) using a metal mold (10 mm of diameter and 1 mm thickness). After desiccation, the cured specimens were weighed and then stored in distilled water for 7-days. Independent sample t-tests were performed to determine the statistical difference between the tested groups at a 0.05 level of significance.

**Results:** The mean sorption value of BZF ( $34.3 \pm 2.7 \mu\text{g}/\text{mm}^3$ ) was significantly lower ( $t_{4.497} = 30.713$ ;  $p < 0.001$ ) than that of MB2 ( $72 \pm 0.7 \mu\text{g}/\text{mm}^3$ ). However, our solubility results revealed that the solubility of BZF ( $-8.1 \pm 1.8 \mu\text{g}/\text{mm}^3$ ) was significantly higher ( $t_{4.495} = 7.974$ ;  $p = 0.002$ ) than that of MB2 ( $-2.7 \pm 1.9 \mu\text{g}/\text{mm}^3$ ).

**Conclusions:** The results of the present investigation indicated lesser sorption but higher solubility of BZF when compared to MB2. Further studies are required for the evaluation of their mechanical properties and to establish relationships with their sorption and solubility properties.



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## Strain distribution on heat-polymerized, milled and 3D-printed maxillary denture base

P. Huang<sup>1</sup>, T. Yang<sup>2</sup>, L. Lin<sup>2</sup>

<sup>1</sup>Graduate Institute of Clinical Dentistry, School of Dentistry, National Taiwan University, Taipei, Taiwan.

<sup>2</sup>School of Dentistry, National Taiwan University, Taipei, Taiwan.

**Objectives:** This study was to evaluate the strain distribution on heat-polymerized, milled and 3D-printed maxillary denture bases. And the strain change after artificial aging by water immersion up to 28 days.

**Methods:** An edentulous maxillary test model with artificial gingiva 2mm in thickness was fabricated. Denture bases with 2mm even thickness were designed and fabricated by following 3 process ( 6 materials in total ): (1) heat- polymerized resin process ( injection molded, compression molded ); (2) milled process (CCM group); (3) 3D-printed process (3DP group ). Seven Strain gauges were then attached on the labial notch (Ch1) , 1<sup>st</sup> premolar(Ch2, Ch4), post- dam(Ch3) across denture midline, left buccal notch (Ch5), ridge crest around 1<sup>st</sup> premolar(Ch6) and tuberosity(Ch7) on each testing denture base. A static 50N axial load was applied on each denture base for 3 times. Mean strain values (MSV) were collected for comparison. Then denture bases was immersed in the 37 degree Celsius constant temperature water bath, the same loading procedure was applied at 14 and 28 days on each denture bases.

**Results:** The strain distribution of CCM group and 3DP group was similar, and the CCM group presented lesser MSV than 3DP group. Moreover, the 3DP group showed divergent result. Almost the MSVs increased in each group after 14- days water immersion. However, the MSVs decreased in each group after 28-days water immersion. The difference among each group became smaller, except 3DP group.

**Conclusions:** (1) High MSV presented in labial notch (CH1) , post dam (CH3) and tuberosity(CH7) in each group, but 3DP group exhibits the largest strain deviation. (2) After artificial aging, CCM group had the smallest changes, followed by heat polymerized process. The 3DP group had the largest changes for 28 days.

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## Effects of Two Types of Denture adhesive on Oral Function

R. Guo<sup>1</sup>, Y. Hama<sup>1</sup>, T. Yoshida<sup>2</sup>, K. Yamaguchi<sup>3</sup>, A. Katheng<sup>1</sup>,  
W. Tonprasong<sup>1</sup>, K. Thu<sup>1</sup>, S. Minakuchi<sup>1</sup>

<sup>1</sup>Gerodontology and Oral Rehabilitation, Tokyo Medical and Dental University, Tokyo, Tokyo, Japan.

<sup>2</sup>Healthcare Division, KOBAYASHI Pharmaceutical Co.,Ltd, Tokyo, Japan.

<sup>3</sup>Central R&D Laboratory, KOBAYASHI Pharmaceutical Co.,Ltd, Tokyo, Japan.

**Objectives:** The objective of this study is to clarify the effect of two types of denture adhesives (DA), cream and liner, on oral function.

**Methods:** Firstly, questionnaire surveys had done on the Internet. Then some people were selected for further investigation (Inclusion criteria: Use denture with denture adhesive; agree face to face to inspect. Exclusion criteria: serious systemic diseases;). The further investigation includes masticatory performance, moisture, and hygiene were evaluated by color-changeable chewing gum (Masticatory Performance Evaluating Gum XYLITOL; Lotte Co., Ltd.), oral moisture-checking device (mucus; YOSHIDA Co., Ltd.), and the inspection of tongue-coating by dentists. The difference of masticatory performance with or without DA, and the difference of moisture and hygiene in cream and liner, were analyzed statistically. This research was conducted in collaboration with Kobayashi Pharmaceutical Co., Ltd. The study protocol was approved by the Ethics Committee of Tokyo Medical and Dental University (D2018-057).

**Results:** From the online survey, the number of valid replies was 318. Among them, 54 people (Cream:39, Liner:14) agreed with further investigation. There is a significant difference in masticatory performance with and without DA. However, when separating the two types, cream or liner, there is no significant difference in masticatory performance. There is no significant difference in the moisture and hygiene between cream and liner.

**Conclusions:** DA tends to have better masticatory performance, but there is no significant difference when divided into cream and liner respectively. Though there is no significant difference in the moisture and hygiene between cream and liner, for cream user, their hygiene tends to be worse. Because the sample size of liner was small, no significant difference was found. Calculating from measurement values in this study, the required sample size was 38 people. More subjects will be added in the following survey.

## Interfacial analysis of dentin-resin cement after acid-base challenge

S. Aung<sup>1</sup>, M. Ikeda<sup>2</sup>, T. Takagaki<sup>3,1</sup>, J. Tagami<sup>1</sup>

<sup>1</sup>Cariology and Operative Dentistry, Tokyo Medical and Dental University, Ichikawa, Chiba, Japan.

<sup>2</sup>Department of Oral Prosthetic Engineering, Tokyo Medical and Dental University, Tokyo, Japan.

<sup>3</sup>Department of Operative Dentistry, Division of Oral Functional Science and Rehabilitation, Asahi University, Gifu, Japan.

**Objectives:** The universal adhesives are used as silane application prior to the application of self-adhesive resin cement. The purpose of this study was to evaluate dentin bond strength and to observe the adhesive-dentin interface after acid-base challenge using three different self-adhesive resin cements (SARCs) combined with universal adhesives (UA).

**Methods:** Panavia SA Luting Cement Plus (SAP) with Clearfil Universal Bond Quick (UBQ), MaxCem Universal (MXC) with Optibond Universal (OBU), and Calibra Universal (CAU) with Prime&Bond Universal (PBU) was tested. Thirty dentin surfaces from caries-free human molars were ground and bonded with one of UA and then followed by respective SARCs. The microtensile bond strength ( $\mu$  TBS) test was performed at a crosshead speed of 1 mm/min. The interface of the bonded specimens after the acid-base challenge was also examined by SEM.

**Results:** The  $\mu$  TBS of SAP+UBQ were significantly higher than those of MXC+OBU and CAU+PBU and provided an increased in  $\mu$  TBS after 10000 TC. There were statistically significant differences among all thermal cycle periods of MXC+OBU and CAU+PBU ( $p < 0.05$ ). An acid-base resistant zone (ABRZ) was observed in all groups, however, the formation of the ABRZ was material dependent.

**Conclusions:** SAU with UBQ provided the most reliable bonding performance to dentin of human molars and presented resisting against acid-base challenge.

## Comparison of two different methods in the removal of oil based calcium hydroxide from root canal system: A triple blinded randomized clinical trial

M. Motiwala, S. Badar, R. Ghafoor

Surgery-Operative Dentistry, Aga Khan University Hospital, Karachi, Pakistan.

**Objectives:** To compare the effectiveness of rotary master apical file (RMAF) with ultrasonic activation of endodontic file (UAF) in the removal of silicon oil based intracanal medicament from the canal.

**Methods:** This is a randomized controlled trial. Ethical committee approval was obtained. Patients referred to Dental Clinics of Aga Khan University Hospital, older than 18 years of age, for root canal treatment of single rooted necrotic teeth with chronic apical periodontitis having canal curvature less than 25 degrees from July 2019 to March 2020 were included. Pregnant, immunocompromised, patients with other systemic illness, periodontally compromised or teeth unable to be isolated under rubberdam were excluded. Informed consent was obtained. After chemo-mechanical preparation and placement of silicon oil based calcium hydroxide, patients were recalled after 7 days. They were randomized into two groups for medicament removal: RMAF and UAF group. A pre-removal radiograph was taken for adequate adaptation of the medicament and a second radiograph after removal was taken to evaluate the effectiveness of removal method. Effectiveness was calculated using a 4- graded scoring scale. Mann Whitney U test was used to analyze difference between the two methods of medicament removal at different surface levels

**Results:** There was no statistically significant difference in the removal efficiency of group RMAF and Group UAF at coronal ( $p=0.74$ ) middle ( $p=0.71$ ) and apical third ( $p=0.68$ ). According to the graded score both techniques were equally effective in cleaning at all thirds of canal (RMAF= Apical:1.09, Middle:0.61, Coronal:0.33 and UAC= Apical:1.00, Middle:0.52, Coronal:0.28). There was also no statistically significant association between the removal method and the location of tooth in maxillary or mandibular arch. ( $p=0.35$ )

**Conclusions:** Both the methods, Ultrasonic activation of file and Rotary master apical file, for oil based calcium hydroxide intracanal medicament removal were equally effective in all the thirds of canal. And none of the techniques were able to completely remove the oil based  $\text{Ca}(\text{OH})_2$ . There was no association of tooth location with intracanal medicament removal method

## Anti-inflammatory effect of different irradiation modes of Azulene-mediated photodynamic therapy

S. Rattanayatikul<sup>1</sup>, B. Wuttirak<sup>1</sup>, N. Sontikarn<sup>1</sup>,  
T. Damrongrungruang<sup>1, 2</sup>, A. Kaewrawang<sup>3</sup>

<sup>1</sup>Oral Biomedical Science, Khon Kaen University, Khon Kaen, Khon Kaen, Thailand.

<sup>2</sup>Lasers in Dentistry Research Group, Khon Kaen, Thailand.

<sup>3</sup>Electrical Engineering, Khon Kaen University, Khon Kaen, Thailand.

**Objectives:** This study aimed to study the effects of different irradiation modes in Azulene-mediated photodynamic therapy on the amount of inflammatory cytokine PGE<sub>2</sub>.

**Methods:** Azulene was dissolved in ethanol/distilled water to obtain 1, 10 and 100  $\mu$ M and added 10  $\mu$ M dimethyl anthracene, a singlet oxygen probe, in 96-black well plate then irradiated in arbitrary laser unit (wavelength 638 nm, 1.515 mW/cm<sup>2</sup>, light bulb-to-well bottom distance = 2 cm) to obtain energy densities 4 or 40 J/cm<sup>2</sup> by either of following irradiation modes; 1) continuous, 2) fractionation (1/4 of final energy density x4; resting 15 minutes between each session), 3) pulse (by on 300 msec/ off 700 msec). Subsequently, singlet oxygen was relatively quantified by Varioscan® (Thermo Fisher Scientific, USA) fluorescence microplate reader (excitation/emission wavelength = 375/473 nm) in term of optical density. For anti-inflammatory assays,  $1 \times 10^5$  cells of human peripheral blood mononuclear cell (PBMCs) were cultured in RPMI-1640+10% Fetal bovine serum (37 °C, 90% humidity, 5% CO<sub>2</sub>) for 24 hours and 6-hour preincubated with 10 ng/ml of TNF- $\alpha$  to activate inflammation. Azulene concentrations were incubated for 30 minutes prior to irradiate in aforementioned conditions. 100  $\mu$ l of supernatant was transferred for measuring PGE<sub>2</sub> using Human PGE<sub>2</sub> ELISA kit with above fluorescence microplate reader at absorbance 420 nm. Kruskal-Wallis test with post-hoc test was used for comparisons of mean absorbance at significant level  $p < 0.05$ .

**Results:** The continuous mode with 40 J/cm<sup>2</sup>+10  $\mu$ M Azulene could produce the highest amount of singlet oxygen ( $p = 0.001$ ). The fractionation mode with 40 J/cm<sup>2</sup>+ 1  $\mu$ M Azulene could reduce amount of PGE<sub>2</sub> the most.

**Conclusions:** In conclusion, fractional mode with relatively low Azulene concentration in photodynamic therapy tended to reduce PGE<sub>2</sub>.

## Oral Status is Associated with Eating Difficulty in Thai Elderly

P. Harirugsakul<sup>1</sup>, I. Kaewkamnerdpong<sup>2</sup>, S. Krisdapong<sup>2</sup>

<sup>1</sup>Geriatric Dentistry and Special Patients Care, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

<sup>2</sup>Community Dentistry, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** The number of elderly in Thailand is currently increasing. To create the appropriate oral health services and oral health policies for them requires understanding the associations between dental service utilization (DSU), oral status, and oral health-related quality of life. The aim of this study was to determine the association between oral status and eating difficulty, adjusting for social backgrounds, chronic health conditions, and DSU in Thai elderly.

**Methods:** This cross-sectional study used data from the 8th Thai National Oral Health Survey. Data on 4,130 Thai elderly were collected through interviews and oral examinations. The association between social backgrounds, chronic health conditions, DSU, and oral status; and eating difficulty were investigated using chi-square and logistic regression models.

**Results:** Of the elderly aged 60 to 74 years-old, 52.7% had eating difficulty. Social backgrounds comprising age, income, education, and social welfare were significantly associated with eating difficulty. DSU was significantly associated with eating difficulty. Among the oral statuses evaluated, the number of teeth and occlusal pairs were significantly associated with eating difficulty. A multiple logistic regression analysis determined that elderly with high income, did not utilize dental service in the previous year, and had more than 27 teeth and 8 occlusal pairs were less likely to have eating difficulty compared with their counterparts after adjusting for confounders.

**Conclusions:** Eating difficulty was associated with the number of teeth and posterior occlusal pairs, while an association between prosthesis status and eating difficulty was not found.

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## Non-canonical Wnt signaling participates in Jagged1-induced odonto/osteogenic differentiation in hDPs

C. Kornsutisophon<sup>1, 2</sup>, J. Manokawinchoke<sup>2</sup>, K. Tompkins<sup>3</sup>, T. Osathanon<sup>1, 2</sup>

<sup>1</sup>Oral Biology Graduate Program, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

<sup>2</sup>Center of Excellence for Regenerative Dentistry and Department of Anatomy,  
Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

<sup>3</sup>Office of Research Affairs, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** To examine the involvement of Wnt signaling in Jagged1-induced odonto/osteogenic differentiation in human dental pulp cells (hDPs)

**Methods:** RNA sequencing data of Jagged1-treated hDPs was analyzed to identify their gene expression profile. The mRNA expression of HES1, HEY1, WNT2B, WNT5A, WNT5B, WNT16, DKK1, DKK2, and SOST was examined using real-time polymerase chain reaction. Osteogenic differentiation was determined using osteogenic-related gene expression, alkaline phosphatase (ALP) activity, and mineralization. Wnt signaling was activated using recombinant Wnt proteins, while Wnt signaling was inhibited using DKK1 or IWP-2

**Results:** Notch signaling activation using immobilized-Jagged1 enhanced odonto/osteogenic differentiation in hDPs as determined by increased ALP activity and mineralization. Bioinformatic analysis of the gene expression profile by high throughput RNA sequencing of the Jagged1-treated hDPs revealed that Notch regulated numerous Wnt-related genes. Among Wnt ligands, WNT2B and WNT5A mRNA levels were upregulated after Jagged1 treatment. In contrast, Wnt inhibitors, DKK1, DKK2, and SOST mRNA levels were downregulated in Jagged1-treated cells. Recombinant WNT2B and WNT5A significantly promoted in vitro mineral deposition by hDPs. The Wnt signaling inhibition experiments revealed that IWP-2, but not DKK1, inhibited Jagged1-induced ALP activity and mineralization

**Conclusions:** The Notch ligand, Jagged1, promoted odonto/osteogenic differentiation in hDPs by regulating the non- canonical Wnt pathway

## Epigallocatechin Gallate Protection in Salivary Gland Radiation Injury and Homeostasis

E. Sulistiyani<sup>1</sup>, A. Chansaenroj<sup>2</sup>, G. Urkasemsin<sup>3</sup>, J. Ferreira<sup>2</sup>

<sup>1</sup>International Graduate Program in Oral Biology, Chulalongkorn University Faculty of Dentistry, Bangkok, Bangkok, Thailand.

<sup>2</sup>Exocrine Gland Biology and Regeneration Research Group, Chulalongkorn University Faculty of Dentistry, Bangkok, Bangkok, Thailand.

<sup>3</sup>Mahidol University Faculty of Veterinary Science, Salaya, Thailand.

**Objectives:** Epigallocatechin gallate (EGCG) derived from *Camelia sinensis* leaves is a well-known antioxidant catechin. Our aim was to determine the biological protective effects of EGCG during homeostasis and radiation injury to salivary glands (SG).

**Methods:** Murine fetal ex vivo SG models were used and dose response studies conducted with EGCG 0.15-150µg/ml. For homeostasis conditions, SG were cultured for 48h to identify what EGCG dose range can support their epithelial bud growth or branching morphogenesis index (BMI). Next, SG were pre-treated with EGCG before irradiation (IR) injury, which was delivered using a linear accelerator with high energy photons (7Gy, 6MV, Varian Clinac iX), and 24-48h later the BMI was assessed. Whole-mount immunohistochemistry and quantitative PCR with Ki67, Sox2, KRT14 and AQP5 was performed to investigate whether EGCG modulates epithelial and stem/progenitor cell proliferation and differentiation. Griess assay was run for measuring reactive oxygen species (ROS) induced by IR before and after EGCG treatment. Data was statistically analyzed by one-way analysis of variance with Dunnet's posthoc test with alpha level set at 0.05 using GraphPad Prism.

**Results:** EGCG 1.875-30µg/ml supported SG epithelial homeostasis and 7.5-15µg/ml EGCG prevented radiation- induced epithelial damage. In IR conditions, cellular mitosis (Ki67) was significantly increased with 7.5 and 15µg/ml EGCG at the acinar and ductal epithelial compartments when compared to non-treated SG controls; Sox2 was also highly expressed at both epithelial compartments but without statistical significance. SG ductal progenitor marker KRT14 and acinar marker AQP5 were significantly increased with EGCG 7.5µg/ml relative to non-treated SG. Moreover, EGCG 7.5µg/ml pre-treatment reduced the ROS generated by IR conditions.

**Conclusions:** EGCG at 7.5µg/ml can maintain epithelial homeostasis and proliferation through SG development. In IR injury models, 7.5µg/ml EGCG protected epithelial growth by increasing the proliferation of acinar and ductal progenitor cells, and producing greater antioxidant activity in the SG organ.



## An increase in bFGF expression and imbalanced mitochondrial dynamics are observed in human pulpitis

S. Vaseenon<sup>1</sup>, K. Weekate<sup>1</sup>, T. Srisuwan<sup>1</sup>, N. Chattipakorn<sup>3</sup>, S. Chattipakorn<sup>2</sup>

<sup>1</sup>Department of Restorative Dentistry and Periodontology, Faculty of Dentistry, Chiang Mai University, Muang, Chiang Mai, Thailand.

<sup>2</sup>Department of Oral Biology and Diagnostic Sciences, Faculty of Dentistry, Chiang Mai University, Muang, Chiang Mai, Thailand.

<sup>3</sup>Cardiac Electrophysiology Research and Training Center, Faculty of Medicine, Chiang Mai University, Muang, Chiang Mai, Thailand.

**Objectives:** The objective of this study was to determine apoptosis, the balance of mitochondrial dynamics, and bFGF expression in human pulpitis in compared with healthy pulp.

**Methods:** Sixteen pulp tissues from healthy, as control, (n=8) and irreversible pulpitis (n=8) were collected from the Oral and Maxillofacial Surgery clinic, Faculty of Dentistry, Chiang Mai University. Apoptosis, mitochondrial dynamics, and bFGF expressions in pulpal tissues were determined by western blot analysis.

**Results:** In human pulpitis, there was a significant increase in apoptotic markers as indicated by increased Bax/Bcl2 ratio, when compared with those of controls ( $p < 0.05$ ). An imbalance of mitochondrial dynamics as indicated by decreased mitochondrial fusion proteins, Mfn2 and OPA1, and increased mitochondrial fission protein, Drp-1 were also observed in pulpitis, when compared with those of controls ( $p < 0.05$ ). In addition, the expression of bFGF was significantly increased in pulpitis, when compared with that of control ( $p < 0.05$ ). bFGF also showed positive correlations with cell apoptosis ( $r = 0.5484$ ,  $p < 0.05$ ) and mitochondrial fission ( $r = 0.8333$ ,  $p < 0.05$ ).

**Conclusions:** These findings suggest that increased apoptosis and an imbalance of mitochondrial dynamics occur in irreversible pulpitis, but factors for wound healing in pulpitis as bFGF up-regulates. An increase in bFGF in pulpitis could be the process to maintain cell survivals in pulpal inflammation in order to compensate an increased cell apoptosis and mitochondrial fission events.

P033

## A comparison of microRNA profiles between rat incisors and molars

S. Nipakasem

Microbiology, Chulalongkorn University, Chiangmai, Thailand.

**Objectives:** To demonstrate differential microRNA profiles in rodent incisor and molar of the Sprague–Dawley rats

**Methods:** To study the role of miRNA, we extracted total RNA from the dental pulp tissue collected from the apical part, coronal part of incisors and molars, and compared the expression of miRNAs.

**Results:** RT-PCR array demonstrated 6 miRNAs (miR-32-5p, 885-5p, 665, 338-3p, 663a, 200a-3p) in apical part and 4 miRNAs (miR-32-5p, 665, 338-3p, 663a) from coronal part are significantly lower than molar group whereas miR-23a-3p is the only one that has significantly increase in both apical and coronal part compare to the molars group.

**Conclusions:** The results suggested that these miRNAs may have a role in mineralization process during prolonged crown formation of rodent incisors.

## Bismuth plus Metronidazole Synergistically Dampens *Porphyromonas gingivalis* Persisters Formation

C. Wang, T. Cheng, L. Jin

Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR.

**Objectives:** *P. gingivalis* is the 'keystone' periodontopathogen. Our group has recently demonstrated that metronidazole- treated *P. gingivalis* persisters invade human gingival epithelial cells (HGECs) and perturb innate host response, and yet bismuth drugs markedly suppress *P. gingivalis*. This study explored the potential synergistic effects of bismuth drugs combined with commonly used antibiotics on the formation of *P. gingivalis* persisters.

**Methods:** *P. gingivalis* cells (ATCC 33277) in planktonic and biofilm states were cultured to stationary phase and treated with colloidal bismuth subcitrate (CBS, 100  $\mu$ M), metronidazole (100  $\mu$ g/ml), amoxicillin (100  $\mu$ g/ml) or different combinations of these medications. Drug concentrations of planktonic culture were measured after 6-h, 24-h, and 48-h treatments, and persister formation rate (PFR) was counted by colony-forming unit accordingly. *P. gingivalis* persisters in biofilms were detected by LIVE/DEAD staining after 72-h treatment. Cell viability and cytotoxicity of HGECs were tested after treatments with various concentrations of CBS for 24 h, 48 h, and 72 h.

**Results:** *P. gingivalis* persisters in planktonic culture were identified (PFRs: 10<sup>-5</sup> to 10<sup>-2</sup>) after 48-h treatments, and concurrently lethal dosages of CBS (> 20  $\mu$ M), metronidazole (> 17  $\mu$ g/ml) and amoxicillin (> 15  $\mu$ g/ml) remained to be detectable. Notably, *P. gingivalis* persisters were remarkably eradicated (PFR:10<sup>-8</sup>), in both planktonic and biofilm states, by CBS combined with metronidazole, with reference to CBS or metronidazole alone. No such significant effects were observed in the combination of CBS and amoxicillin (PFR: 10<sup>-4</sup>) or metronidazole and amoxicillin (PFR: 10<sup>-4</sup>). Importantly, cell viability of HGECs was not affected by CBS, and very little cytotoxicity (< 5%) was detected even with a high concentration of CBS (400  $\mu$ M).

**Conclusions:** This study suggests that synergistic use of bismuth drugs and metronidazole dramatically tackles *P. gingivalis* persisters formation, and such novel approach may contribute to effectively controlling periodontitis and *P. gingivalis*-related systemic diseases.

P035

## SDF versus PVP-I and NaF in arresting root caries

J. Zhang, E. Lo, K. Leung, C. Chu

Faculty of Dentistry, University of Hong Kong, Hong Kong SAR.

**Objectives:** To compare the effectiveness of annual application of 38% silver diamine fluoride (SDF) solution with that of 4-monthly application of 10% povidone iodine (PVP-I) followed by 5% sodium fluoride (NaF) varnish in arresting active root caries.

**Methods:** This randomized clinical trial was registered (clinicaltrials.gov # NCT 03654820) and conducted in long-term social welfare care facilities in Hong Kong. Participant inclusion criteria were: 1) had at least one root surface with active caries lesion, 2) aged above 60 years, 3) had at least 6 natural teeth, and 4) had basic self-care and communication ability. Participants were randomly allocated into 2 groups and received the corresponding interventions: Group 1: annual application of 38% SDF solution; Group 2: 4-monthly application of 10% PVP-I followed by 5% NaF varnish (PVP-I/NaF). Included root surface was assessed using the criteria recommended by the International Caries Detection and Assessment System. The participants were examined by the same two calibrated examiners at baseline and follow-up.

**Results:** At baseline, 98 elders (women: 70) (mean age: 74.8±8.5) were examined with 206 active root caries lesions. After 24 months, 76 (77.6%) participants were evaluated. The proportions of root caries lesions that were arrested at the 24-month examination in Group 1 and Group 2 were 99% and 68%, respectively (Fisher's exact test,  $p < 0.001$ ). In the final multi-level logistic regression model, active root caries lesions in the SDF group (OR=35.3,  $p = 0.001$ ) had a higher chance while those with visible plaque present at 24-month follow-up (OR=0.23,  $p = 0.048$ ) had a lower chance to become arrested. The shallower lesions and those in Group 1 became arrested faster than the deeper lesions and those in Group 2.

**Conclusions:** The effectiveness of annual application of 38% SDF solution is significantly higher than that of 4-monthly application of 10% PVP-I and 5% NaF varnish in arresting active root caries.

## Arrest of atypical carious lesions in primary teeth using 38% Silver Fluoride

R. Horn<sup>1</sup>, B. Turton<sup>3</sup>, C. Durward<sup>2</sup>

<sup>1</sup>Dentistry, University of Puthisastra, Phnom Penh, Cambodia.

<sup>2</sup>Faculty of Dentistry, University of Puthisastra, Phnom Penh, Cambodia.

<sup>3</sup>Dentistry, University of Puthisastra, Phnom Penh, Cambodia.

**Objectives:** To investigate whether there is a difference in the odds of caries arrest between typical (TL) and atypical (AL) carious lesions in primary teeth at 12m.

**Methods:** This was a secondary analysis of a subgroup of Cambodian children who participated in a clinical trial examining the efficacy of 38% silver fluoride (AgF) therapies. Carious lesions received an application of silver fluoride therapy at baseline and at the 6m follow-up. Lesions were examined at 12m. An arrested lesion was defined as one which was black in colour, felt hard on probing (ball-ended probe) or had not progressed to a more severe ICDAS code. The EAPD index for hypomineralisation was used to identify teeth which had atypical lesions. Differences in the proportion of teeth with arrested TL or AL were examined using the chi-squared test. A two-level model was used to allow for the clustering effect of multiple carious teeth that might occur within one individual. The first level of the model included individual level variables and the second level included tooth level effects

**Results:** 205 participants entered the study and 156 (73.1%) were examined at 12 m (48.3% female). The mean dmfs was 20.5 (SD14.7) and 78.5% of participants had one or more teeth with an atypical carious lesion. A significantly lower proportion of AL teeth were arrested than teeth with TL (59.1% vs 79.0%; P-value = <0.001). There was no significant difference in caries arrest with respect to type of lesion once lesion size, tooth type, baseline plaque scores, and caries risk were taken into account in multivariate modelling (OR 0.80; 95% CI 0.49, 1.29).

**Conclusions:** Although the proportion of teeth with AL that arrested was lower than the proportion of TL, the differences in observed arrest rate for AL can be accounted for by other clinical characteristics.

P037

## Cemento-Ossifying Fibroma of the Mandible - An Unusual Presentation in a Child

J. Liew, M. Badr

Oral Surgery Department, University Dental Hospital of Manchester, Manchester, United Kingdom

**Objectives:** To raise awareness of the presence of rare lesion in a child in the differential diagnoses of mandibular swellings. To understand the histopathological features of cemento-ossifying fibroma and its significance for accurate diagnosis. To understand the importance of early intervention and management of the lesion and its need of long-term follow-up. To appreciate the importance of different inputs from multi-disciplinary teams throughout the care pathway of the patient.

**Methods:** A 14-year old fit and well girl of Black African-Caribbean background was referred from the Paediatric Dentistry department to the Oral Surgery department in July 2019 with a complaint of left mandibular swelling. The swelling had been present for two years with gradual increase in size. Clinical examination revealed a firm, painless bony expansion encompassing the LL3 to the LL6 which measured 30mm x 15mm in size. Differential diagnoses of fibrous dysplasia and cemento-ossifying fibroma were made based on radiological findings. An incisional biopsy of left mandible was undergone in April 2020. Surgical excision of lesion, removal of LL4, LL5, LLD, ULD and ULE and placement of synthetic bone graft were carried out under general anaesthesia in June 2020.

**Results:** Histopathological analyses revealed fragments of a fibro-osseous lesion composed of dense fibro-cellular connective tissue and spherules of cementum-like material displaying ossification and mineralisation, entrapped with trabecular bone. The specimens confirmed the diagnosis of cemento-ossifying fibroma of the left mandible. The patient made an uneventful recovery from the surgery with no loss of sensation or paraesthesia on the left mental region. Further follow-ups necessitating CBCT images are required. The patient was also referred to the Orthodontic department for assessment of gaps post-surgery and general malocclusion. Regular inputs from the patient's general dental practitioner are crucial for monitoring of teeth vitality and oral hygiene up-keeping.

**Conclusions:** Prompt management of the lesion is imperative to ensure good prognosis with less complications. Long term follow-ups are pivotal due to the likelihood of recurrence for lesions of this nature. The involvement of multi-disciplinary care of a patient before, during and after treatment cannot be overemphasized.

## Dental Caries and Oral Hygiene Status among Special Children in Nepal

B. Pathak<sup>1</sup>, Y. Ngeonwiwatkul<sup>1</sup>,  
P. Taechaboonsersak<sup>2</sup>, S. Srithamrongsawat<sup>3</sup>

<sup>1</sup>Department of Community Dentistry, Mahidol University, Ratchathewi, Bangkok, Thailand.

<sup>2</sup>Department of Family Health, Mahidol University, Ratchathewi, Bangkok, Thailand.

<sup>3</sup>Department of Community Medicine, Mahidol University, Ratchathewi, Bangkok, Thailand.

**Objectives:** Children with special needs (special children) defined as children who have any various difficulties that causes an individual to require specialized services or helps. Recent searches showed that oral health problem among special children are on the rise. However, in Nepal only one study was done. This study aims to determine and compare dental caries experience, oral hygiene status among special with healthy children of age 11-13 years in Kathmandu and Lalitpur District, Nepal

**Methods:** A cross-sectional study was conducted among 158 children (79 special and 79 healthy children) aged '11-13 years studying in special and normal school in Kathmandu and Lalitpur District, Nepal. A total of 79 special children were visually impaired (16.5%), hearing and speech impaired (25.3%) and orthopedically impaired (58.27%). Dental examination was performed using a mouth mirror and a probe according to WHO criteria and methods in 1997.

**Results:** Dental caries prevalence of special children is high (75.9%) when compared to 65.8% in healthy children. The mean DMFT of special and healthy children are  $3.07 \pm 2.48$  and  $2.59 \pm 2.60$  with  $p=0.237$ . The mean for Missing teeth of special and healthy children are  $0.50 \pm 1.11$  and  $0.12 \pm 0.40$  with  $p=0.005$ . Both special and healthy children have fair oral hygiene with mean OHI-S  $2.27 \pm 0.86$  and  $1.63 \pm 0.67$  respectively.

**Conclusions:** Our findings indicate that there is an alarming situation for oral disease among special children. Thus, tailored oral health education and proper oral hygiene habits should be provided to the parents/ caretaker of special children.

P039

## Caries arrest and lesion appearance using two different silver fluoride therapies on primary teeth with and without Potassium Iodide: 12-month results

B. Turton, R. Horn, C. Durward

Dentistry, University of Puthisastra, Phnom Penh, Cambodia.

**Objectives:** To examine differences in caries arrest and lesion colour of primary tooth carious lesions treated using two different silver fluoride therapies with and without Potassium Iodide at 6mo and 12mo.

**Methods:** The study was a four-armed, parallel-design randomised controlled trial and investigated four protocols for caries arrest at 6mo. Children in Group 1 and Group 2 received Rivastar Silver Diammine Fluoride (SDF), and children in Group 3 and Group 4 received an aqueous silver fluoride solution (AgF). Children in Group 2 and Group 4 received a two-step procedure where application of the AgF or SDF solution was followed by KI.

**Results:** At the twelve-month follow-up 318 (75.5%) children were re-examined. The arrest rate varied by group membership; group 1 and group 3 had higher arrest rates (77.3% and 75.3% respectively) than group 2 and group 4 (65.4% and 51.2% respectively). One in ten teeth became pulpally involved over the course of study; those lesions where KI was placed had twice the chance of a lesion becoming pulpally involved. The use of KI was also associated with lower odds of arrest (12m OR 0.25) and higher odds of avoiding black discolouration (12m OR 6.08).

**Conclusions:** This study demonstrated that both AgF and SDF can effectively arrest carious lesions on primary teeth as consistent with other reported literature. The use of KI is associated with lower caries arrest rates and lower chances of the lesion becoming a black colour and should be limited to use on anterior lesions.



## Remineralization Potential of Arginine-Fluoride Varnish in a Bacterial pH-Cycling Model

M. Bijle<sup>1</sup>, M. Abdalla<sup>1</sup>, U. Ashraf<sup>1</sup>, M. Ekambaram<sup>2</sup>, C. Yiu<sup>1</sup>

<sup>1</sup>Paediatric Dentistry, Faculty of Dentistry, The University of Hong Kong, Hong Kong, Hong Kong.

<sup>2</sup>Paediatric Dentistry, Faculty of Dentistry, University of Otago, Dunedin, New Zealand.

**Objectives:** To examine the enamel fluoride uptake and remineralization potential of arginine-fluoride (Arg-NaF) varnishes in a simulated clinical condition using a multi-species bacterial pH-cycling model.

**Methods:** L-Arginine (at 1%, 2%, and 4% by wt.) was incorporated in a 5% NaF varnish. Experimental and control groups were: 1% Arg-NaF; 2% Arg-NaF; 4% Arg-NaF; NaF; and no treatment. Artificial incipient caries-like lesions were formed on 30 enamel specimen blocks (n=6). The specimens underwent multi-species bacterial pH-cycling in an artificial mouth system using oral biofilm reactor for 72 h after treatment with experimental and control varnishes. The multi-species bacterial pH-cycling model included *Streptococcus mutans*, *Streptococcus sanguinis*, and *Streptococcus gordonii* at 1:1:1 ratio in BHI broth (pH-5.0) with 0.5% yeast extract, 2% sucrose, and 1% glucose which served as a suspension for demineralization. For remineralization period, the specimens were subjected to artificial saliva flow in the biofilm reactor. After bacterial pH-cycling, the specimens were evaluated for mineral density using micro-CT, Ca/P ratio with SEM-EDX, and enamel (EFU) with biofilm/plaque (PFU) fluoride uptake. The mineral gain, percentage remineralization, and percentage change in Ca/P were computed. The statistical analysis was done using 1-/2-way ANOVA with SNK/Bonferroni's post-hoc test and the statistical significance was set at  $\alpha=0.05$ .

**Results:** Increasing concentrations of Arg in NaF varnish significantly increased the EFU of incipient caries-like lesions ( $p<0.001$ ). The PFU for 1% Arg-NaF was significantly higher than 4% Arg-NaF and the control NaF ( $p<0.05$ ). Post pH- cycling, Ca/P ratio with 1%/2% Arg-NaF was closest to hydroxyapatite (1.67). Mineral gain and % remineralization of 1%/2% Arg-NaF were significantly higher than the control NaF varnish ( $p<0.05$ ).

**Conclusions:** The prebiotic L-arginine (at 1%/2% by wt.) in a 5% NaF varnish enhanced the enamel fluoride uptake and remineralization potential of the conventional 5% NaF varnish.

## KetoC Targets on Gut Microbiota Thereby Preventing Periodontitis

B. Sulijaya<sup>1,3</sup>, N. Takahashi<sup>2</sup>, K. Yamazaki<sup>3</sup>

<sup>1</sup>Department of Periodontology, Faculty of Dentistry, Universitas Indonesia, DKI Jakarta, Jakarta Pusat, Indonesia.

<sup>2</sup>Division of Periodontology, Department of Oral Biological Science,  
Graduate School of Medical and Dental Sciences Niigata University, Niigata, Japan.

<sup>3</sup>Research Unit for Oral-Systemic Connection, Division of Oral Science for Health Promotion,  
Graduate School of 4Medical and Dental Sciences, Niigata University, Niigata, Japan.

**Objectives:** Oral-gut bacterial dysbiosis facilitates the connection between periodontitis and systemic disease. A bioactive metabolite generated by intestinal bacteria, KetoC, possesses beneficial roles in maintaining homeostasis. Nevertheless, its function to oral-gut dysbiosis in periodontitis remains unclear. We investigated whether gut microbiota is affected in periodontitis model. Moreover, we demonstrated that KetoC shows an indirect mechanism to restore gut bacterial alteration leading to the periodontal homeostasis.

**Methods:** A total of 31 eight-week-old male C57BL/6N mice were randomly divided into four groups (non-ligation, non-ligation + KetoC, ligation + *Porphyromonas gingivalis* (*P. gingivalis*), and ligation + *P. gingivalis* + KetoC) ( $n = 7/8$  mice/group) and given a daily oral gavage of KetoC (15 mg/mL) or vehicle for two weeks. On day 7, a 5-0 silk ligature was placed on the maxillary left second molar and *P. gingivalis* W83 (109 CFU) was delivered orally every three days to induce periodontitis. On day 14, fresh fecal samples were collected, then all mice were euthanized. Alveolar bone resorption was determined from the level of the cemento-enamel junction to the alveolar bone crest at the mesial and distal sites of maxillary second molar. Gut microbial diversity and composition in the feces were analyzed by metagenomics assay. Statistical analyses were performed accordingly.

**Results:** Periodontitis model was successfully obtained in this model as alveolar bone destruction was observed. Periodontitis group exhibited less gut bacterial diversity than non-ligation groups. In the periodontitis group, at the phylum level, Verrucomicrobia and Firmicutes were upregulated and downregulated, respectively; while, *Ruminococcus* and *Akkermansia* were downregulated and upregulated at the genus level, respectively. KetoC administration in the periodontitis group significantly reduced alveolar bone destruction and restored gut bacterial alteration.

**Conclusions:** This metabolite prevents alveolar bone loss and improves gut bacterial diversity and composition in the oral-gut dysbiosis-related periodontitis model, as its indirect mechanism.

## The impact of periodontal disease on systemic health and quality of life: A qualitative study on dental professionals and patients' knowledge and perception.

L. Wong<sup>1, 2</sup>, S. Kunnasegaran<sup>3</sup>, A. U. Yap<sup>1, 2</sup>, P. Allen<sup>2</sup>

<sup>1</sup>Dentistry, Ng Teng Fong General Hospital, Singapore, Singapore.

<sup>2</sup>Faculty of Dentistry, National University of Singapore, Singapore.

<sup>3</sup>Oral Health Therapy, Nanyang Polytechnic, Singapore, Singapore.

**Objectives:** This qualitative study aimed to assess the knowledge and perceptions of dental professionals and periodontal patients on the impact of periodontal disease on systemic health and quality of life (QoL) and the application of a health status measure to assess patient-reported outcomes.

**Methods:** In-depth semi-structured face to face interviews were conducted with 10 dental professionals and 10 patients selected using purposive sampling. Audio recordings of the interviews were transcribed verbatim, coded and analysed with a software, followed by an inductive thematic analysis of the data.

**Results:** Three domains were identified for the dental professionals: 1) knowledge of periodontal disease, systemic health and QoL; 2) experience in managing periodontal patients to improve their QoL; 3) perception of having a disease specific QoL instrument for periodontal disease. Three domains were identified for periodontal patients: 1) knowledge of periodontal disease, systemic health and QoL; 2) experience and perception of how periodontal treatment can improve QoL; 3) perception on having a disease specific QoL instrument for periodontal disease. Both groups were knowledgeable about the relationship between periodontal disease, systemic health and QoL and had experienced how periodontal treatment could improve QoL. Both groups also agreed that a disease specific QoL instrument for periodontal disease would be beneficial.

**Conclusions:** Both the dental professionals and periodontal patients were aware of the relationship between periodontal disease, systemic health and QoL, including the benefits of periodontal treatment in improving QoL. The value of developing a disease specific QoL instrument for periodontal disease was recognized by both groups.

## A comparison of different standard setting methods in final year dental examination

A. N. Abd Rahman<sup>1, 2</sup>, I. H. Baharuddin<sup>1</sup>, M. I. Abu-Hassan<sup>1</sup>, S. J. Davies<sup>2</sup>

<sup>1</sup>Faculty of Dentistry, Universiti Teknologi MARA, Sungai Buloh, Selangor, Malaysia.

<sup>2</sup>Faculty of Life Sciences and Education, University of South Wales, Cardiff, Wales, United Kingdom.

**Objectives:** This study aims to compare between the conventional, norm reference and modified Angoff standard-setting methods for final year dental examination and to estimate the test-retest and inter-rater reliability of the modified Angoff method.

**Methods:** The norm reference method of standard setting (mean minus 1 SD) was applied to the real scores of 40 final year (5th year) dental students on a multiple-choice examination (MCQ), short answer question (SAQ) and objective structured clinical examination (OSCE). A panel of 10 judges set the standard using the modified Angoff method for the same paper in one sitting and two judges set the passing mark of 10 OSCE questions after 2 weeks. Comparison of the grades and pass/fail rates derived from the absolute standard, norm reference and the Angoff methods were made. The test-retest and inter-rater reliability of the modified Angoff method were also assessed.

**Results:** The pass rate with the absolute standard was 100% (40/40), norm-reference method was 62.5% (25/40) and that by the Angoff method was 80% (32 out of 40). The percentage agreement between modified Angoff method and conventional method was 59% and with norm reference was 55%, between conventional standard and norm-reference was 30%. The modified Angoff method had a good inter-rater reliability of 0.876 and excellent test-retest reliability of 0.941.

**Conclusions:** There were significant differences in the outcomes of these three standard setting methods, as shown by the difference in the proportion of candidates that passed and failed the assessment. The modified Angoff method was found to have an acceptable percentage agreement with other methods, a good inter-rater reliability and an excellent intra-rater reliability to be applied in final year dental assessment with a future direction for the professional qualifying examinations to determine the passing candidates.

P044

## Oral Microbiome Characterization of Urban and Rural Healthy Women in Indonesia

C. F. Theodorea<sup>1</sup>, A. S. Widyarman<sup>2</sup>

<sup>1</sup>Oral Biology, Faculty of Dentistry, Universitas Indonesia, Central Jakarta, Jakarta, Indonesia.

<sup>2</sup>Microbiology, Faculty of Dentistry, Trisakti University, Jakarta, DKI Jakarta, Indonesia.

**Objectives:** The oral microbiome studies performed in Indonesia especially in between urban and rural area are remain underrepresented. According to Indonesia Basic Health Research (RISKESDAS) 2018, most of noncommunicable diseases, showed an increasing trend compared to the previous report in 2013. The prevalence of diabetes, heart disease, hypertension and obesity are higher in the urban area than in rural area. All rates are found higher in the females than males. The aim of this pilot study was to examine the oral microbiome characterization isolated from the tongue biofilm of urban and rural Indonesian healthy women with the level of oral hygiene.

**Methods:** Twenty women aged 21-47 years old from West Jakarta, DKI Jakarta's residents (n=10) as representative of urban area, and Ende, Nangapanda, East Nusa Tenggara's residents (n=10) as representative of rural area were voluntary participated in this study. The participants were evaluated by the Simplified Oral Hygiene Index (OHI-S) according to the criteria of Greene & Vermillion and divided into three groups. High-throughput DNA sequencing were performed on an Illumina iSeq 100 platform.

**Results:** This study revealed phylum Firmicutes was the most abundant in both urban and rural area. However, genus Prevotella was abundant in urban area while genus Streptococcus was the most abundant in rural area. At species level, Leptotrichia wadei, Prevotella melaninogenica, and Prevotella jejuni were dominated in urban area, while Acinetobacter junii Actinomyces odontolyticus, and Rothia mucilaginosa were found dominantly in rural area.

**Conclusions:** This is the first study demonstrating the characterization of oral microbiome in the Indonesian women in urban and rural area. The microbial communities display unique characterization between the urban area and rural area. The specific characterization of Indonesian women microbiota are likely linked to the host diet, cultural habits and socioeconomic status as well as the geographic location or population studied.

## Association between caries and stunted growth among 2-year-old Cambodian Children

E. Peris Renggli<sup>1</sup>, B. Turton<sup>2</sup>, K. Sokal-Gutierrez<sup>3</sup>

<sup>1</sup>01Robert Koch Institute, Berlin, Germany.

<sup>2</sup>University of Puthisastra, Phnom Penh, Cambodia.

<sup>3</sup>University of California, Berkeley, Berkeley, CA, United States.

**Objectives:** To explore the relationship between severe early childhood caries and chronic stunting malnutrition in Cambodia.

**Methods:** This was a secondary analysis of longitudinal data on 1307 children (51.7% females) <24 months of age at baseline (2017) and approximately one year older at follow-up (2018) from the Cambodian Health and Nutrition Monitoring Study (CAHENMS) and the added oral health component. Data were collected in 2 rural and 1 urban provinces, including parent interviews and child exams for dental status and anthropometric measures for nutritional status. Logistic regression modelling examined the associations between severe dental caries and the prevalence of new cases of stunting and wasting malnutrition at follow-up.

**Results:** At baseline, 51.9% of the children had caries and 39.9% presented stunted growth. The prevalence of caries at follow-up was 63.3% and 17.6% of the children transitioned from a healthy length- for-age to being stunted over the 1- year follow-up. Children who belong to the 1/3 with the highest number of caries prevalence, as defined by Significant Caries Index (Scl), had almost twice the risk (OR=1.8, CI 1.0-3.0, P=0.039) of presenting stunted growth after controlling for diet and sociodemographic characteristics. 8.9% of the children presented wasting at baseline and 5.2% transitioned from healthy status to a wasting condition over the observation period. Although not statistically significant in this sample (P=0.072), the children with Scl at baseline presented 1.9 OR of becoming wasted at follow-up.

**Conclusions:** Severe, untreated early childhood caries, with its consequent mouth pain and chronic inflammation, can interfere with early childhood feeding and growth, and be an under-investigated as well as an under-treated contributor to stunting malnutrition during early childhood. Further extended longitudinal studies are warranted to examine the complex relationship between severe early childhood caries and malnutrition.



P046

## Application of SDF versus ART restoration in treating dentine caries lesions in primary teeth

W. Chan, M. Jiang, C. Chu, E. Lo

The University of Hong Kong, Tsuen Wan, Hong Kong.

**Objectives:** This study aimed to compare the clinical outcomes of placing atraumatic restorative treatment (ART) restorations with those of semi-annual application of silver diamine fluoride (SDF) solution in treating decayed primary teeth in preschool children.

**Methods:** This randomized clinical trial was conducted in 23 kindergartens in Hong Kong. After obtaining written parental consent, children aged 3-4 years who had cavitated dentin caries lesions in their primary teeth were randomly assigned to receive either ART restorations (Ketac Molar, 3MESPE, Germany) or semi-annual application of 38% SDF solution (Saforide, Toyo Chemical, Japan). All treatments were carried out in the kindergartens using hand instruments only. The treated teeth were examined by an independent blinded examiner every 6 months using ball-ended probes and disposable dental mirrors attached to a handle with an intra-oral LED light source. Clinical success was defined as the treated tooth having no active caries, other signs (e.g. abscess) or symptoms; and for teeth in the ART group, the restoration being retained and without major defect

**Results:** A total of 412 children received treatment at baseline, with 208 and 204 in the SDF and ART groups, respectively. There was no significant difference between the baseline mean ( $\pm$ SD) dft scores of children in the SDF ( $5.0\pm 3.5$ ) and the ART ( $4.9\pm 3.5$ ) groups. So far, 160 and 154 treated lesions in the SDF and ART groups, respectively, were assessed after 24 months. In 81% of the SDF treated lesions, the surface was hard and there were no signs of active caries or discomfort. No significant differences in the caries arrest rates of different classes of lesions were found (Chi-square test,  $p>0.05$ ). About one-third (32%) of the ART restorations were present and had no or only minor defect. The success rates of ART restorations ranged from 0% in Class III to 40% in Class I restorations.

**Conclusions:** So far in this clinical trial, the 24-month clinical success rate of SDF treatment was higher than that of ART restorations. This study is still ongoing and more findings will be reported later.

## Detecting efficiency of pit and fissure sealant in penetrating the full-depth of occlusal fissures using optical coherence tomography

P. Sukumaran<sup>1</sup>, M. A. Gonzalez<sup>2</sup>, H. Rahim<sup>1</sup>, N. Johari<sup>1</sup>

<sup>1</sup>University of Malaya, Kuala Lumpur, Malaysia.

<sup>2</sup>Private Practice, Manila, Philippines.

**Objectives:** This study aimed to evaluate the penetrability of pit and fissure sealant (PFS) in covering the full-depth of different occlusal fissure depths using swept-source optical coherence tomography (SS-OCT).

**Methods:** Ninety-seven investigation sites of occlusal fissures on fifteen premolars with ICDAS 01 or 02 were categorized using SS-OCT into four groups (smooth, shallow, intermediate, and deep fissures) based on the classification used by Ito et al. (2016). After pit and fissure sealant placement, cross-sectional images of these fissures were observed again with SS-OCT. Randomly selected samples from each group were examined under stereomicroscope and the resulting cross sectional images were qualitatively compared with OCT images.

**Results:** The result of this study showed that pit and fissure sealants (PFS) can fully penetrate the smooth fissures (100%) followed by shallow fissures (94.2%) and intermediate fissures (47.6%). There was incomplete PFS penetration in all deep fissures (100%). The depth of PFS penetration into fissures observed using OCT B-scans (cross sectional images) were comparable with cross sectional stereomicroscope images.

**Conclusions:** In conclusion, the depth of the fissure will largely affect the penetrability of pit and fissure sealants into the fissure.



## Silver Diamine Fluoride Application in Deep Carious Lesions: In Vitro

J. Manuschai, S. Talungchit, S. Naorungroj

Faculty of Dentistry, Prince of Songkla University, Hat Yai, Songkhla, Thailand.

**Objectives:** This study aimed to evaluate depth and pattern of silver penetration in deep carious lesions in permanent teeth treated with 38% silver diamine fluoride (SDF).

**Methods:** Six extracted human permanent teeth with carious lesion extending inner third of dentin were randomly divided into 2 groups, according to deep caries removal technique. Peripheral soft carious infected dentin was completely removed at DEJ in both groups. Group A: soft carious infected dentin was left pulpally, while Group B: leathery to soft carious infected dentin was left pulpally. Then, both groups were treated with 38% SDF for 3 minutes and rinsed with distilled water for 10 seconds. Before and after SDF application, the samples were scanned using micro-CT (voxel size 18.5  $\mu\text{m}$ ) to measure mineral density. Two parameters were calculated, which were estimated lesion depth and estimated penetration depth. The samples were then fixed with 2.5% glutaraldehyde, 0.1% osmium tetroxide, and dehydrated in ascending ethanol concentrations. The samples were embedded in clear resin and sectioned through the region of interest. The pattern of silver particles penetration was assessed by FE-SEM and EDS-point scan.

**Results:** The micro-CT analysis showed that the estimated silver penetration depth was greater than the estimated lesion depth (200-300  $\mu\text{m}$ ). Depending on mineral density and remaining dentin thickness, silver can penetrate into underneath dentin or dental pulp in both groups. FE-SEM images showed that silver particles densely deposited at superficial lesions and occluded in dentinal tubules. EDS-point scan confirmed that increased mineral density was a result from silver particles precipitation.

**Conclusions:** The silver penetration depth is positively associated with the lesion depth. SDF is a promising conservative method for deep carious lesion management.

P049

## In-Vitro Antibacterial Efficacy of Methanolic Extract of *Vitex parviflora* A. Juss Leaves Against *Streptococcus Mutans*

M. A. Hemedes, A. A. Mangaliag, R. S. Ruedas, J. Rebueno Santos

University of the Philippines Manila, Manila, Philippines.

**Objectives:** Studies have shown antibacterial activities of methanolic crude extracts of *Vitex parviflora* A. Juss (molave) leaves and stem against *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa* and *Bacillus subtilis* but, has not been tested against oral pathogens. This study determined the antibacterial efficacy of molave leaves extract on growth inhibition of *Streptococcus mutans*.

**Methods:** An in vitro experimental design was used to determine the antibacterial efficacy of molave leaves extract on the inhibition of *Streptococcus mutans* through disk diffusion method. For cost-efficiency, total sample size of 80 plates were reduced by placing 5 test groups in one plate divided in 5 portions. The test was done in 18 replicates. From a single tree, 500 grams of fresh molave leaves were collected and subjected to a methanolic extraction process. Molave extracts in 50 mg/ml and 100 mg/ml concentrations, 0.12% chlorhexidine, distilled water, and 95% methanol were tested on 18 Mueller-Hinton agar (MHA) plates inoculated with *Streptococcus mutans*. Plates were incubated for 48 hours in anaerobic conditions and resulting zones of inhibition of each solution were measured with a millimeter ruler. Data were then analyzed through one-way ANOVA and Bonferroni tests.

**Results:** Mean diameter of zones of inhibition produced by 100 mg/ml and, 50 mg/ml concentrations of *Vitex parviflora* A. juss methanolic leaves extract, and 0.12% chlorhexidine were 15.78mm, 11.63 mm, and 21.44mm respectively. Both distilled water and 95% methanol did not inhibit bacterial growth. Results suggest that 100 mg/ml concentration has stronger antibacterial properties than 50 mg/ml concentration. Furthermore, both concentrations of molave leaves extract were relatively weaker compared to chlorhexidine.

**Conclusions:** *Vitex parviflora* A. juss methanolic leaves extract have the ability to inhibit the growth of *Streptococcus mutans*, under ideal circumstances, based on the diameter of zone of inhibition through disk diffusion method.

## Effects of epigallocatechin-3-gallate on properties of a double-species cariogenic biofilm

F. Tsai<sup>1</sup>, C. Wu<sup>1, 2</sup>, S. Yang<sup>2, 3</sup>, S. Hung<sup>1, 2</sup>

<sup>1</sup>Department of Dentistry, Institute of Oral Biology, Taipei, Taiwan.

<sup>2</sup>Department of Stomatology, Taipei, Taiwan.

<sup>3</sup>Department of Dentistry, Taipei, Taiwan.

**Objectives:** Epigallocatechin-3-gallate (EGCG) was shown to be a potential caries-protective agent and an inhibitor against biofilm formation of the cariogenic *Streptococcus mutans* (Sm). However, whether EGCG could still reduce biofilm formation when an antigenizer of Sm, *S. sanguinis* (Ss), was present. In this study, effects of EGCG on the properties of biofilms formed by Sm or/and Ss were characterized.

**Methods:** Biofilms of Sm alone, Ss alone or Sm-Ss co-cultures (Sm-Ss) were formed in the absence or presence of EGCG (0-16µg/ml) in chemically defined media. Biomass of biofilms were measured by the crystal violet assay. Morphology were observed by scanning electron microscopy (SEM). Distribution of live/dead bacteria, extracellular polysaccharides (EPS) or extracellular DNA (eDNA) was stained with the LIVE/DEAD kit, Fluorescein-conjugated dextran or SYTOX, respectively, and then observed by confocal laser microscopy. Concentrations of H<sub>2</sub>O<sub>2</sub> in culture media were determined by the Amplex Red assay.

**Results:** EGCG (4µg/ml) reduced biomass or levels of live bacteria in Sm biofilms, when 2µg/ml was required reduction in Ss or Sm-Ss biofilm. Bacterial density in biofilms was also decreased by EGCG. Growing biofilms with 0-2µg/ml EGCG did not change levels of dead bacteria in Sm biofilms, which, meanwhile, were higher than Ss or Sm-Ss biofilms. EGCG (4µg/ml) reduced amounts of dead bacteria in Sm biofilms, while 8µg/ml decreased dead bacteria in Ss or Sm-Ss biofilms. EPS responded to EGCG similarly to changes in dead bacteria; however, the level of EPS tended to be higher in Sm-Ss biofilms than in Sm biofilms. EGCG (0-8µg/ml) gradually increased eDNA in Sm or Sm-Ss biofilms in a dose-dependent manner, but it didn't affect eDNA levels in Ss biofilms. EGCG decreased H<sub>2</sub>O<sub>2</sub> levels of Ss or Sm-Ss groups in a dose-dependent manner, while H<sub>2</sub>O<sub>2</sub> was unaffected in Sm groups.

**Conclusions:** EGCG differently interfered properties of Sm, Ss or Sm-Ss biofilms.

## GM-CSF activated neutrophils induce neovascularization in triple cell co-culture model

T. Herath<sup>1,2</sup>, M. L. Hui<sup>1</sup>, A. Larbi<sup>3</sup>, S. H. Teoh<sup>4</sup>, C. J. Kirkpatrick<sup>5</sup>, B. T. Goh<sup>6</sup>

<sup>1</sup>Oral Health Academic Clinical Programme, National Dental Centre of Singapore, Singapore, Singapore.

<sup>2</sup>Duke-NUS Graduate Medical School, Singapore, Singapore.

<sup>3</sup>Singapore Immunology network, Agency for Science, Technology and Research, Singapore, Singapore.

<sup>4</sup>Division of Bioengineering, School of Chemical and Biomedical Engineering, Nanyang Technological University, Singapore, Singapore.

<sup>5</sup>Clinic for Cranio- & Maxillofacial Surgery, University Medical Centre, Johann Wolfgang Goethe University, NA, Germany.

<sup>6</sup>Oral & Maxillofacial Surgery, National Dental Centre of Singapore, Singapore, Singapore.

**Objectives:** Neovascularization is an important part of bone tissue engineering. Inadequate neovascularization hinders proper transport of nutrients and oxygen supply to the bone graft, resulting in failure of the bone regeneration. Previously we demonstrated that neutrophils enhance angiogenesis and osteogenesis in a triple cell co-culture model. However, the major limitation factor for practical application of neutrophils is their short lifespan. Granulocyte macrophage colony-stimulating factor (GM-CSF) has shown to enhance the survival of neutrophils. The objective of the present study was to investigate the efficacy of GM-CSF activated neutrophils to enhance angiogenesis in bone regeneration.

**Methods:** Human neutrophils were isolated from peripheral blood according to a previously optimized protocol. Primary osteoblasts (HOB) and endothelial cells (HUVECs) were co-cultured in the transwell system and the effect of GM-CSF activated neutrophils was examined by dose- and time-dependent assays using different doses of 0.5-100ng/ml GM-CSF for 4-72 h. In-vitro angiogenic potential of GM-CSF activated neutrophils was evaluated on proliferation, expression of angiogenic markers and microvessel formation by cell-counting, qRT-PCR, ELISA and confocal immunofluorescence assays respectively.

**Results:** GM-CSF activated neutrophils significantly up regulated the gene expression levels of pro-inflammatory marker IL-8, basic angiogenic markers VEGF-2, EGF, FGF-2 and MMP-9 compared to the non-activated neutrophils in dose- and time- dependent manner ( $P < 0.05$ ). Moreover, the protein expression levels of VEGF-2 and MMP-9 were significantly induced by GM-CSF activated neutrophils compared to controls ( $P < 0.05$ ). Notably, activated neutrophils accelerated proliferative capacity of HUVECs in a time course study. Interestingly, formation of microvessel-like structures was comparatively increased by activated neutrophils as indicated by CD31 expression at 14 days.

**Conclusions:** This study provided a new insight on the positive activity of GM-CSF activated neutrophils on neovascularization in bone regeneration. This novel strategy to enhance microvasculature may bring significant advantages in the field of bone tissue engineering, particularly for treating bone defects in oral-maxillofacial region.

P052

## Impact of Early Biofilm on the Assessment of Enamel Erosion with Optical Coherence Tomography

A. Abdul Aziz<sup>1</sup>, M. A. Gonzalez<sup>1</sup>, A. U. Yap<sup>2, 1</sup>

<sup>1</sup>Restorative Dentistry, University of Malaya, Kuala Lumpur, Malaysia.

<sup>2</sup>Department of Dentistry, National University, Singapore, Singapore.

**Objectives:** To examine the impact of early biofilm formation on the optical coherence tomographic (OCT) assessment of initial enamel erosion.

**Methods:** Forty-five enamel windows of 2 x 4mm<sup>2</sup> were prepared on extracted human teeth. The specimens were exposed to citric acid (pH 3.2) for 30 minutes and randomly divided into three groups (n=15): Group 1 - no biofilm, Group 2 – 1 day old biofilm, and Group 3 – 3 days old biofilm. The biofilms were formed with three species of oral bacteria (*Strep sanguinis*, *Strep mitis* and *Actinomyces* sp). Specimens in Groups 2 and 3 were inoculated to produce early laboratory-cultivated biofilms for 1 and 3 days, respectively. Surface microhardness (SMH) measurements were taken at pre- (t1) and post-erosion (t2); and Swept-source OCT (SS-OCT) scans were done at t1, t2 and post-biofilm cultivation (t3). Integrated reflectivity (IR) of the tooth-air interface (IR<sub>surface</sub>) and enamel (IR<sub>enamel</sub>) were computed from the mean A-scans. Statistical analysis was performed using paired T-tests and one-way ANOVA ( $\alpha=0.05$ ).

**Results:** A significant decrease in SMH and increase in IR<sub>enamel</sub> was observed at t2 ( $p<0.05$ ). At t3, IR<sub>surface</sub> between Group 1 (control) and Group 2 ( $p = 0.012$ ) as well as Group 3 ( $p = 0.001$ ) were significantly different. As significant variances in IR<sub>enamel</sub> were perceived between t2 and t3 for Groups 2 and 3 but not Group 1, it was determined that biofilm impacted the OCT assessment of initial enamel erosion.

**Conclusions:** Biofilm on the tooth surface should thus be removed prior to clinical OCT assessment.

## Overexpression of Ifd6p Increased Farnesol Level in *Candida dubliniensis* Biofilms

P. Tsang<sup>1</sup>

Technological and Higher Education Institute of Hong Kong, Hong Kong.

**Objectives:** To investigate the in vitro effects of overexpression of ADH5, CSH1, and IFD6 on levels of excreted alcohols and virulence in *Candida dubliniensis* biofilms.

**Methods:** Overexpression of ADH5, CSH1, and IFD6 in *C. dubliniensis* Wü284 was achieved using a PCR-based gene targeting method. Overexpression was verified by real time quantitative PCR (RT-qPCR). *C. dubliniensis* biofilms were prepared in microtiter plates (polystyrene, flat bottom 24-well). The cell suspension (1 mL, 10<sup>7</sup> cells/mL in PBS) was transferred to the wells and incubated at 37°C, 80 rpm for 1.5 h. Unattached fungal cells were washed away, and added with fresh YPD (1 mL) with doxycycline (50 µg/mL) and further incubated for 48 h. Composition of excreted alcohols in culture supernatant was evaluated by gas chromatograph-mass spectrometer equipped with an HP 19091B-005 50-m capillary column at a flow rate of 1 mL/min. Peaks were identified and quantified by comparing with the retention times and MS spectra of authenticated alcohol standards. Virulence was evaluated using oral reconstituted human epithelial (RHE) tissues. Sections of 1 µm-thick were cut and stained with hematoxylin and eosin, and viewed under light microscope. Released lactate dehydrogenase from the RHE tissues was determined using CytoTox 96 nonradioactive cytotoxicity assay.

**Results:** Four kinds of alcohols (isoamyl alcohol, phenethyl alcohol, nerolidol, and farnesol) were detected and authenticated. Level of farnesol was increased by ~23% ( $P < 0.05$ ) in IFD6-overexpressed *C. dubliniensis* when compared with their control. There was no significant difference in alcohol levels in ADH5-overexpressed and CSH1-overexpressed *C. dubliniensis*. The virulence of all *C. dubliniensis* biofilms was similar to that of the reference strains.

**Conclusions:** IFD6 is a gene that is involved in biosynthesis of farnesol in *C. dubliniensis* biofilms. Overexpression of IFD6 in *C. dubliniensis* leads to increased level of farnesol without any effect on fungal virulence.

## CPP-ACP Varnish Treatment Effect on Oral Microbiome Metagenomic Profile in Children

A. S. Widyarman<sup>1</sup>, C. F. Theodorea<sup>3</sup>, A. Apriani<sup>2</sup>,  
T. E. Astoeti<sup>4</sup>, C. J. Seneviratne<sup>5</sup>

<sup>1</sup>Microbiology, Faculty of Dentistry, Trisakti Universitas, Jakarta, DKI Jakarta, Indonesia.

<sup>2</sup>Department Pediatric Dentistry, Faculty of Dentistry, Maranatha University, Bandung, West Java, Indonesia.

<sup>3</sup>Department of Oral Biology, Faculty of Dentistry, Universitas Indonesia,, Jakarta, DKI Jakarta, Indonesia.

<sup>4</sup>Department of Public health, Faculty of Dentistry, Trisakti University, Jakarta, DKI Jakarta, Indonesia.

<sup>5</sup>Academic Clinical Program, National Dental Center Singapore, SingHealth Duke NUS, Singapore, Singapore, Singapore.

**Objectives:** The oral microbiome plays major roles in many oral diseases, including early childhood caries. Caries is associated with alterations of the oral microbiome, including changes in microbial composition and the metabolic functional profile. A topical application of casein phosphopeptide–amorphous calcium phosphate (CPP–ACP) containing fluoride can reduce oral pathogens such as *Streptococcus mutans* in children's saliva and the risk of dental caries. The aim of this study was to investigate the efficacy of a CPP–ACP varnish on the plaque microbiome metagenomic profile in children and its potential role in the prevention of dental caries.

**Methods:** This preliminary study included 10 children aged 8–9 years. The children received topical fluoride CPP–ACP once a week for one month. Plaque samples were collected from 10 children before and after the procedures. Genomic DNA extraction was performed using a Geneaid Presto Buccal Swab gDNA Extraction Kit. Sequencing was performed using an iSeq 100 NGS System.

**Results:** We discovered several unique bacteria that were significantly different between pre- and post-treatment groups, such as over-abundance of *Gemella haemolysans*, *Granulicatella elegans*, and *Schwartzia succinivorans* after CPP-ACP treatment, and significantly less abundant of *Lautropia mirabilis* in post-treatment groups ( $p < 0.05$ ). *G. elegans* and *G. haemolysans* are bacteria usually found in healthy human oral. These bacteria are usually fastidious in growth and difficult in identification, therefore its clinical importance is commonly overlooked, but could become potential biomarkers of successful treatment.

**Conclusions:** The plaque microbiome in the oral cavity of children aged 8–9 years is a highly heterogeneous ecosystem. Microbial composition changes were observed after CPP–ACP treatment. The abundance and diversity of the oral microbiome differed between the pre- and post-treatment plaque sample groups. Using culture-independent techniques could discover new potential biomarkers for evaluating the efficacy of dental treatment, especially using CPP-ACP.

P055

## Lansoprazole Delays Extraction Sockets Healing in Bisphosphonate-medicated Mice

R. Yoshioka

Department of Medical System Engineering, Graduate School of Biomedical and Health Sciences,  
Hiroshima University, Hiroshima City, Japan.

**Objectives:** Developing Medication / Anti-resorptive agents / Bisphosphonate -related osteonecrosis of the jaw (ONJ) is a rare but potentially severe adverse effect in patients using anti-resorptive drugs. The Japanese Allied Committee on Osteonecrosis of the Jaw proposed several risk factors including antiresorptive agents, systemic, congenital, lifestyle and co-administered agents. Whereas this position paper mentioned that these risk factors are including hypothesis without robust medical evidence. In 2017, a large-scale cohort study targeting osteoporosis patients in Denmark was reported. It suggested that risk of surgically treated Bisphosphonate-related ONJ (BRONJ) was higher in patients with use of Proton Pump Inhibitors (PPIs). Here, we evaluate the impact of co-administration of Bisphosphonate and PPIs on the healing of extraction sockets in mice.

**Methods:** We used zoledronic acid (ZA) as bisphosphonate, and Lansoprazole (LP) as PPI in this study. Six-week-old female C57BL/6J mice were treated with ZA intravenously twice in a week and/or LP intraperitoneally for 3 consecutive days followed by a 1-day off, for 3 weeks. After 1 week of starting the animal experiment, tooth extraction was carried out in all groups. Micro CT scans were carried out to evaluate the healing of extraction sockets. New bone volume (bone volume fraction; BV/TV) and Trabecular Separation (Tb.Sp) were used as the parameters for extraction socket healing.

**Results:** Micro CT analysis for alveolar bone revealed that BV/TV in ZA/LP-medicated group was significantly lower compared with saline, ZA or LP single administration group. In addition, the value of Tb.Sp in ZA/LP-medicated group was significantly higher compared with other groups.

**Conclusions:** Our results suggested long-term administration of PPI may delay healing of extraction sockets in patients with Bisphosphonate treatment.



## Associations of Antibody Levels to Porphyromonas gingivalis and Atrial Fibrillation

T. Hoshino<sup>1</sup>, N. Kaneko<sup>1</sup>, A. Yoshihara<sup>1</sup>, K. Suwama<sup>1</sup>, Y. Ito<sup>2</sup>, J. Tanaka<sup>3</sup>,  
I. Narita<sup>2</sup>, H. Ogawa<sup>1</sup>

<sup>1</sup>Faculty of Dentistry & Graduate School of Medical and Dental Sciences, Niigata University, Niigata City, Japan.

<sup>2</sup>Graduate School of Medical and Dental Sciences, Niigata University, Niigata City, Japan.

<sup>3</sup>Niigata University Medical and Dental Hospital, Niigata City, Japan.

**Objectives:** The present study aimed to examine the association between periodontal condition based on the plasma antibody levels to periodontopathic bacteria and a history of atrial fibrillation (AF).

**Methods:** A cross-sectional study was conducted on 1,740 participants (1,199 men and 541 women) aged 60–79 years using the baseline health survey data in the Uonuma region of Japan from 2012 to 2014. Data were collected from medical examinations, self-administered questionnaires that enquired about a history of AF, and plasma IgG antibody levels to *Porphyromonas gingivalis* gingipain. A history of AF (0: absence, 1: presence) was used as a dependent variable while antibody levels (0: third quartile, 1: >third quartile) and a history of angina pectoris were considered independent variables. Age and sex were used as covariates. Multivariate logistic regression analysis was conducted to determine the association between antibody levels to *P. gingivalis* and a history of AF.

**Results:** Among 1,740 participants, 39 (2.2%) had AF. Participants with higher antibody levels to *P. gingivalis* showed a significantly higher prevalence of AF than those with lower antibody levels (4.1% vs. 1.6%;  $p < 0.05$ ). Multivariate logistic regression analysis showed that participants with higher antibody levels to *P. gingivalis* had an approximately 3- fold higher odds of having AF (OR = 2.71; 95% CI = 1.42–5.14).

**Conclusions:** A correlation was observed between antibody levels to *P. gingivalis* and a history of AF in Japanese adults aged 60–79 years. These results may suggest that periodontal condition contributes to AF onset.

P057

## Characterization and cytotoxicity of the acid soluble, porcine skin extracted collagen on periodontal ligament cells

P. Thunyakitpisa<sup>1</sup>, A. Thant<sup>2</sup>

<sup>1</sup>Anatomy, Chulalongkorn University, Bangkok, Thailand.

<sup>2</sup>Dental Biomaterials Science Program, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** To characterize acid soluble collagen extracted from porcine skin and investigate its cytotoxicity in primary periodontal ligament cells

**Methods:** The native collagen was extracted using an enzymatic-acid technique. The porcine skins were washed thoroughly in ice-cold normal saline solution. After removing hair, the skins were stripped of remaining fat, noncollagenous proteins and polysaccharides using sodium hydroxide, and the mixture of acetic acid and 0.1% (w/w) enzyme pepsin, respectively. The acid soluble collagen extracts were further precipitated with 3 M sodium chloride, and collected by centrifugation. The white precipitant was dialyzed in 20 volumes of ice-cold dH<sub>2</sub>O, frozen, and lyophilized. The lyophilized extracted collagen was further characterized using the amino acid content analysis and SDS-PAGE. Primary periodontal ligament cells were treated with the conditioned media of 5, 10, 25, 50, and 100 mg extracted collagen for 24 h. The cytotoxicity was evaluated using MTT based colorimetric assay. Three independent experiments were performed. Data were collected and analyzed using SPSS program. p value less than 0.5 was considered significant.

**Results:** The major composition of the extracted collagen were glycine, proline, and hydroxyproline. The approximately 100, 200, and 300 kDa polypeptide bands were observed. The MTT assay demonstrated that the 100 mg collagen conditioned media significantly reduced cell viability at 24 h ( $p < 0.05$ ). The condition medium of 5, 10, and 25 mg collagen slightly increased cell viability, while that of 50 mg collagen slightly decreased cell viability.

**Conclusions:** The extracted collagen at 5, 10, 25, and 50 mg were biocompatible to primary periodontal ligament cells.

## Vital Pulp Therapy in Carious Pulp Exposed Permanent Teeth: Review

D. J. Leong, A. U. Yap

Dentistry, Ng Teng Fong General Hospital, Singapore.

**Objectives:** There has been increased evidence indicating rather high success rates of vital pulp therapies and these procedures are suggested as possible alternative treatments for permanent teeth with carious pulp exposure. This umbrella review aimed to provide an overview of existing systematic reviews regarding the outcomes of vital pulp therapy, specifically direct pulp capping, partial pulpotomy, and full pulpotomy, in carious pulp exposed permanent human teeth.

**Methods:** The review process was registered in PROSPERO (CRD42020156694). The specific PICO questions were: Population - permanent human teeth with carious pulp exposure; Intervention - direct pulp capping with pulp capping materials; Comparators - partial pulpotomy and full pulpotomy; Outcomes success rate and prognostic factors. PubMed, Ovid, and Cochrane databases were searched in conjunction with hand searching. Grey literature was searched too. The searches were last conducted on May 5, 2020. Study selection, data extraction and study appraisal (AMSTAR 2 criteria) were performed independently by two authors. A consensus was reached through discussion when disagreements arose.

**Results:** Six articles fulfilled the inclusion criteria. Higher and more predictable success rates of 2 years were observed for partial pulpotomy and full pulpotomy in carious pulp exposed permanent human teeth as compared to direct pulp capping. Possible prognostic factors (pre-operative pulp status, pulp capping material and apex closure) yielded conflicting results. Restorative material, periapical status at baseline, final irrigation solution, age and study type did not seem to affect the treatment outcome.

**Conclusions:** This is the first umbrella review of vital pulp therapy in permanent human teeth with carious pulp exposure. Based on the current evidence, vital pulp therapy (partial pulpotomy and full pulpotomy in particular) is a reliable treatment option for permanent teeth with carious pulp exposure and could be considered as an alternative for root canal treatment. However, more high-quality studies are required to corroborate this finding.

P059

## Resistance of *P.gingivalis*, *S.aureus*, *P.aeruginosa* to a Cetyl Pyridinium Chloride-containing Mouthwash.

H. Taninokuchi<sup>1</sup>, H. Nakata<sup>1</sup>, Y. Takahashi<sup>2</sup>, K. Inoue<sup>1</sup>, S. Kasugai<sup>1</sup>, S. Kuroda<sup>1</sup>

<sup>1</sup>Department of Oral Implantology and Regenerative Dental Medicine, Division of Oral Health Sciences, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University, Tokyo, Japan.

<sup>2</sup>Clinical Laboratory of Dental Hospital, Tokyo Medical and Dental University, Tokyo, Japan.

**Objectives:** To evaluate the bactericide effect of a Cetyl Pyridinium (CPC), Tranexamic Acid (TXA), and Dipotassium Glycyrrhizinate(Gk2)-based mouthwash in *P.gingivalis*, *Staphylococcus aureus* sp., *Pseudomonas Aureuginosa* sp. all being microorganisms known for its high pathogenicity and drug-resistance.

**Methods:** *Porphyromonas gingivalis* (ATCC® 33277TM) (*P.gingivalis*), *Staphylococcus aureus* subsp.aureus KWIK-STIKTM (ATCC® 29213TM) (*S.aureus*), and *Pseudomonas aeruginosa* KWIK - STIKTM (ATCC® 27853TM) (*P.aeruginosa*) were evaluated in presence or absence of CPC, TXA, and Gk2(+) or CPC, TXA, and Gk2(-) in vitro. Solutions containing *S.aureus* and *P.aeruginosa* were plated into BD Trypticase Soy Agar II with 5% Sheep Blood (BD Diagnostics), and results were analyzed after 48 hours of aerobic incubation. Whereas for *P.gingivalis*, bacterial solutions were plated in Brucella HK agar (Kyokuto Pharmaceutical Industrial Co.,Ltd.) and results were analyzed after 96 hours of anaerobic incubation which was achieved by Mitsubishi™ AnaeroPacks, all procedures were repeated 4 times. A quantitative analysis was performed with ImageJ (version 2.0.0) in order to measure the amount of surface colonization of the plates by bacteria. The p-value was evaluated with an unpaired F test to compare variances (Prism8 for MacOS). Results with a p-value <0.05 were considered as statistically significant.

**Results:** The bactericide effect in Cpc, Gk2, TXA (+) was evidently total for *P.gingivalis*, and significant for *S.aureus* and *P.aeruginosa* compared to plates belonging to Cpc, Gk2, TXA (-).

**Conclusions:** Surface colonization by *P.gingivalis*, *S.aureus*, and *P.aeruginosa* was inhibited by a CPC, Gk2 and TXA-containing solution. Taken altogether, these results show that a mouthwash containing these agents, might inhibit the proliferation of these bacteria.

## Proximity of roots of maxillary posterior teeth to maxillary sinus floor in a sample of Pakistani population using Cone Beam Computed Tomography

M. Motiwala, A. Arif, R. Ghafoor

Surgery-Operative Dentistry, Aga Khan University Hospital, Karachi, Pakistan.

**Objectives:** To evaluate the vertical relationship of the roots of maxillary posterior teeth with maxillary sinus floor in a sample of Pakistani population using cone-beam computed tomography (CBCT) and to relate it with gender and compare right and left sides.

**Methods:** Ethical review committee approval was obtained prior to commencement of the study. 60 CBCT scans of individuals aged between 15-65 years were evaluated. The cross-sectional images in the axial, coronal, and sagittal planes were reconstructed using GALAXIS version 1.9 and roots classified into Jungs classification for proximity to maxillary sinus floor. The distance in mm between the sinus floor and the apices of maxillary posterior teeth was measured using the software. Descriptive statistics for Jungs classification was computed. Paired t-test was applied to evaluate bilateral symmetry and independent t-test for difference in gender.

**Results:** In 60 CBCT scans, a total of 1066 roots were evaluated. The most common maxillary tooth root in Type III group of Jung classification is the mesio-buccal root of the 2<sup>nd</sup> molar followed by palatal roots of 1<sup>st</sup> molar with the shortest mean distance of  $0.44 \pm 3.05$ mm and  $1.58 \pm 4.01$ mm respectively. The maxillary tooth root most frequent in Type I group is buccal root of 1<sup>st</sup> and 2<sup>nd</sup> premolars with mean distance of  $8.15 \pm 6.65$ mm and  $7.38 \pm 6.60$ mm respectively. No statistically significant difference was found between gender and sides. (p 0.05).

**Conclusions:** In a sample of Pakistani population, among the roots of the maxillary molars, the most common root protruding in the sinus, was the mesio-buccal root of the 2<sup>nd</sup> molar followed by palatal roots of 1<sup>st</sup> molar. The most distant maxillary tooth root from the sinus was the buccal root of 1<sup>st</sup> and 2<sup>nd</sup> premolars.

P061

## Minimally Invasive Surgical Management of Multiple Gingival Recession Defects: A Case Study

Vandana Daqa

Manipal College of Dental Sciences, Mangalore, Manipal Academy of Higher Education, India

**Objectives:** Evaluate Clinical and Patient reported outcome (PROMs) for Platelet Rich Fibrin (PRF) with Minimally Invasive Coronally Advanced Flap (MICAFA) for the treatment of Multiple Gingival Recession Defects (MGRD).

**Methods:** 3 systemically healthy patients with MGRD categorized as RT1 or 2 were included. The clinical parameters measured were Recession height & width (RH, RW), Probing depth (PD), Clinical Attachment Level (CAL), Width of Keratinized Tissue (WKT), Gingival Thickness (GT) and PROMs, at baseline and 6 months.

**Results:** At 6 months, RH, RW, CAL and WKT showed statistically significant improvement. Irt. GT, even though the follow-up measurements were superior to baseline, it wasn't statistically significant. All the patients reported with no complications and were comfortable with the surgical procedure.

**Conclusions:** The use of PRF with MICAFA resulted in almost complete root coverage and can be a patient compatible treatment alternative for the management of MGRD.

P062

## Cone Beam Computed Tomographic Assessment of C-shaped Canal in Malaysian Chinese Mandibular Molars

Amanda Liaw Li Qi, Cheah Chooi Kei, Sham Kishor Kanneppady,  
Venkateshbabu Nagendrababu, Shekhar Bhatia

International Medical University, Kuala Lumpur, Malaysia.

**Objectives:** The study aimed to evaluate the prevalence of C - shaped canal in mandibular molars of the Malaysian Chinese population using cone beam computed tomography(CBCT).

**Methods:** CBCT scans of 187 Malaysian Chinese patients(374 mandibular first molars, 374 mandibular second molars)were analysed. Root canal morphology was observed at five cross-sectional levels of root. Fan et al. classification was used to categorise the C-shaped canal.

**Results:** The prevalence of C-shaped canal in mandibular first and second molar was 1.1% and 33.2%. C-shaped canal showed statistically significant higher prevalence in mandibular second molar bilaterally and in the female population( $P<0.05$ ). It was statistically significant that C-shaped canal was most frequently located in the coronal cross-sectional level of the root( $P<0.05$ ).

**Conclusions:** The high prevalence of C-shaped canal in mandibular molars of the Malaysian Chinese population highlights the need to recognise C-shaped canal in endodontic treatment.

P063

## Pain Perception, Attitude and Diet Quality of Patients Undergoing Fixed Orthodontic Treatment

E-Vien Mok, Umami Sofia Abdul Rahman, Saxena Kirti, Snigdha Misra

International Medical University, Kuala Lumpur, Malaysia

**Objectives:** To assess pain perception, attitude and diet quality of patients undergoing fixed orthodontic treatment. Subsequently, to determine the correlation of pain perception with attitude and diet quality.

**Methods:** 103 patients with fixed orthodontic appliances on both arches were recruited. Information on pain perception, attitude and diet quality was collected through questionnaires. The correlation between variables were analysed using Pearson Correlation Coefficient.

**Results:** 90% of orthodontic patients had low pain perception; 98% had a positive attitude during treatment; a majority of 49.5% had moderate diet quality. There was no significant correlation between pain perception and diet quality( $p>0.05$ ) whilst a significant negative weak correlation between pain perception and attitude was found( $r=-0.289, p<0.05$ ).

**Conclusions:** Patients undergoing fixed orthodontic treatment have an overall low pain perception, positive attitude and moderate diet quality.



## Microbiological Evaluation of Sealing Materials for the Access Holes of Implant Restorations

Kensuke Inoue<sup>1</sup>, Hidemi Nakata<sup>1</sup>, Hiromi Taninokuchi<sup>1</sup>, Yuta Takahashi<sup>2</sup>,  
Shohei Kasugai<sup>1</sup>, Shinji Kuroda<sup>1</sup>

<sup>1</sup>Department of Oral Implantology and Regenerative Dental Medicine, Division of Oral Health Sciences, Graduate School of Medical and Dental Sciences, Tokyo Medical and Dental University.

<sup>2</sup>Clinical Laboratory of Dental Hospital, Tokyo Medical and Dental University.

**Objectives:** To evaluate the permeability of sealing materials used in access holes of screw-retained implant superstructures.

**Methods:** Fifteen screw-retained final restorations were randomly divided into 3 groups (n=5). Following disinfection and isolation, all access holes were initially filled with sterilized cotton pellets of same weight. Then, depending on the group, the access holes were finally sealed with either tempofill (DETAX), Fitseal (GC), or Unifast III Acrylic Resin (GC). After one-month of functional period, the inner cotton pellets were collected as bacterial reservoirs. The amount of Total Aerobics (TA) bacteria and total G [-] anaerobic (TGNA) bacteria was measured after bacterial culture of 48h and 72h respectively.

**Results:** Samples of Tempofill showed less CFU than Fit-seal and Acrylic resin.

**Conclusions:** In this study, Tempofill showed the best sealing properties as it might prevent bacterial invasion of the access hole of implant superstructure."



## Quaternary Ammonium Silane based Antimicrobial Triggers Biofilm Destruction and Cleaves MMPs: A Molecular Simulation Study

Esther Kok Sook Kuan<sup>1</sup>, Lim Xian Jin<sup>1</sup>, Chew Soo Xiong<sup>1</sup>, Ong Shu Fen<sup>1</sup>, See Lok Yin<sup>1</sup>, Lim Siao Hua<sup>1</sup>, Wong Ling Ang<sup>1</sup>, Amalraj Fabian Davamani<sup>2</sup>, Venkateshbabu Nagendrababu<sup>1</sup>, Amr Fawzy Moussa<sup>3</sup>, Umer Daood<sup>1</sup>

<sup>1</sup>Division of Clinical Dentistry, School of Dentistry, International Medical University Kuala Lumpur, Malaysia

<sup>2</sup>Faculty of Biomedical Science, School of Health Sciences, International Medical University, Kuala Lumpur, Malaysia

<sup>3</sup>UWA Dental School, University of Western Australia, Nedlands, Australia

**Objectives:** Study antimicrobial effects of quaternary ammonium silane (QAS/k21) exposure on *Streptococcus mutans* and *Lactobacillus acidophilus* bacterial biofilms at different concentrations.

**Methods:** Discs with *Streptococcus mutans*/*Lactobacillus acidophilus* biofilms were cultured for 3-days, treated, un-treated with disinfectant and returned to culture for four-days. Small-molecule drug discovery-suite was used to analyze QAS/ Sortase-A active site. Cleavage of a synthetic fluorescent peptide substrate was used to analyze inhibition of Sortase-A. Biofilms were stained and analysis done with DAPI and SEM (without staining). Docking studies were carried out on MMP-2 S1 binding-domain with QAS.

**Results:** Sortase-A protein underwent conformational change due to QAS molecule, showing fluctuating alpha and beta strands. SEM demonstrated absence of bacterial colonies after treatment. DAPI staining decreased with 1% QAS ( $p < 0.05$ ). MMP-2 ligand binding was seen accurately indicating possible target sites for QAS intervention.

**Conclusions:** QAS demonstrated to be a potent antibacterial disinfectant and can be of potential significance in eliminating bacteria.

P066

## Effect of Dried Ginger Root (*Zingiber officinale*) Extracts on Age-related Hyposalivation in C57BL/6 mice

Kan Chang Yu, H'ng Jing Xuan, Frederick Smales,  
Tan Eng Lai, Abhishek Parolia

International Medical University, Kuala Lumpur, Malaysia

**Objectives:** The aim was to evaluate the effects of 70% methanol, 80% ethanol and 100% dimethyl sulfoxide (DMSO) extracts of dried ginger root (DGR) on the age-related hyposalivation in C57BL/6 mice.

**Methods:** Three DGR extracts were prepared through maceration process using 70% methanol, 80% ethanol and 100% DMSO. Twenty-eight 15 weeks old mice were divided into 4 groups. After the baseline saliva was measured at 15th week, the three DGR extracts and saline (control) were administered intraperitoneally for three weeks. The saliva measured at the end of treatment week was compared with the baseline and analysed with Kruskal-Wallis test.

**Results:** All three DGR extracts showed significant increase in salivation ( $P < 0.05$ ). 100% DMSO DGR extract showed the highest increase in salivation but no significant difference was observed among the three extracts.

**Conclusions:** All three DGR extracts were able to reverse the age-related hyposalivation in C57BL/6 mice, and 100% DMSO DGR extract was the most effective among the three DGR extracts.

## Identification of Bacteria Sample Plaque from Periodontal Disease among Diabetic Patients

Nur Fatimah Zaharah Salehuddin<sup>1</sup>, Amiratulaiman Abdullah Tahir<sup>1</sup>,  
Haslinda Ramli<sup>1</sup>, Tuti Ningseh Mohd Dom<sup>2</sup>, Shahida Mohd Said<sup>2</sup>,  
Rohazila Mohamad Hanafiah<sup>1</sup>

<sup>1</sup>Faculty of Dentistry Universiti Sains Islam Malaysia, Kuala Lumpur, Malaysia.

<sup>2</sup>Faculty of Dentistry Universiti Kebangsaan Malaysia, Kuala Lumpur, Malaysia.

Periodontal disease is a consequence of extension of the gingival inflammation to the underlying supporting structures of the periodontium, due to the presence of plaque and its substances on the surfaces of the teeth and adjacent structures. This research was conducted to identify bacteria that present in plaque sample among diabetic patients collected from dental clinic. About  $2.07 \times 10^6$  cfu/mL of bacteria had been successfully collected from periodontal plaques on diabetes patient. From the numbers, only 5 had been selected to identify the species. Four from the samples were Gram-positive bacteria, meanwhile one sample was identified as Gram-negative bacteria. All isolated samples were amplified using Polymerase Chain Reaction (PCR). The PCR products were purified and run gel electrophoresis to separate DNA fragments based on their size and charge. *Streptococcus mutans* and *Aggregatibacter actinomycetemcomitans* were identified from all samples via DNA sequencing.

## Application of Machine Learning on Periapical Disease Diagnosis on X-ray Images

A. K. Le

School of Dentistry, Hanoi Medical University, Ha Noi, Viet Nam

**Objectives:** We conducted this research to determine sensitivity, specificity and accuracy of machine learning in peri- apical diseases diagnosis on X- Ray images.

**Methods:** In our research, the model is constructed by applying Faster R-CNN combining with experts' knowledge. Experts have important roles in collecting data, labelling the lesion regions and choosing images for testing.

- *Step 1: Parameter selecting*
- *Step 2: Model training*
- *Step 3: Model testing*
- *Step 4: Model evaluating*

**Results:** Endodontist diagnosed 143 teeth with periapical lesions and 377 teeth without periapical lesions. For software's diagnosis, the sensitivity, specificity and accuracy is 89.5%, 97.9% and 95.6 %, respectively.

**Conclusions:** As can be seen from this study, artificial intelligent with faster R-CNN training can predict apical lesions properly with favorable result.



## Third Molar Maturity Index to Determine 18-year-old for Thai Population

S. Pholwong, T. Tanthanapinan, S. Chaysan,  
P. Sinpitakakul, P. Pittayapat

Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** The aim of this study was to determine the specific cut-off point in a Thai population to indicate that an individual was 18-years-old using the third molar maturity index previously reported.

**Methods:** 1000 digital panoramic radiographs were retrospectively evaluated from the hospital database at the Radiology clinic, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand. The samples were Thai, age 15-24 years old. The samples were categorized into 10 age groups. The width of the root apices and tooth length of the mandibular third molars were measured and the third molar maturity index (I3M) was calculated based on previously published method. The evaluations were performed by two observers. Twenty percent of the samples were randomly selected for repeated measurements after 4 weeks. Statistical analysis was performed.

**Results:** The new specific cut-off value of (I3M) in this Thai population was 0.1255. The sensitivity and specificity was 84.3% and 78.3%, respectively. The Youden index was 0.626, which was closer to 1 than the cut-off value previously reported (0.595) when applied to this Thai population. The probabilities of correctly classifying individuals were 89.7% in males and 87.0% females. Intraclass correlation coefficients showed excellent intra-observer (0.993) and inter-observer reliability (0.991).

**Conclusions:** This study found a new cut-off point of I3M specific for a Thai population. If the calculated I3M of an individual is  $<0.1255$ , there is a high probability that the person is 18 years old or older. The application of this new finding will be useful for identifying minors among illegal laborers and migrants in Thailand.

## Iloprost Treatment Induced Bone and Cementum Formation in an Immediate Rat Tooth Avulsion Model

N. Chenboonthai, N. Nisaeh, A. Teantongdee, S. Yodsanga, T. Osathanon, C. Limjeerajarus

Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** The aim of the present study was to evaluate the influence of root surface pretreatment with iloprost on the histomorphometric parameters of rat molars after immediate replantation.

**Methods:** Tooth replantation was performed on the maxillary molars of 8 weeks-old Wistar rats. The teeth were extracted and the root surfaces were treated with iloprost or Hanks' balanced salt solution (HBSS) prior to replantation. The animals were sacrificed after 30 days. Histological sections of the specimens were prepared and underwent hematoxylin and eosin (H&E) and tartrate-resistant acid phosphatase (TRACP) staining. Histological analyses were performed; bone volume (BV/TV), osteoclast surface (OC.S/BS), osteoclast volume density (N.Oc/T.Ar), osteoclast bone surface density (N.Oc/B.Pm), acellular cementum, and inflammatory score (IS). The results were analyzed using the Mann-Whitney test at the 95% significance level.

**Results:** Root and bone resorption, and inflammation occurred in both groups. The histomorphometric parameters; OC.S/BS, N.Oc/T.Ar, N.Oc/B.Pm, and IS were not significantly different between the iloprost-treated and the control groups. However, BV/TV was higher in the iloprost-treated group compared with the control HBSS group. Acellular cementum was observed in some specimens in the iloprost-treated group and the acellular cementum was thicker in the apical area compared with the coronal area.

**Conclusions:** The results demonstrated reduced root resorption and inflammation in the iloprost-treated group. Moreover, the increased bone volume and acellular cementum in the iloprost group indicate that iloprost may promote the healing process. These data suggest that iloprost could be further used to reduce root/bone resorption in clinical tooth replantation.



## Probiotic *Lactobacillus reuteri* Eliminates Mixed-Species Endodontic Biofilms through Reuterin-based Mechanism

L. Anastasya<sup>1</sup>, J. Jesslyn<sup>1</sup>, A. S. Widyarman<sup>2</sup>, C. J., Seneviratne<sup>3</sup>

<sup>1</sup>Trisakti University Faculty of Dentistry, Jakarta Barat, DKI Jakarta, Indonesia.

<sup>2</sup>Microbiology, Faculty of Dentistry, Trisakti University, Jakarta, DKI Jakarta, Indonesia.

<sup>3</sup>Dentistry, National Dental Center Singapore, Singapore, Singapore.

**Objectives:** Biofilm infection is the major cause of treatment failure of the endodontically-treated teeth. *Enterococcus faecalis* and *Fusobacterium nucleatum* are two major endodontic pathogens responsible for biofilm infections. The aim of the present study was to investigate the ability of probiotic bacteria *Lactobacillus reuteri* to eliminate mixed-species endodontic biofilms of foregoing endodontic pathogens when used as an irrigating solution.

**Methods:** Firstly in vitro activity of planktonic, mono-species and mixed-species biofilms of the *Lactobacillus reuteri* was determined using MIC assays in 96-well plates. Thereafter, a total of 60 human premolar teeth samples were collected, prepared, and sterilized for ex vivo experiments. All teeth samples were inoculated with mono-species and mixed-species of *Enterococcus faecalis* and *Fusobacterium nucleatum* and cultured for 24 hours for biofilm formation. Teeth were divided into 3 groups according to the irrigant type. group 1 was 2.5% NaOCl (positive control), group 2 was saline (negative control) and, group 3 was the experimental reuterin isolate irrigant. The endodontic samples were obtained at 5 minutes and 30 minutes post-irrigation to determine the number of *E. faecalis* and *F. nucleatum*. In addition, DNA was extracted and individual bacterial counts were evaluated using Real-time PCR. Data were statistically analyzed via one-way ANOVA, where  $p < 0.05$  was set as the level of significance.

**Results:** Reuterin isolated from *L. reuteri* showed promising antibiofilm activity. The antibiofilm concentration of reuterin against biofilms of *E. faecalis* and *F. nucleatum* biofilms was significant compared to the negative control ( $p < 0.05$ ) and similar to that of NaOCl positive control. Interestingly, reuterin also demonstrated anti-biofilm activity in ex vivo tooth model at the concentration of 25 $\mu$ g/mL against *E. faecalis* and *F. nucleatum*.

**Conclusions:** The present study has for the first-time demonstrated that reuterin isolate *Lactobacillus reuteri* can successfully eliminate pathogenic endodontic biofilms as root canal irrigant. This new finding will lead to clinical benefits in future.



## The Salivary and Tissue Expression of TNF- $\alpha$ in Recurrent Aphthous Stomatitis

P. Handy, A. A. Nagoro, K. A. Anggrarista, M. D. Surboyo

Universitas Airlangga, Surabaya, East Java, Indonesia

**Objectives:** Recurrent aphthous stomatitis (RAS) is an oral mucosal inflammation with ulceration as a clinical manifestation and has relation with the increase of TNF- $\alpha$  expression. The purpose of this study is to systematically analyze and assess the level of TNF- $\alpha$  expression in salivary and tissue in patients with RAS.

**Methods:** A comprehensive search of PubMed, Scopus, Web of Science databases, and Embase was conducted in January 2020. The focused question was 'Does the RAS patient express a different level of TNF- $\alpha$  compared to a healthy person?'. The inclusion criteria were observational studies that assessed the level of salivary TNF- $\alpha$  and or tissue expression of TNF- $\alpha$ . Studies without control groups, case series, case reports, experimental studies, letter to editors, reviews, were excluded.

**Results:** Three studies reported the tissue expression of TNF- $\alpha$  in 110 RAS patients and 83 healthy patients with mRNA extraction method (n=2) and IHC method (n=1). Furthermore, six studies reported the salivary TNF- $\alpha$  level in 174 RAS patients and 151 healthy patients with Elisa method. All studies reveal that the level of TNF- $\alpha$  expression in salivary and tissue are higher in RAS patients than in healthy patients with significant differences.

**Conclusions:** Available data indicates that TNF- $\alpha$  has a role in the pathogenesis of RAS. The increase of TNF- $\alpha$  is very important and able to be used for designing preventative strategies and proper treatment could be performed.

## Application of Deep Learning Technology to Support the Diagnosis of Gingivitis

H. S. Nguyen, H. Q. Nguyen, H. V. Nong, V. V. Nguyen,  
T.T. Nguyen, N. N. Vo Truong

Hanoi Medical University, Hanoi, Viet Nam

**Objectives:** This study aimed to develop and assess a software which supports diagnosing and provides dental recommendation for gingivitis using machine learning.

**Methods:** The total sample size was 720 separated into three stages of study. In all stages, every subject was clinically examined and taken a standard intraoral photo set for the reference diagnosis (the gold standard diagnosis). At the first stage, 508 gingivitis patients were recruited to develop the dataset for training the software. At the second stage, data from 112 subjects were utilized to evaluate the accuracy of diagnosis provided by the software after being trained. At the last stage, we used data from 100 subjects to assess the reliability of providing dental recommendations of the software for subjects with and without gingivitis. Statistical analyses consisted of sensitivity and specificity of diagnoses provided by the software, and the percentage of accurate dental recommendations for each type of diagnosis (with or without gingivitis).

**Results:** Compared to dentist's diagnoses and software's diagnoses has the sensitivity of 77%, the specificity of 72,9% and the accuracy of 74,5%. According to the diagnoses, the percentage of the accurate dental recommendations given by the software was 100%

**Conclusions:** This Software could be used as an equipment to diagnose and give a dental advice for Gingivitis

## Remineralizing Agents Differentially Affect Amelogenesis Imperfecta Enamel Microhardness

M. Navankasattusas, M. Phuckdeedindan, N. Yiamwattana, T. Porntaveetus

Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

**Objectives:** Autosomal dominant hypocalcified amelogenesis imperfecta (ADHCAI) caused by FAM83H mutation is the most severe form of AI. The tooth enamel is cheesy soft, porous, and irregular; while dentin is mildly disturbed. Currently, the dental management of ADHCAI is unresolved. The aim of this study was to investigate the ultrastructure and how remineralizing agents affect ADHCAI tooth microhardness.

**Methods:** Five ADHCAI teeth were obtained from patients identified with FAM83H mutation. The phenotypic properties of each tooth evaluated were compared with 3 normal control teeth. Microhardness was measured with a Vickers indenter at baseline versus after applying a remineralizing agent and pH cycling (treated group). NaF varnish, APF gel, Neutral NaF gel, Silver diamine fluoride (SDF), and Tooth mousse were used. One half of each tooth served as its own control (untreated group). Tooth ultrastructure was examined using scanning electron microscopy (SEM).

**Results:** The SEM images demonstrated irregular and broken enamel rods in ADHCAI tooth enamel. At baseline, ADHCAI enamel showed a significantly lower microhardness than normal controls. ADHCAI enamel treated with NaF varnish or SDF exhibited a significantly decreased percent microhardness compared with its untreated half, suggesting the superior effects of NaF varnish and SDF on maintaining enamel hardness in ADHCAI. A significant difference between treated and untreated ADHCAI dentin microhardness was not observed. Among the different remineralizing agent types, the percent microhardness decrease in ADHCAI enamel treated with SDF was significantly lower compared with tooth mousse.

**Conclusions:** This study demonstrates severe abnormalities in enamel prisms and decreased enamel microhardness in ADHCAI tooth enamel, indicating a weakness that results in rapid destruction. Here, we propose for the first time that NaF varnish and SDF could be effective remineralizing agents to preserve ADHCAI enamel integrity and minimize ADHCAI tooth deterioration.

S009

## The Effectiveness of Sweet Tamarind Solutions as Calculus-Softening Agents

A. M. Tuhepaly

Brawijaya University, Malang, East Java, Indonesia.

**Objectives:** To compare the effectiveness of seeds and pulps of sweet tamarind (*Tamarindus indica* L.) in aqueous solutions as calculus-softening agents by reducing calculus hardness.

**Methods:** Softening of calculus were showed by reduction of calculus hardness measured using Micro Vickers Hardness Tester. Calculus hardnesses were measured before and after the application of sweet tamarinds. Twenty-four post-scaling calculus were divided into six groups according to the application of sweet tamarinds (T); untreated (T0) as a control, tamarind seeds solution 25% (T1), tamarind seeds solution 50% (T2), tamarind pulp solution 25% (T3), tamarind pulp solution 50% (T4), plain tamarind pulp (T5). The sweet tamarinds were smeared on one side of the mounted calculus. All groups of calculus were soaked in artificial saliva and incubated in 37°C incubator for 30 minutes. The data were analyzed statistically using Kruskal-Wallis test and Post-Hoc Mann-Whitney U-test.

**Results:** The mean hardnesses of calculus before and after the application of sweet tamarind are compared. The mean hardness of untreated calculus (T0) that are only soaked in artificial saliva is increasing. Besides, the mean hardnesses of calculus in treatment groups T1, T2, T3, T4, T5 are decreasing. There are significant differences among the six groups ( $p < 0.05$ ). The mean hardness of calculus smeared with tamarind pulp solution 50% (T4) is significantly different from the control group (T0) ( $p < 0.05$ ). The mean hardness of calculus smeared with tamarind pulp solution 25% (T3) shows a significant statistical difference when compared to other groups (T0, T1, T2, T4, T5) ( $p < 0.05$ ).

**Conclusions:** It can be concluded that tamarind pulp solution 25% is effective in being used as a calculus-softening agent shown by a significant reduction of calculus hardness.

## Periostin Promoted PDL Cell Migration and Myfibroblast Differentiation

B. Manosuttikij, N. Panjasiri, C. Putta, P. Pavasant

Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

**Objectives:** Periostin is a matricellular protein involved in cell adhesion, migration, and modulating cellular response to mechanical stimulation. The exact function of periostin in periodontal tissue is unresolved. The aim of this study was to investigate the function of this protein on periodontal ligament (PDL) cells.

**Methods:** Human PDL cells were isolated from the periodontal tissue of 5 permanent molars. A scratch wound assay was used to investigate cell migration. Cells were subjected to intermittent compressive force (ICF) for 24 h and alpha-smooth muscle actin ( $\alpha$ -SMA) and receptor activator of nuclear factor kappa-B ligand (RANKL) expression was examined using quantitative reverse transcription polymerase chain reaction and western blot. The periostin gene (POSTN) was knocked down by transfecting the cells with periostin siRNA. Statistical significance was considered at  $p < 0.05$  (ANOVA test).

**Results:** Periostin-coated surfaces accelerated cell movement compared with the control in the scratch wound assay. Although the periostin-knockdown cells (POSTN-KD cells) migrated slower compared with control, the decreased migratory rate was rescued when the POSTN-KD cells were seeded on periostin-coated surfaces. RANKL expression increased in the POSTN-KD cells, however, the ICF-induced RANKL expression was attenuated in POSTN-KD cells. ICF also increased  $\alpha$ -SMA expression, however, POSTN-KD cell responsiveness to ICF decreased significantly compared with the control. Interestingly, it is periostin-coated surfaces that reduced these ICF-inductive effects, not soluble form of periostin as in other previous report.

**Conclusions:** Periostin promoted PDL cell migration. Moreover, ICF promoted myfibroblast differentiation in PDL cells based on the significantly increased  $\alpha$ -SMA expression ( $p < 0.05$ ) compared with the control. ICF regulated  $\alpha$ -SMA and RANKL is a periostin dependent. However, the impact of ICF on RANKL expression remains unclear. This finding emphasizes the importance of extracellular matrix proteins on PDL cell function.

## Effect of Edible's Bird Nest Mouthwash on Gingivitis Patient

E. C. Putri

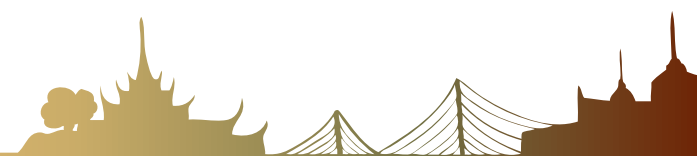
Universitas Gadjah Mada, Bekasi, West Java, Indonesia

**Objectives:** Gingivitis has a high incidence and affects epithelial maturation of gingiva by decreasing superficial cell number. Edible bird's nest (EBN) is one of the most highly valued food products in South East Asia, yet the use of it in dentistry has never been heard. EBN contains sialic acid and epidermal growth factor that can reduce inflammation and increase cellular maturation. The aim of this study was to investigate the effect of 2.5% EBN extract on gingival maturation index and gingival index of moderate gingivitis patients.

**Methods:** Twenty (20) moderate gingivitis subjects were divided into control and treatment group. The patients on control group were treated with 0.1% chlorhexidine gluconate while the treatment group were treated with 2.5% EBN extract. Each subject was instructed to gargle 10 ml of mouthwash twice a day for 5 consecutive days. Epithelial smear samples were taken using cytobrush on the 1st day before the treatment and 6th day after gargling. Gingival index scoring from each patients was also performed on that day. The samples were stained using papanicolaou staining before observation under light microscope to examine the basal-parabasal, intermediate, and superficial cells.

**Results:** The result of this study shows that the gingival maturation index and gingival index after gargling in control group and treatment group shows no difference statistically ( $p < 0.05$ ).

**Conclusions:** It can be concluded that the use of 2.5% EBN extract could shift gingiva maturation to normal and has the same effect to chlorhexidine gluconate 0.1% in healing gingivitis.



S012

## Alternative Methods for Betel Nuts Consumers with Long-Lost Vertical Dimension and Posterior Teeth Combined with Severe Attrition of Lower Anterior Teeth

Q. TRAN, T. Huang

Chung Shan Medical University, Taichung, Taiwan.

**Objectives:** To restore the vertical dimension of severe anterior teeth attrition patients with prolonged history of betel nuts consuming with a combination of removable dentures, composite overlay and porcelain fused metal crowns.

**Methods:** Two middle-aged aboriginal Taiwanese with long history of betel nuts chewing presented with chief complaints of missing lower posterior teeth and severe attrition of lower anterior teeth. Conventional methods of restoring vertical dimension with interim denture often leads to anterior open bite and excessive occlusal load at the posterior region. To evenly distribute the occlusal force, composite overlay on the lower anterior teeth and crowns with metal palatal surfaces of upper anterior teeth were designed along with an interim denture to restore the vertical dimension. The posterior edentulous area was permanently rehabilitated with a removable partial denture afterwards.

**Results:** Both patients reported satisfied with the treatment 3 months after full mouth rehabilitation. No TMJ or alveolar ridge pain were noted. Articulating paper showed that the occlusal contact points were evenly distributed and similar to the day of delivery.

**Conclusions:** Composite overlay on anterior teeth with severe attrition can facilitate restoration of vertical dimension while preventing excessive occlusal load on the posterior partial denture.

## Prevalence Of Malocclusion In Saudi Arabia – Systematic Review and Meta-analysis

R. M.D.S<sup>1</sup>, N. H Felemban<sup>1</sup>, Y. Althomali<sup>1</sup>,  
P. M. Battepati<sup>4</sup>, P. Gupta<sup>2</sup>, V. Venkat Ramaiha<sup>3</sup>

<sup>1</sup>Orthodontic Division Preventive Dentistry, College of Dentistry, Taif University, Taif KSA, Raichur, Karnataka, India.

<sup>2</sup>Department of Community Dentistry, Government College of Dentistry, Indore, Madhya Pradesh, India.

<sup>3</sup>Department of Dental Hygiene, College of Applied Health Sciences (QU), Al-Rass, Qaseem, Saudi Arabia.

<sup>4</sup>Pediatric Division Preventive Dentistry, College of Dentistry, Taif University, Taif KSA, Taif, Makkaha, Saudi Arabia.

**Objectives:** The objective is to estimate the prevalence of malocclusion among children in Saudi Arabia using meta- analysis and to determine gender variations in the prevalence of malocclusion in Saudi Arabia.

**Methods:** This review conducted in adherence to PRISMA standards of quality for reporting systematic reviews and meta-analyses submitted in PROSPERO with an I.D 198427. Our systematic search included international databases including MEDLINE, EMBASE, CINAHL, PsychINFO, Scopus, Science-Direct, key journals and review articles; the date of the last search was June 2020. Methodological quality of the studies graded by means of the Quality Assessment Tool for Quantitative Studies, developed for the Effective Public Health Practice Project (EPHPP). Studies reporting overall prevalence of malocclusion for subjects under the age of 18 years were included in the study. Data analysis done by STATA version 11 software, METAN package. The standard error of the overall as well as gender-based prevalence of malocclusion was calculated using binominal distribution formula. The heterogeneity index between the studies was determined using Cochran (Q) and I2 tests. Random or fixed effects model used to estimate the overall as well as gender variations of prevalence of malocclusion.

**Results:** Total 29 articles were eligible for the Meta-analysis. Estimation of prevalence of malocclusion done in 34,263 children. Total prevalence of Class I, II, and III malocclusion was 62.6% (52.4–72.8), 28.5% (24.6–32.5), and 9.35% (8.2–10.5), respectively. The prevalence of Class I, II, and III malocclusion was 54.7% (44.8–64.6), 25.9% (22.5–29.3), and 8.15% (6.4–9.9) in boys, 50.5% (42.6–58.4), 22.35% (19.3–25.4), and 5.8% (4.7–6.9) in girls respectively.

**Conclusions:** Present review and meta-analysis showed a high prevalence of malocclusion among children of Saudi Arabia. Prevalence of malocclusion is higher in boys showing a gender variation.



S015

## Dental Workforce Planning in Thailand: A System Dynamics Modeling

W. Jaichuen<sup>1</sup>, N. Urwannachotima<sup>2</sup>, B. Leerapan<sup>3</sup>, P. Teekasap<sup>4</sup>,  
A. C. Meeyai<sup>5</sup>, K. Chiangchaisakultha<sup>6</sup>, K. Udomaksorn<sup>7</sup>

<sup>1</sup>Ministry of Public Health, Nonthaburi, Thailand.

<sup>2</sup>Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

<sup>3</sup>Faculty of Medicine Ramathibodi Hospital, Mahidol University, Bangkok, Thailand.

<sup>4</sup>Stamford International University, Bangkok, Thailand.

<sup>5</sup>London School of Hygiene and Tropical Medicine, London, United Kingdom.

<sup>6</sup>International Health Policy Program, Nonthaburi, Thailand.

<sup>7</sup>Faculty of Pharmacy, Prince of Songkla University, Songkla, Thailand.

**Objectives:** To estimate the future supply of dental workforce based on the projection of oral healthcare demand in Thailand from 2017 to 2037.

**Methods:** A three-stage system dynamics model was developed to consolidate the relationship between the oral healthcare demand for Thai population and the supply of dental personnel. The demand model combined population demography and types of oral healthcare needs (prevention, simple and complex treatment) with dental services used in different facilities based on the National oral health survey data was developed. Then, the projections on workforce supply based on work hours and competencies were analyzed to produce the estimation of future workforce. Finally, four potential policies including the ranges of skill-mix in dental care team and distribution of dental personnel were simulated to compare the projection of required dental workforce in each scenario.

**Results:** The result showed that the numbers of dentists and dental nurses were projected to increase from 2017 to 2037 by 87% and 64%, respectively as the current policy. The private dentists were estimated to be 73% of dental providers in 2037. However, the unmet oral healthcare need was projected to decrease by only 20%. The public supply was still unable to meet the population demand, while the number of dentists in private practice was projected to be over the population demand for simple dental treatment in 2025. The study suggested that scenario of skill-mix dental care team and public-private cooperation for health insurance system would provide the most benefit in decreasing the unmet oral healthcare need by 33% in 2037.

**Conclusions:** The planning of sufficient and sustainable dental workforce involves the dynamics of demand and supply in oral health system as a whole. This simulation model can provide policy makers with additional insights to support strategic dental health workforce planning efforts. of Class I, II, and III malocclusion was 54.7% (44.8–64.6), 25.9% (22.5–29.3), and 8.15% (6.4–9.9) in boys, 50.5% (42.6–58.4), 22.35% (19.3–25.4), and 5.8% (4.7–6.9) in girls respectively.

**Conclusions:** Present review and meta-analysis showed a high prevalence of malocclusion among children of Saudi Arabia. Prevalence of malocclusion is higher in boys showing a gender variation.

## Association between Parental Education and Oral Hygiene among Indonesian children

C. Santoso, A. Nagy

Public Health and Epidemiology, University of Debrecen, Debrecen, Hajdú-Bihar, Hungary.

**Objectives:** Poor oral health is mainly caused by poor oral hygiene, which is often reflected by individuals' tooth-brushing habits. The aim of this study was to assess the prevalence of poor oral hygiene practice among children in Indonesia and its association with parental education.

**Methods:** Cross-sectional data from the 2014 Indonesian Family Life Survey (IFLS-5) was analysed. The sample included 11,023 children aged 14 years or younger. Multiple logistic regression was employed to determine the associations of maternal and paternal education with poor oral hygiene (never brushing the teeth). The covariates included age, sex, residential area, economic status, and family size. Weighting was applied to make the sample representative of the Indonesian population in 13 provinces.

**Results:** Around 8.6% of children in Indonesia never brushed their teeth. The mean age of the children was 7.7 years and 51% were male. Younger age (OR=2.52; 95% CI 2.26-2.80), male (OR=1.19; 95% CI 1.02-1.40), lower economic status (OR=1.10; 95% CI 1.04-1.17), lower maternal education (OR=1.35; 95% CI 1.09-1.67) and higher number of children in the family (OR=1.56; 95% CI 1.28-1.90) were associated with never brushing the teeth. Our study could not find associations between residential area, paternal education and tooth-brushing habit.

**Conclusions:** There is still a need to improve the oral hygiene practice of Indonesian children. Oral health interventions should be specially targeted towards younger children, males and those with lower economic status. Furthermore, our findings that only the education of mothers, but not fathers, was associated with tooth-brushing habit, might indicate the important role of mothers in Indonesia in influencing their children's oral health behaviours.

S017

## Presence of Temporomandibular Disorders: Outcome Comparisons of Three Screening Instruments

V. Natu<sup>1, 2</sup>, A. U. Yap<sup>1, 2</sup>, Y. Leong<sup>1</sup>, X. Lim<sup>1</sup>

<sup>1</sup>Nan Yang Polytechnic, Singapore, Singapore.

<sup>2</sup>National University of Singapore, Singapore, Singapore.

**Objectives:** This study assessed the prevalence of TMDs using three screening instruments and compared the outcomes of the different TMD screeners.

**Methods:** Subjects, aged 17-24 years, were recruited from a local Polytechnic. The presence of TMDs was determined with the Fonseca Anamnestic Index (FAI), the short-form FAI (SFAI), and the TMD pain screener (TPS). Data were analysed using the Chi-square test and Spearman's correlation ( $p < 0.05$ ).

**Results:** 400 participants (204 females; 196 males) were evaluated. The prevalence of TMDs was 45.8% when subjects were appraised using the FAI. TMD prevalence was 9.5% and 8.5% with the SFAI and TPS respectively. Irrespective of the TMD screener utilized, a female predominance in TMDs was observed. However, significant gender differences were only observed with the FAI ( $p < 0.001$ ) and TPS ( $p = 0.042$ ). The FAI was strongly correlated ( $r_s = 0.756$ ) to the SFAI but weakly connected to the TPS ( $r_s = 0.395$ ). The correlation between SFAI and TPS was moderate ( $r_s = 0.407$ ).

**Conclusions:** A distinct variance in TMD prevalence was observed depending on the TMD screener. As the FAI appeared to over-estimate TMD prevalence, the TPS is preferred for screening painful TMDs and the SFAI for both pain and function-related TMDs.

S018

## Service Patterns in Delivery of the Basic Package of Oral Care in Rural Nepal

R. Sapkota, L. Spero

Jevaia Foundation, Hartford, CT, United States.

**Objectives:** To review service use and treatment patterns using the Basic Package of Oral Cares (BPOC) in a primary health care setting in Nepal.

**Methods:** This program evaluation used treatment data aggregated from seven Health Posts in Nepal where primary oral health providers (POHPs) were delivering the BPOC in the Jevaia Oral Health Care model. The model includes service delivery across three access points: in a weekly Health Post clinic, at school-based seminars, and in community spaces through outreach activities. Data on service delivery were submitted to administrative staff by POHPs across the year 2019, and analyzed to examine service use and treatment types by age-groups and access points.

**Results:** Across the eight health posts there were 5072 patients who received treatment. There was a gradient whereby younger age groups required lower proportions of referral. There were 109 (5.1%) children referred for additional care compared to 183 (21.6%) of teenagers and 407 (19.6%) of adults. The Health Post accounted for just 26.3% of patient contact (N=1332), while 2654 patients (52.3%) were seen in school seminars which target children and their parents, and 1086 patients (21.4%) were seen in outreach activities. There was a difference in the proportions of treatment types performed across the different access points and the highest proportion of extractions were performed in the Health Post setting.

**Conclusions:** Most of the care was delivered outside of the Health Post setting, and all three access points demonstrated different patterns of service use and proportions of treatment types. The health post space delivered the lowest proportion of preventive care and the school setting appeared to be able to meet the majority of treatment needs among the child age-group.



S019

## Effectiveness of Rinsing Water and Chewing Gum on Restoring pH of Saliva after Drinking the Drinking Yogurt

K. Suksiripadungwat<sup>1</sup>, C. Arssiri<sup>1</sup>, B. Chaijaroen<sup>1</sup>,  
K. Kasevayuth<sup>2</sup>, P. Pisanrturakit<sup>3</sup>

<sup>1</sup>Chulalongkorn University, Bangkok, Thailand.

<sup>2</sup>Biochemistry, Chulalongkorn University, Bangkok, Thailand.

<sup>3</sup>Community Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** To compare the duration in restoring the salivary pH to normal level by four strategies after drinking a drinking yogurt.

**Methods:** Subjects with stratification by sex were randomly allocated into 4 different strategies after drinking a drinking yogurt: A-plain water rinsing, B-gum chewing, C-plain water rinsing follow by gum chewing, and D-do nothing. The unstimulated salivary flow rate, pH and buffer-capacity were measured at baseline and at 0, 5, 10, 15, 30 and 45 minutes after drinking 50 ml of drinking yogurt and the assigned strategies. , The durations in restoring the salivary pH to normal level and patterns of pH changing were evaluated by ANOVA and Repeated Measures ANOVA (RMANOVA) using SPSS for windows version 22.0 (IBM Corp., USA).

**Results:** The 52 Buddhajak-Wittaya-School-student with 14.18(0.78) years of age were recruited into the study. 24 of them were male. 13, 14, 12, and 13 students were allocated into group A, B, C, and D, respectively. The mean (SD) durations in restoring the pH to normal levels of group A, B, C, and D were 22.69(28.26), 26.43(30.66), 10.83(8.48), and 10.0(4.56) respectively. Group-B and Group-C indicated lowest drop of pH within 10 minutes after drinking the drinking yogurt. Group-A revealed similar pattern as Group-D with slightly lower change of the salivary pH.

**Conclusions:** Different strategies after drinking the drinking yogurt indicated no significant different (ANOVA, p-value = 0.141) of durations in restoring the pH to normal levels with different salivary pH at each time point (RMANOVA, p- value = 0.046).



## Identifying Three-Dimensional Facial Fluctuating Asymmetry in Normal Pediatric Individuals: A Panel Assessment Outcome Study of Clinicians and Observers

C. Hsu<sup>1</sup>, P. Chou<sup>1</sup>, R. Denadai<sup>1</sup>, S. Chen<sup>1</sup>, H. Tseng<sup>2</sup>, S. Wang<sup>3</sup>, R. Hallac<sup>4</sup>,  
C. Chen<sup>1</sup>, A. Kane<sup>4, 5</sup>

<sup>1</sup>Department of Plastic and Reconstructive Surgery and Craniofacial Research Center, Chang Gung Memorial Hospital, Chang Gung University, Taoyuan City, Taiwan.

<sup>2</sup>Clinical Trial Center, Chang Gung Memorial Hospital, Taoyuan, Taiwan.

<sup>3</sup>Department of Biomedical Engineering, National Yang-Ming University, Taipei, Taiwan.

<sup>4</sup>Analytical Imaging and Modeling Center, Children's Medical Center, Dallas, TX, United States.

<sup>5</sup>Department of Plastic Surgery, UT Southwestern, Dallas, TX, United States.

**Objectives:** This study measures the three-dimensional facial fluctuating asymmetry in a cohort of normal pediatric individuals and assess the various severity levels of facial fluctuating asymmetry using a panel composed of surgical professionals and adults, as well as pre-adolescent observers.

**Methods:** Three-dimensional facial fluctuating asymmetry in 600 normal and healthy Taiwanese individuals (6 to 12 years old) were measured using 3dMD system and MATLAB program. The perceptions of increasing levels of facial fluctuating asymmetric severity were assessed by using a panel composed of 20 clinicians (surgical professionals), as well as 20 adults and 40 pre-adolescent observers.

**Results:** On average, this normal cohort presented a facial fluctuating asymmetry of  $0.96 \pm 0.52$  mm, with  $0.52 \pm 0.05$ ,  $0.67 \pm 0.09$ ,  $1.01 \pm 0.10$ , and  $1.71 \pm 0.36$  mm for levels I, II, III, and IV of severity, respectively. For all categories of raters, significant differences in the average symmetry–asymmetry scale values were observed, with level I < level II < level III = level IV (all  $p < 0.01$ , except for level III vs. IV comparisons with  $p > 0.05$ ). For level I, pre-adolescent observers presented a significantly ( $p < 0.05$ ) higher symmetry–asymmetry scale value than adult observers, with no significant (all  $p > 0.05$ ) differences for other comparisons. For overall facial asymmetry and levels II, III, and IV, no significant (all  $p > 0.05$ ) differences were observed.

**Conclusions:** We report the normal pediatric face is asymmetric and the panel assessment of facial fluctuating asymmetry was influenced by the level of severity and the category of raters. This study also contributes to the literature by revealing that pre-adolescent raters present a similar or higher perception of facial asymmetry than adult raters.

## Oral Health And Quality Of Life In Andean Preschoolers

A. A. Huamán Mendoza<sup>1</sup>, K. Pinedo<sup>3</sup>, F. Valdez<sup>2</sup>

<sup>1</sup>Univeristy of São Paulo, São Paulo, São Paulo, Brazil.

<sup>2</sup>Cayetano Heredia University, Lima, Peru.

<sup>3</sup>Federico Villarreal National University, Lima, Peru.

**Objectives:** The aim of the present work was to analyze the oral health status and its relationship with the quality of life of preschool children in an Andean and vulnerable community in Peru.

**Methods:** The observational, correlational, prospective and cross-sectional study was conducted on a sample of 120 children aged 3-5 years. A pilot study was carried out to calibrate, to analyze the reliability of measurements (ICC intra- examiner = 0.885 and ICC inter-examiner = 0.821) as well as to identify the degree of internal consistency (Cronbach's alpha = 0.806) of the Early Childhood Oral Health Impact Scale (ECOHIS) questionnaire in oral health-related quality of life (OHRQoL). Early childhood caries (ECC) was determined using the dmft index. Malocclusions were considered to be: overjet greater than 3 millimeters, anterior open bite, anterior crossbite, bis to bis bite and anterior deep bite. The ECOHIS scores were summarized with measures of central tendency and dispersion. Oral factors and variables were analyzed univariate and bivariate using the Mann Whitney U test and Kruskal-Wallis test. Spearman correlation and linear regression analysis was performed to identify the factors and the extent to which they explained the ECOHIS score.

**Results:** Multiple linear regression analysis by least squares method only included as significant ( $p < 0.05$ ) the contribution of dmft to explain the ECOHIS score, leaving aside variables such as gender, age, malocclusion and simplified oral hygiene index. The estimated regression model was  $\text{ECOHIS Scores} = 11.67 + 0.79 * \text{dmft}$ , where ECOHIS scores increased by 0.79 for each unit gain of dmft, and the variability of the scores obtained is explained by the dmft in an  $R^2 = 30\%$  ( $p < 0.001$ ).

**Conclusions:** There is an impact of ECC on OHRQoL among Andean preschoolers in Peru, and their families.

## Feeding Habits and Oral hygiene Practices of Infants in Hong Kong

W. Luo, G. Lee, G. Wong, M. Wong

The University of Hong Kong, Hong Kong, Hong Kong.

**Objectives:** The study aimed to explore the feeding habits and oral hygiene practices of one-year-old infants in Hong Kong.

**Methods:** Infants aged one-year-old with high caries risk and their primary caregivers were recruited for an ongoing randomized controlled trial. A parental self-completed structured questionnaire was conducted at baseline to collect information about the parents' sociodemographic background, feeding habits and oral hygiene practices for their infants.

**Results:** A total of 579 infants aged 12-16 months old (Boy: 306; Girl: 273) were recruited. Each of their caregivers completed the parental questionnaire at baseline. Over half of the parents (53.7%) have not received any oral health education previously. Regarding the infant feeding habits, the majority (73.6%) of the infants had six or fewer meals per day. About three-quarter (71.3%) of the infants had a habit of taking sweet snacks. More than half (60%) of the parents would let their infant fall asleep with a nursing bottle containing milk or sugary drink; however, two-thirds of them would not clean the infant's mouth or teeth after drinking. Majority of the parents (90.8%) had performed cleaning for their infant's mouth and teeth with a toothbrush (65.0%) and gauze (40.9%). Only 10.3% of them would use toothpaste.

**Conclusions:** The feeding habits and oral hygiene practices of one-year-old infants in Hong Kong are not satisfactory. Oral health education is needed for caregivers of infants to promote proper oral health habits among infants.





## Reuterin Inhibits *Candida albicans* and *Staphylococcus aureus* Biofilms on Dentures

T. V. Maukar<sup>1</sup>, H. A. Irma<sup>1</sup>, A. S. Widyanman<sup>2</sup>, C. J Seneviratne<sup>3</sup>

<sup>1</sup>Trisakti University Faculty of Dentistry, Jakarta , DKI Jakarta, Indonesia.

<sup>2</sup>Microbiology, Faculty of Dentistry, Trisakti University, Jakarta, DKI Jakarta, Indonesia.

<sup>3</sup>Dentistry, National Dental Center Singapore, Singapore, Singapore.

**Objectives:** Denture stomatitis is the commonest debilitating problem among denture users worldwide. Currently, patients have to undergo a course topical drug. However, immunocompromised patients may require systemic antimicrobial agents. One of the alternative treatments could be natural probiotics. *Lactobacillus reuteri*, best known as a probiotic bacteria, produces antimicrobial substance called reuterin. The aim of the present study was to evaluate the effect of reuterin isolated from probiotic *L. reuteri* on *C. albicans* and *S. aureus* biofilms using in-vitro model of denture stomatitis.

**Methods:** *S. aureus* were cultured in BHI whereas *C. albicans* were cultured in SDB at 37 °C in aerobic environment. *L. reuteri* were cultured in MRS for 24 h, at 37 °C. Firstly, minimum inhibitory concentrations (MIC) of reuterin on planktonic *C. albicans* and *S. aureus* were evaluated. Thereafter, standard preventive and therapeutic assays were performed on biofilms grown on denture acrylic plates. Effect of reuterin on biofilms were quantified by crystal violet staining, colony counting and qPCR method and the experimental data were analysed by appropriate statistical tests.

**Results:** MICs of reuterin against planktonic *S. aureus* and *C. albicans* were 100 µg/ml and 25 µg/ml respectively ( $p < 0.05$ ). Interestingly, reuterin exhibited anti-biofilm activity against *S. aureus* and *C. albicans* at 100 µg/ml and eradicate the biofilms by 24 h incubation ( $p < 0.05$ ). Moreover, reuterin was also effective against monospecies biofilms and mixed species biofilms on acrylic resin plates.

**Conclusions:** This pioneering study has demonstrated that reuterin has anti-biofilm activity against *C. albicans* and *S. aureus* mixed-species biofilms in a model of denture stomatitis. Hence, the new data will provide a basis to develop reuterin as a probiotic-based natural solution for denture stomatitis in future.

S024

## Salivary Proteomics Identifies Biomarkers for Early Detection of Pregnancy Loss

P. Prajod<sup>1</sup>, Y. S. Chong<sup>2</sup>, L. Qingsong<sup>3</sup>, T. K. Lim<sup>3</sup>, M. L. Wong<sup>4</sup>,  
V. Lopez<sup>5</sup>, H. G. He<sup>6</sup>, C. J. Seneviratne<sup>1</sup>

<sup>1</sup>Oral Health Academic Clinical Program, National Dental Research Institute Singapore (NDRIS), National Dental Center Singapore (NDCS), Singapore, Singapore.

<sup>2</sup>Department of Obstetrics and Gynecology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore.

<sup>3</sup>Department of Biological Sciences, Faculty of Science, National University of Singapore, Singapore, Singapore.

<sup>4</sup>Faculty of Dentistry, National University of Singapore, Singapore, Singapore.

<sup>5</sup>Hubei University of Medicine, Shiyan, China.

<sup>6</sup>Alice Lee Centre for Nursing Studies, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore.

**Objectives:** Early pregnancy loss (EPL) within the first trimester, is one of the most common complications encountered in clinical practice. As most of EPLs occur quite early on during pregnancy, they are often ignored and misunderstood as an expected menstrual cycle. Thus, it is essential to investigate diagnostic biomarkers for monitoring pregnancy loss.

Saliva collection being non-invasive becomes well suited for continuous non-invasive monitoring of EPL. Hence, we conducted a case-control study using iTRAQ-based proteomic approach to identify analytes that may act as biomarkers for non-invasive monitoring of subjects with risk of pregnancy loss.

**Methods:** Saliva samples were collected from a cohort of Singaporean Chinese pregnant women with EPL and matched cohort of healthy pregnant women as controls. Salivary proteins were extracted and subjected to iTRAQ-labeling and LC-MS/MS analysis. Peptide identification and quantification was done to identify the differentially abundant proteins in EPL. The iTRAQ data set were further validated using Enzyme-linked immunoassay (ELISA).

**Results:** Enrichment analysis of the 38 differentially abundant proteins identified that regulation of nucleobase, nucleoside, nucleotide and nucleic acid metabolism were significantly affected in EPL patients. Gene ontology analysis revealed nucleosome assembly was significantly downregulated in EPL patients and was associated with depletion of histone proteins (H2B, H3 and H4). ELISA experiments confirmed that the expression of the histone proteins was consistent with the proteomic results. These data suggest that a depletion of histones can impairs nucleosome assembly. Regulation of nucleosome is critical for the maintenance of genome stability and epigenetic information, lack of which may lead to pregnancy loss.

**Conclusions:** Assessing and monitoring salivary histone levels in patients with threatened miscarriage can be a quick and easy method of obtaining periodic diagnostic information that can speed up treatment decisions.

## Functional Epithelial Organoids Induce Salivary Gland Regeneration Via Their Exosomes

A. Chansaenroj<sup>1</sup>, C. Adine<sup>4</sup>, R. Chaisuparat<sup>1, 2</sup>,  
S. Yodmuang<sup>1, 3</sup>, J. Ferreira<sup>1</sup>

<sup>1</sup>Exocrine Gland Biology and Regeneration Research Group, Chulalongkorn University Faculty of Dentistry, Bangkok, Bangkok, Thailand.

<sup>2</sup>Oral pathology, Chulalongkorn University, Bangkok, Bangkok, Thailand.

<sup>3</sup>Research Affairs, Chulalongkorn University Faculty of Medicine, Bangkok, Thailand.

<sup>4</sup>Biomedical Engineering, National University of Singapore, Singapore, Singapore.

**Objectives:** Replacing the secretory units in the hypofunctional salivary gland (SG) damaged by radiotherapy for head and neck cancers is a clinical prerequisite. Here, SG-like epithelial organoids were developed using magnetic 3D bioprinting (M3DB), and their secretome (exosomes) was investigated for SG regeneration after radiotherapy.

**Methods:** SGo from human dental pulp stem cells (hDPSC) were developed using M3DB in serum-free conditions with different concentrations of FGF10 (4-400ng/ml), an essential SG epithelial signaling cue. Exosomes were isolated from SGo conditioned media by sequential centrifugation and then characterized with transmission electron microscopy, nanoparticle tracking analysis, western blot and mass spectrometry. Afterwards, exosomes were supplemented to irradiated SG ex vivo models to determine epithelial regenerative potential and compare it with the transplanted SGo. Quantitative PCR, whole-mount immunohistochemistry, functional studies for calcium influx and amylase were performed. Data was statistically analyzed by one-way analysis of variance with Tukey posthoc test with a set alpha at 0.05 using GraphPad Prism 8 software.

**Results:** SGo supplemented with 400ng/ml FGF10 displayed several functional features including calcium influx upon neurostimulation (carbachol and isoproterenol) and amylase production. Exosomes from SGo were abundant and possessed a mode diameter of 79.78 ( $\pm 2.20$ ) nm and displayed exosome specific markers and FGF signaling cues (including FGF2, FGF7 and FGF10) and downstream effectors. After transplantation, epithelial growth index was significantly increased with SGo exosomes treated glands in both non-irradiated and irradiated SG via an increase in Ki67, Sox2 and  $\beta 3$ -tubulin.

**Conclusions:** SGo can secrete relevant exosomes with the ability to promote epithelial growth during SG homeostasis, and can also regenerate the epithelial compartment in the irradiated SG by increasing cellular mitosis, stem cell populations depleted by radiotherapy and neuronal sprouting. These regenerative effects were mediated by several FGF downstream signaling cues.

## Remineralization Effect of Adding Poly-dopamine to Fluoride Applications

S. CHOI, H. Jung, H. You

Dentistry, Iksan, Korea (the Republic of).

**Objectives:** Fluoride is recognized as being one of the most widely used method for caries prevention and various researches were done to use fluoride more effectively. This study aimed to evaluate such effect of poly-dopamine (DOPA) when it is applied on the enamel of teeth with fluoride and to compare remineralization effect of surface of teeth to traditional ways of fluoride application.

**Methods:** In a blind trial, enamel specimens were collected from human molars. Among them, 85 enamel specimens were selected and they were randomly separated into five groups and each treatments were applied for each groups respectively : Group A(DOPA + NaF ; n=20), Group B(F varnish ; n=15), Group C(NaF ; n=15), Group D(DOPA ; n=15), Group E(no fluoride ; n=20). After five days of pH-cycling regimen for specimens, the VHN of each specimens was measured. After measuring VHN, one representative enamel specimen from each 5 groups were selected and were investigated using SEM-EDX and XPS.

**Results:** The Group A showed lowest reduction of the VHN and this indicated adding DOPA to fluoride application significantly strengthen enamel remineralization effect compared with the other fluoride application treatments. Elemental compositions of enamel specimen achieved through the SEM-EDX and XPS analysis supported those results.

**Conclusions:** Adding poly-dopamine to fluoride application increases an adhesion capacity, and it allows fluoride to maintain on an enamel surface longer.

## Time-dependent Modulation of Gut Microbiome in Response to Systemic Antifungals

C. Seneviratne<sup>1, 2</sup>, N. Udawatte<sup>1</sup>, S. Wook<sup>6</sup>,  
S. Manzanero<sup>3</sup>, Y. Wang<sup>5</sup>, T. Arumugam<sup>4</sup>

<sup>1</sup>National Dental Research Institute Singapore, National Dental Centre Singapore, Singapore, Singapore.

<sup>2</sup>Oral Health ACP, Duke National University of Singapore, Singapore, Singapore.

<sup>3</sup>Jamieson Trauma Institute, Brisbane, QLD, Australia.

<sup>4</sup>Department of Physiology, Anatomy & Microbiology Centre for Cardiovascular Biology and Disease Research, La Trobe University, Melbourne, VIC, Australia.

<sup>5</sup>Institute of Molecular and Cell Biology, Singapore, Singapore.

<sup>6</sup>LSU Health Sciences Center, New Orleans, LA, United States.

**Objectives:** We developed a novel antifungal agent, SM21, an active small molecule against oral and systemic candidiasis. Antifungal and antibacterial agents have been shown to modulate the gut microbiome in disease conditions. However, it is not known if and how SM21 affects healthy gut bacteriome and mycobiome. In the present study, we examined the effect of short-course of SM21 on gut bacteriome and mycobiome in comparison to other systemic antifungal agents amphotericin B (AMB) and voriconazole in healthy animals.

**Methods:** Thirty-six, five weeks old male healthy Sprague-Dawley (SD) rats were randomized into experimental and control groups (n=12 each). Sterilized antifungals viz. SM21, AMB and voriconazole were administered once per day by intravenous injection, for 5 consecutive days. Control groups received an equal volume of sterilized 0.9% saline. Fecal samples were collected from all rats at day 0 (before treatment), and days 1, and 5 post antifungal treatments. Extracted bacterial and fungal DNA was sequenced using V3–V4 region and ITS2 region, respectively. Data were comprehensively analysed using QIIME bioinformatics.

**Results:** The key findings were I) The healthy gut microbiome was not significantly influenced by antifungal treatment, although specific bacterial taxa showed significant differences in AmB and voriconazole treatment, II) The modulation of probiotic *Lactobacillus* strains including bacteria *L. reuteri* was increased, possibly as a response to restore dysbiotic gut microbiome due to AMB and SM21 treatment III) Gut mycobiome diversity decreased longitudinally with several waves of succession reflecting the personalised nature.

**Conclusions:** The present study demonstrated that a short course of antifungal treatment does not alter healthy gut microbiome. However, there is a significant modulation of few bacterial taxa in the gut microbiome, including probiotic *Lactobacillus reuteri* in response to SM21 treatment. Hence, healthy gut microbiota are capable of resisting major dysbiotic-shift during a short-course of antifungal treatment. We report for the first time the dynamics of healthy gut microbiome and mycobiome in response to short course of antifungals.

## Caries Arrest with Silver Nitrate and Sodium Fluoride Containing fTCP

K. J. Chen, S. Gao, D. Duangthip, E. Lo, C. Chu

The University of Hong Kong, Hong Kong, Hong Kong.

**Objectives:** The aim of this double-blind, parallel-design, randomised controlled trial is to compare the effectiveness of two fluoride application protocols in arresting dentine caries of primary dentition.

**Methods:** Children aged three with at least one tooth surface with active dentine caries were recruited and randomly allocated into two treatment groups. Children in Group A received a semi-annual application of a 25% silver nitrate (AgNO<sub>3</sub>) solution followed by a 5% sodium fluoride (NaF) varnish on the carious tooth surfaces. Children in Group B received a semi-annual application of a 25% AgNO<sub>3</sub> solution followed by a 5% NaF varnish containing functionalized tricalcium phosphate (fTCP). Carious tooth surfaces that were hard by probing were classified as arrested. Chi-square test, t-test, intention-to-treat analysis, and hierarchical generalized linear model were undertaken.

**Results:** A total of 408 children with 1,831 tooth surfaces with active dentine caries were recruited at baseline. No significant differences were found between two treatment groups at baseline. At the 24-month evaluation, 356 children (87%) with 1,607 tooth surfaces (88%) were examined. No difference was found in dropout rates between groups. The arrest rates at the tooth-surface level were 42% in Group A (without fTCP) and 57% in Group B (with fTCP) ( $p < 0.001$ ). Results of the hierarchical generalized linear model showed that active carious tooth surfaces treated in Group B (with fTCP) had a higher chance of being arrested than those treated in Group A (without fTCP) (OR=1.91; CI:1.01, 3.60,  $p = 0.046$ ). In addition, tooth-surface type, tooth location, presence of dental plaque, and monthly family income were related to caries arrest rate ( $p < 0.05$ ).

**Conclusions:** Semi-annual application of a 25% AgNO<sub>3</sub> solution followed by a 5% NaF varnish with fTCP is more effective in arresting dentine caries of primary dentition than that of a 25% AgNO<sub>3</sub> solution followed by a 5% NaF varnish without fTCP (ClinicalTrials.gov: NCT03423797).

## Evaluation of School-based Oral Health Program using Silver Diamine Fluoride

D. T. Duangthip, S. Gao, K. J. Chen, E. Lo, C. Chu

Faculty of Dentistry, University of Hong Kong, Hong Kong, Hong Kong.

**Objectives:** The study aimed to evaluate a school-based oral health program using silver diamine fluoride (SDF) treatment in preschool children in Hong Kong.

**Methods:** A large-scale school-based oral health program using SDF for caries control has been implemented in preschool children in Hong Kong since 2010. Written parental consent for participation was obtained. The program comprised of three main activities as follows; 1) clinical examination to identify children who had cavitated dentine caries using visual inspection and apply SDF on these lesions for caries arrest, 2) provide oral health education for parents, 3) train kindergarten teachers to promote child oral health in their schools. Information on the acceptability of SDF treatment, the prevalence of dentine caries, and adverse effects were collected.

**Results:** A total of 169,382 preschool children enrolled in the program from 2010 to 2019. Among them, parents of 144,091 (85%) children accepted that their child should receive SDF treatment if needed. In total, 159,793 children received the dental examination, and 60,936 (38%) children were diagnosed having dentine caries. Out of these, 53,497 children (88%) received SDF treatment. The prevalence of dentine caries gradually declined from 43% in 2010 to 34% in 2019. No major adverse effect and acute systematic illness were reported.

**Conclusions:** A school-based oral health program using SDF is effective for caries control in preschool children. SDF treatment is safe, feasible, and well accepted by preschool children and their parents.

## Two-year Results of a Clinical Trial with Two Basic Filling Materials in Cambodia

C. Durward, R. Horn, B. Turton

Faculty of Dentistry, University of Puthisastra, Phnom Penh, Cambodia.

**Objectives:** To compare the success of GIC (GC - Fuji IX) and Cention-N (Ivoclar Vivadent) restorations in Class II cavities on the permanent teeth of young adults in Cambodia.

**Methods:** This study was a randomized controlled clinical trial involving students from the University of Puthisastra. Ethical approval was obtained from the Cambodian National Health Research Ethical Committee. Following an examination and PBW radiographs to identify caries, students who met the inclusion criteria (ICDAS code 4 or 5 proximal lesions on molars/premolars) for the trial were invited to participate and provided informed consent. Restorations were placed by two experienced dentists and the material used was based on random allocation of either an ion-releasing, self-curing, resin-based material Cention N (Ivoclar Vivadent), or Fuji IX Glass Ionomer Cement (GIC). A third calibrated dentist evaluated the restorations (clinically and radiographically) at the 2-year follow-up using the FDI criteria.

**Results:** 238 restorations were placed (124 Cention-N vs 114 GIC) and 176 (73.9%) were followed at 2-years. Four participants representing 13 restorations chose to withdraw from the study. There was a statistically significant difference in the failure of restorations whereby GIC restorations were six-times more likely to fail (P-value <0.001; chi squared test). 2 Cention-N restorations failed (2.7%) compared with 12 GIC restorations (10.7%).

**Conclusions:** Cention N restorations had a significantly higher success rate (97.3%) after two years compared with Fuji IX GIC restorations (success rate 89.3%). The success rate of Cention N restorations is comparable to clinical studies using other composite restorative materials.





S031

## Fluorescent Imaging System as a Monitoring Tool for Dental Fluorosis

B. Nandlal<sup>1,2</sup>

<sup>1</sup>Pediatric and Preventive dentistry, JSS Dental College and Hospital, Mysore, Karnataka, India.

<sup>2</sup>Faculty of Dentistry, JSS Academy of higher education and research, Mysore, Karnataka, India.

**Objectives:** 1.To evaluate the use of fluorescent imaging for the quantification of dental fluorosis in an epidemiological survey and to determine the level of association using a standard clinical index. 2.To quantify the amount of effected areas of fluorosed tooth with respect to severity of fluorosis and fluoride level in water using QLF software.

**Methods:** Subjects who fulfilled the following inclusion criteria were included in the novel monitoring standardisation study. School children of age 8 to 13 years with good general health. Subjects with both maxillary incisors fully erupted. Subjects parents who will give consent to participate in the study and Subjects who were lifelong residents of their particular locality & used drinking water from one of three major sources identified from birth. With complete records on of History of residence, School and Age ,Source of water use from birth to age three and Current water use for both cooking and drinking. Drinking water samples fluoride concentration analysis was carried out with Specific Ion Electrode method OAKTON Fluoride Ion Selective Electrode Equipment, USA Two Clinical examiners trained and calibrated for Dean's Index 1942 ,Thylstrup and Fejerskov Index 1978 examined Left maxillary central incisor. QLF and White light polarized light images of teeth were captured with Florescent Camera using Inspektor Research System bv, Amsterdam, Netherlands QLF-D Research Suite™ -Biluminator™ 2+B fluorescent camera system and subjected to analysis using Its software.

**Results:** The prevalence of 62 %to 78% dental fluorosis was observed in children between 8 to 13 years among those drinking water with fluoride levels between 0.001 to 2 ppm. Of which 39% of children had EOF at 0.7ppm which increased further to 58% at 1 ppm Similarly, the QLF images showed a similar trend for . Group I 0.000-0.199, Group II 0.200-0.599,Group III 0.600- 0.899,Group IV 0.900-1.599,Group V 1.600-1.999 with the Delta F values ranging from -9.26 to -19 ,99 fluorescence loss..

**Conclusions:** Based on ambient temperature and diet pattern 0.5-0.7ppm would be maximum permissible limit for drinking water fluoride instead of present BIS recommendation of 1ppm.



## Moog Simodont Dental Trainer in Dental Education

C. YEUNG

Faculty of Dentistry, The University of Hong Kong, Hong Kong, Hong Kong

**Objectives:** To see if pre-clinical dental teaching would be improved by incorporation of virtual reality simulator, Moog Simodont dental trainer.

**Methods:** In addition to performing a literature review, extensive firsthand experience on the system was obtained.

**Results:** It was found that the system is capable of providing very realistic 3D visual, audio and haptic input to the users. The provision of instantaneous feedback from the system allows students to practice independently at their own pace. Also, the instructors are well-informed of how a mistake has been committed and they can therefore provide more accurate corrective instructions. The system also allows students to work on new teeth at a much lower cost. While the plastic teeth are constructed with standardized sizes and morphologies, and aligned identically in the dental arch, the teeth used for simulation are created by scanning extracted human teeth with the desired morphologies and pathologies. Also, the alignment of teeth in the dental arches can vary. In addition, the system also provides better resemblance of the resistance of sound enamel, dentine, carious tooth structure and pulp to cutting by dental burs. Finally, although the initial purchase cost is high, the maintenance cost of the system is low.

**Conclusions:** The Simodont serves as a useful adjunct to conventional simulation using plastic teeth.



## Students' Perceptions and Preferences for Intraoral Scanning and Impression Taking

W. Lam, K. Mak

The University of Hong Kong, Hong Kong, Hong Kong

**Objectives:** Students' perceptions and preferences for new technologies should be considered to determine how to apply and integrate such technologies into new curriculum. The objective of this survey was to investigate the students' perceptions and preferences for intraoral-scanning and impression-taking.

**Methods:** Final-year undergraduate dental students from two cohorts were invited to complete an online questionnaire related to the perceptions and preferences of intraoral-scanning/impression-taking via Google Forms (IRB number: UW 20-514). Wilcoxon signed rank test, McNemar test and binary logistic regression were performed at  $\alpha=0.05$ .

**Results:** Ninety-seven students participated in this study with response rate of 98.0%. Eighty-one students (83.5%) have tried intraoral-scanning on peers. Fifty-three (54.6%) students preferred intraoral-scanning and based on response were categorized as Pro-scanning. Forty-four (45.4%) students either preferred impression-taking ( $n=21$ ) or not sure ( $n=23$ ) were categorized as Others. More than half of students in both groups felt that intraoral-scanning is easier to identify defect ( $P>0.05$ ) and easier in disinfection ( $P>0.05$ ). Less than one-fifth of students in both groups felt that scanning takes more time ( $P>0.05$ ). Most of the students ( $>80\%$ ) in both groups did not feel that more dental surgery assistant support is required for intraoral-scanning. While Pro-scanning group has 41 (77.4%) students felt that scanning is more efficient, only 10 students (22.7%) in the Others group have the same feeling ( $P=0.000$ ). More Pro-scanning students (77.4%) felt that intraoral-scanning is easier to master as a beginner than that in Others group (56.8%) ( $P=0.03$ ). More Pro-scanning group students ( $n=36$ , 67.9%) found that they can deal well with operating the software program of the intraoral scanner than Others students ( $n=19$ , 43.2%) ( $P=0.01$ ). Regression showed that students preferred a technique that is more efficient to them ( $P=0.000$ ).

**Conclusions:** While intraoral-scanning has many perceived advantages, many students still prefer impression-taking.



S034

## Prevalence of Periodontal Disease Among Filipino Older Adults

M. Garcia<sup>1</sup>, S. de la Vega<sup>2, 3</sup>, M. Yanga-Mabunga<sup>4</sup>

<sup>1</sup>College of Dentistry, University of the Philippines Manila, Manila, Philippines.

<sup>2</sup>Institute on Aging, National Institutes of Health, Manila, Philippines.

<sup>3</sup>College of Medicine, University of the Philippines Manila, Manila, Philippines.

<sup>4</sup>Department of Health Policy and Administration, College of Public Health, University of the Philippines Manila, Manila, Philippines.

**Objectives:** Periodontitis is prevalent worldwide, and previous research has reported its prevalence to be high among elderly. However, there is limited data on the periodontal health status of elderly in the Philippines. Therefore, this study aimed to determine the prevalence of periodontal disease among Filipino older adults.

**Methods:** The study protocol was approved by the Research Ethics Board of the University. A total of 316 subjects from four localities in the Philippines underwent oral health assessment as part of the Focused Interventions for Frail Older Adults Research and Development Program (FITforFRAIL) Study. Exclusion criteria included subjects who were completely edentulous, whose teeth were all root fragments, and those for whom probing depths and/or clinical attachment levels could not be determined because of calculus or discomfort during assessment. Full mouth periodontal examination (six sites per tooth) was completed on 183 subjects with at least two teeth present. A periodontal diagnosis was assigned for eligible subjects, using the 2018 Classification of Periodontal Diseases and Conditions.

**Results:** Out of the 183 participants, majority (63.4%) belonged to the young-old age group (60-69 years), while 27.9% and 8.7% were categorized as middle-old (70-79 years) and oldest-old (80 years), respectively. None were diagnosed with clinical gingival health nor gingivitis, and all subjects were diagnosed with periodontitis (100%). Most presented with severe periodontitis (94%), while the remaining 6% were classified as having moderate periodontitis. The percentage of severe periodontitis was observed to increase with age. Among the young-old, 93.1% had severe disease, while 94.1% of the middle-old and 100% of the oldest-old were found to have severe destruction.

**Conclusions:** Periodontitis is highly prevalent in this representative sample of Filipino elderly. Additional research is recommended to corroborate the present study's findings, and Philippine health policies may need updating to reduce the prevalence of periodontitis among Filipino elderly.

## Dental Calculus as an Information Source of Long-term Macronutrients Intake

I. Setiawan<sup>1</sup>, N. Pranata<sup>5</sup>, D. Herawati<sup>3</sup>, I. Sufiawati<sup>4</sup>, S. Widyaputra<sup>2</sup>

<sup>1</sup>Dental Public Health, Maranatha Christian University, Bandung, Jawa Barat, Indonesia.

<sup>2</sup>Oral Biology, Universitas Padjadjaran, Bandung, Jawa Barat, Indonesia.

<sup>3</sup>Public Health, Universitas Padjadjaran, Bandung, Jawa Barat, Indonesia.

<sup>4</sup>Oral Medicine, Universitas Padjadjaran, Bandung, Jawa Barat, Indonesia.

<sup>5</sup>Oral Pathology, Maranatha Christian University, Bandung, Jawa Barat, Indonesia.

**Objectives:** The current dietary assessment still has many constraints, particularly related to the objectivity of data gathering. The dental calculus, which is usually considered as a medical waste of dental treatment, turns out to be a provider of abundant oral information. The objective of this study was to obtain information about the long-term intake of macronutrients from dental calculus content.

**Methods:** This study is a descriptive study with a cross-sectional study design. The data used in this study were obtained from the assessment of carbohydrate, protein, and fat content of dental calculus. There were three groups of dental calculus samples. The first group was treated with the Anthron method to assess the carbohydrate content. The second group was treated with the Soxhlet extraction method. The third group was treated with SDS-PAGE. Twenty samples of dental calculus were taken using quota sampling method, each of which, was taken from the medical waste from the patient who got dental calculus cleaning treatment at Maranatha Dental Hospital.

**Results:** The average concentration of carbohydrates from all dental calculus samples is 0.0246 ppm. The average fat level from dental calculus is 0.05754%. The average concentration of protein from all dental calculus samples is 1.9834 mg/ml.

**Conclusions:** Carbohydrates, proteins, and fats can be examined from dental calculus; therefore, dental calculus can be an information source of long-term macronutrients intake.



S036

## Economic Analysis of Orthodontic Treatment in a Lower Middle Income Country

R. M. Shrestha

Orthodontics, Kantipur Dental College, Kathmandu, Bagmati, Nepal.

**Objectives:** To assess the factors affecting patient's perception, willingness to pay (WTP) for orthodontic treatment, and patient's monetary evaluation of orthodontic treatment cost in Nepal.

**Methods:** Methods: The sample comprised of 623 subjects including 311 orthodontic group and 312 non-orthodontic control group. The structured questionnaire comprised of sections on subjects' demographic factors, perception towards orthodontic treatment, and WTP for orthodontic services. Quantitative data were recorded and analyzed for descriptive and analytical measurements. The relationships between the respondents' educational level, job type, family income, orthodontic health status based on Index of Orthodontic Treatment Need and perception towards orthodontic treatment were compared using multiple regressions.

**Results:** There was a difference in perception towards orthodontic treatment between orthodontic patients and non-orthodontic patients. Respondents' educational level, job type, orthodontic status affected the choice of orthodontic appliance and WTP for orthodontic treatment.

**Conclusions:** Conclusions: Conventional metal brackets are generally the mostly chosen brackets by the Nepalese samples. Economic analyses are useful tool for health policy and planning in determining the orthodontic treatment costs in health service sectors.



S037

## Acemannan Modulates Resin-modified Glass-ionomer Cement Physical Properties, Fluoride-release and Biocompatibility

K. Includech, S. Lalitkanjanakul, N. Kuvieng, P. Thunyakitpisal

Orthodontics, Kantipur Dental College, Kathmandu, Bagmati, Nepal.

**Objectives:** To investigate the depth of cure, flexural strength, fluoride ion release, and cytotoxicity of an acemannan- containing resin modified glass ionomer cement (aceRU-HBM1).

**Methods:** Acemannan (3, 5, or 10%) was added into the resin modified glass ionomer cement (aceRU-HBM1), with VitraBond (VB) as control. The depth of cure and flexural strength were determined per ISO. The cumulative fluoride release was measured by suspending each sample in deionized water. The solutions were collected and replaced at day 1, 3, 7, 14, and 28. Primary human dental pulp cells were cultured in the conditioned medium from each specimen, with growth media used as a control. Cytotoxicity was determined using an MTT assay.

**Results:** The aceRU-HBM1 samples met the ISO requirements for depth of cure and flexural strength. The 10% aceRU- HBM1 significantly reduced the depth of cure compared with RU-HBM1, 3%, and 5% aceRU-HBM1 ( $p < 0.05$ ). There was no significant difference in flexural strength between the RU-HBM1 and aceRU-HBM1 groups ( $p > 0.05$ ). The cumulative fluoride ion release in the RU-HBM1 and 5% aceRU-HBM1 groups were significantly higher compared with VB at day 14 and 28 ( $p < 0.05$ ). The MTT assay revealed that the 5% and 10% aceRU-HBM1 conditioned media significantly increased cell viability at 24 h, while the VB conditioned media reduced cell viability ( $p < 0.05$ ).

**Conclusions:** The ace-RU-HBM1 samples met the ISO requirements for depth of cure and flexural strength. RU-HBM1 and aceRU-HBM1 released fluoride ion up to 28 days. 5% and 10% aceRU-HBM1 induced pulp cell proliferation.

## Applications of Microfluidic Organ-on-a-Chip Technologies in Dental and Craniofacial Research

G. Sriram

Faculty of Dentistry, National University of Singapore, Singapore, Singapore.

**Objectives:** Organ-on-a-chip systems leverage on recent advances in microfluidic and microfabrication technologies to fabricate miniaturized cell culture devices containing hollow microchannels and microchambers. These devices provide a continuous supply of nutrients and drainage of metabolic wastes, application of shear stress, and model micro/nano features. The dynamic perfusion systems also enable the application of test substances (dental materials, oral-care products, and biomaterials) in a close to clinical use context. In this talk, the potential use of a microfluidic organ-on-a-chip device to reconstruct tissue equivalents representative of skin (SE) and oral mucosa (OME); and their applications in topical drug delivery, host-microbiome and biocompatibility would be presented.

**Methods:** The microfluidic organ-on-a-chip device was fabricated using microfabrication technology. The microchambers within the device were used to culture SEs and OMEs. A peristaltic pump connected to the device was used to provide a continuous and controlled flow of media and test compounds. The SEs and OMEs cultured within the organ-on-a-chip device were characterized by immunohistology. Drug permeation studies were conducted using caffeine and dental anesthetics as model drugs.

**Results:** The organ-on-a-chip device enabled the development of skin and oral mucosa-like tissues. Histological sections of SEs and OMEs demonstrated the formation of a 3D stratified epithelial representative of the epidermis and oral epithelium over a fibroblast-populated matrix. The SEs and OMEs demonstrated the expression of stratified epithelial cytokeratins, matrix proteins, and barrier proteins. TEER, caffeine and dental anesthetic permeation studies demonstrated the barrier function of SEs and OMEs. Upon exposure to oral microbiome, the OMEs demonstrated innate immune response in terms of the release of pro-inflammatory cytokines. Similarly, the OMEs exposed to uncured dental composites showed the release of surrogate markers of cytotoxicity.

**Conclusions:** Organ-on-a-chip technology provides a miniaturized platform to recreate microphysiological conditions representative of the skin and oral mucosal tissues which can be used as a versatile and physiologically relevant alternative to human and animal models.





## Mapping Dentin Biostability in situ with Spectroscopies

P. Tseng<sup>1</sup>, D. Shieh<sup>1, 2</sup>, S. Chuang<sup>1, 3</sup>

<sup>1</sup>Institute of Oral Medicine and Department of Stomatology, College of Medicine, National Cheng Kung University Hospital, National Cheng Kung University, Tainan, Taiwan.

<sup>2</sup>Institute of Basic Medical Sciences, National Cheng Kung University, Taipei City, Taiwan.

<sup>3</sup>School of Dentistry, National Cheng Kung University, Tainan, Taiwan.

**Objectives:** Bond to the deeper portion of dentin is known to degrade more rapidly than to the superficial part. Previous studies relate the phenomenon to the differential distribution of endogenous collagenolytic enzymes. Nevertheless, study regarding the biostability in different depths of dentin itself is still lacking. The objective of this study was therefore to investigate the biostability along longitudinal dentin sections. By mapping the acid-etched surface, the biostability was defined with the spatial distribution of organic matrix remnant after collagenase degradation.

**Methods:** Organic matrix on longitudinal dentin sections was exposed with 37% phosphoric acid etching for 30s. Afterwards, specimens were subjected to collagenase challenge (100ug/ml from *Clostridium histolyticum*, Sigma) for 4 hours, while those not treated with collagenase were served as controls. All specimens were extensively rinsed for 3 times after etched and after collagenase degradation. Then, the specimens were sequentially dehydrated in ethanol for subsequent observation. The specimens were first analyzed with non-contact refractive Fourier-transform infrared (FTIR) spectroscopy to map the matrix-to-mineral ratio (area ratio of amide I and phosphates) across the surface. Finally, elements on the surfaces were resolved with energy-dispersive adsorption x-ray (EDAX) spectroscopy. SEM images of the demineralized dentin surface were captured as well.

**Results:** Both matrix-to-mineral ratio (FTIR) and carbon percentage (EDAX) gradually decreased from DEJ to pulp in all samples after collagenase degradation. The gradient was revealed in SEM images as well. The results clearly suggested that superficial dentin was more resistant to collagenase challenge.

**Conclusions:** After challenged by collagenase, gradient of organic matrix remnants is observed on the longitudinal sections of dentin. The unique phenomenon is reported for the first time, and it adequately explains the faster bond deterioration in deeper dentin. The findings bring us deeper insights into the depth-dependent bond instability and open up new research possibilities in the future.



## Histologic Study of the Osteonecrosis of the Jaw

V. Tran Ngoc Thuy, R. Chaisuparat

Department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand.

**Objectives:** Among many types of osteonecrosis of the jaw (ONJ), medication-related osteonecrosis of the jaw (MRONJ), osteoradionecrosis of the jaw (ORN) and osteomyelitis of the jaw (OM) share similarities in some clinical symptoms, despite differences in their cause and pathophysiology. To reach an optimal results in treatment, an accurate diagnosis is essential. Histopathological diagnosis is considered critical for confirming the clinical diagnosis of this pathology group. This study aims to describe the histologic features of MRONJ, ORN and OM and to discuss their differences.

**Methods:** Biopsy archives from the department of Oral Pathology, Faculty of Dentistry, Chulalongkorn University from 2010 to 2019 were reviewed. Hematoxylin and eosin staining slides of the cases diagnosed with MRONJ, ORN and OM were retrieved for histologic review. Histologic features including the presence of bone cells, inflammation types, and bacterial colonies were studied in 17 MRONJ, 15 ORN and 77 OM cases. Data analysis using Kruskal-Wallis test was performed.

**Results:** Overall, there were differences in histological features among 3 lesions regarding the presence of osteoclasts, inflammation and bacterial colonies. MRONJ exhibited a statistically significant difference in the presence of osteoclasts compared to ORN and OM ( $p < 0.05$ ). Although the presence of bacterial colonies at the bony periphery was a striking feature in MRONJ, a statistically significant difference was found only between MRONJ and OM ( $p < 0.05$ ). Inflammatory cell infiltration made no difference when comparing groups separately ( $p > 0.05$ ).

**Conclusions:** The findings of this study suggest that there are different in histologic features among MRONJ, ORN and OM. Histologic examination of the specimens from the patients is to confirm the clinical diagnoses and to rule out the possibility of jaw malignancies.

S041

## Associations between Temporomandibular Disorder Subtypes, Emotional Distress, Impaired Sleep and Oral-health Related Quality of Life in Asian Patients

J. Lei<sup>1</sup>, A. U. Yap<sup>2, 3</sup>, M. Zhang<sup>1</sup>, K. Fu<sup>1</sup>

<sup>1</sup>Center for TMD & Orofacial Pain and Department of Oral and Maxillofacial Radiology, Peking University School & Hospital of Stomatology, Beijing, China.

<sup>2</sup>Department of Dentistry, Ng Teng Fong General Hospital, National University Health System, Singapore, Singapore.

<sup>3</sup>Faculty of Dentistry, National University of Singapore, Singapore, Singapore.

**Objectives:** This study determined the differences in emotional states, sleep, and oral health-related quality of life (OHRQoL) between patients with pain-related and intra-articular Temporomandibular disorders (TMDs), and correlated emotional symptoms with sleep and OHRQoL variables.

**Methods:** Subjects were recruited from a tertiary TMDs referral center. The Depression, Anxiety, Stress Scales-21 (DASS-21), Pittsburgh Sleep Quality Index (PSQI), and Oral Health Impact Profile-TMDs (OHIP-TMDs) were used to assess emotional states, sleep disturbance, and OHRQoL respectively. TMD-related and sociodemographic data were also gathered. Patients were divided into pain-related (PT), intra-articular (IT) and combined TMDs (CT) groups based on the Diagnostic Criteria for TMDs. Data were analyzed using parametric and logistic regression analysis with the significance level set at  $P < 0.05$ .

**Results:** Data of 1079 patients with a mean age of  $29.63 \pm 14.22$  years were appraised. The severity/prevalence of emotional distress, impaired sleep, and OHRQoL of the PT/CT groups were significantly higher than the IT group. Moderate to strong inter-relationships between emotional, sleep, and OHRQoL variables were more explicit for patients with painful TMDs. Logistic regression analysis demonstrated that painful-TMDs were associated with higher stress and lower OHRQoL with odds ratios (ORs) of 1.482 and 6.502, respectively ( $P < 0.05$ ).

**Conclusions:** Patients with pain-related TMDs reported high levels of emotional distress, disturbed sleep, and impaired OHRQoL. Stress and impaired OHRQoL were significantly related to painful TMDs.

S042

## Serum Vitamin D, Calcium, Alkaline Phosphatase and Parathyroid Hormone Level in Chronic Periodontitis and Healthy Periodontium

S. Pradhan

Dental, National Academy of Medical Sciences, Kathmandu, Nepal.

**Objectives:** To compare serum vitamin D, calcium, alkaline phosphatase and parathyroid hormone levels in patients with periodontitis and healthy periodontium and find out if any correlation exists between their level and periodontal diseases

**Methods:** comparative study was done in 80 patients visiting Department of Dental Surgery, Bir Hospital, National Academy of Medical Sciences, Kathmandu, Nepal. Parameters measured were plaque index, gingival index, clinical attachment level and pocket depth for the presence of healthy periodontium and chronic periodontitis. Blood investigations for serum Vitamin D, calcium, alkaline phosphatase (ALP) and parathyroid hormone (PTH) level were obtained. Data were analysed using IBM SPSS Statistics for Windows, version 26 (IBM Corp., Armonk, N.Y., USA) software and independent t-test was used for comparing the mean of serum vitamin D, calcium, ALP and PTH level between healthy and chronic periodontitis patients and compare between male and female and ANOVA were used for analysis of the mean level of serum Vitamin D, calcium, ALP and PTH level between different age groups.

**Results:** Out of total 80 patients enrolled, 40 patients had healthy periodontium and 40 were with chronic periodontitis mean age of  $36.20 \pm 7.37$  years. Mean level of serum vitamin D ( $p=0.123$ ), Calcium ( $p=0.227$ ), ALP ( $p=0.671$ ) and PTH ( $p=0.460$ ) were statistically insignificant when compared in sex. Mean levels of serum Vitamin D ( $p=0.006$ ), calcium ( $p=0.020$ ) were statistically significant and ALP ( $p=0.267$ ) and PTH ( $p=0.351$ ) were statistically insignificant between patients with healthy periodontium and chronic periodontitis.

**Conclusions:** Within the limitation of this study, it is concluded there is no differences in the level of serum ALP and PTH between the chronic periodontitis and healthy patients and higher level of serum vitamin D and calcium were seen in the chronic periodontitis patients as compared to healthy patients. Thus, no association was seen with the level of serum vitamin D, calcium, ALP and PTH and chronic periodontitis

## MicroRNA-26a-5p Delivered by Core-cone Mesoporous Silica Nanoparticles Promotes Osteogenic Differentiation

S. Hosseinpour, L. J. Walsh, C. Xu

School of Dentistry, The University of Queensland, Brisbane, QLD, Australia.

**Objectives:** RNA mediated bone regeneration is a novel, safe, and effective modality which has been studied in recent years. Despite there being many microRNAs, little work has been done on their use for promoting osteogenesis. Moreover, microRNA needs a safe, affordable, and efficient transfection method. The present study explored the osteogenic effect of rno-miRNA-26a-5p delivery on rat bone marrow mesenchymal stem cells (rBMSCs) using polyethyleneimine coated core-cone mesoporous silica nanoparticles (CC-MSNs).

**Methods:** The novel microRNA delivery system was based on CC-MSNs (45 nm pore size, surface area 2.59 cm<sup>3</sup>/g). Nanoparticles were fabricated by an oil and water system. Some batches of nanoparticles were coated by polyethyleneimine (10 KDa) to increase the zeta potential, for greater nucleic acid interaction. MSNs were characterized by SEM and TEM. Cell viability assessed were assessed after 1, 3, and 7 days by the MTT assay. Rhodamine-labeled MSNs were loaded with fluorescent-tagged microRNAs, and their transfection efficiency for rBMSCs was evaluated by confocal laser scanning microscopy and flow cytometry analysis. CC-MSNs were loaded with 1. MicroRNA-26a-5p mimic, 2. MicroRNA-26a-5p inhibit, or 3. Negative control microRNA. Expression of osteogenic genes (Runx-2, OCN, collagen 1, and BMP-2) was assessed at 7 days using the real-time quantitative polymerase chain reaction. In addition, osteogenic differentiation was assessed at 14 days by alkaline phosphate activity and alizarin red S staining.

**Results:** Polyethyleneimine coated CC-MSNs effectively transfected rBMSCs with miRNA-26a. A low concentration of these nanocomplexes significantly intensified the expression of osteogenic genes compared to controls (p <0.05). Moreover, both matrix mineralization and ALP activity were enhanced significantly by miRNA treatment.

**Conclusions:** Overall, these findings support the concept that microRNA-26a-5p mimic can be effectively delivered into mesenchymal stem cells using CC-MSNs as the vector for gene therapy, to promote osteogenic differentiation of stem cells.



S044

## Organ-on-a-Chip Device Enables Reconstruction of Lamina Propria and Oral Mucosa Equivalents

G. Muniraj, G. Sriram

Faculty of Dentistry, National University of Singapore, Singapore, Singapore.

**Objectives:** Advances in the field of tissue engineering and microfluidics have provided opportunities to develop next-generation tools such as ‘Organ-on-a-Chip’ devices. These are miniaturized devices that contain hollow microchannels and microchambers that can host living cells, micro-tissues and allow controlled delivery of media, drugs, and microbiome. Controlled perfusion through microchannels enables the supply of nutrients and delivery of drugs, test substances, or even microbes to the cells or tissues in a highly regulated spatiotemporal manner. In this study, we developed an organ-on-a-chip device to reconstruct tissue equivalents representative of lamina propria (LPE) and oral mucosa (OME) and investigated its potential for drug permeation studies.

**Methods:** Using microfabrication technology, we fabricated an organ-on-a-chip device that contains an array of microchambers and microchannels. The microchambers were used to culture LPEs and OMEs. LPEs were fabricated by seeding oral fibroblasts embedded in a fibrin-based matrix within the culture chamber of the organ-on-a-chip device.

OMEs were fabricated by seeding oral keratinocytes over LPE. The LPEs and OMEs cultured within the organ-on-a-chip device were characterized by immunohistology. Drug permeation studies were conducted using dental anesthetics as model drugs.

**Results:** The organ-on-a-chip device enabled the development of lamina propria and oral mucosa-like tissues. Histological sections of LPEs demonstrated the expression of vimentin-positive oral fibroblasts embedded within a collagen-1 and fibronectin rich lamina propria-like matrix. Similarly, the OMEs demonstrated a multilayered squamous epithelium over a cellular lamina propria. The mucosal epithelium demonstrated the expression of stratified epithelial cytokeratins (CK5, CK13, CK19, CK10) and barrier proteins (flaggrin and loricrin). Drug permeation studies demonstrated that lidocaine and articaine are more permeable through LPEs than OMEs.

**Conclusions:** Organ-on-a-chip technology provides a miniaturized platform to culture oral mucosal tissue equivalents and conducts downstream permeation studies. In the future, it can be used to study host-microbiome interactions, to assess the toxicity and biocompatibility of dental biomaterials and oral-care products.

## Characteristic of Dental Pulp Stromal Cells from Cleft Lip Palate Patients

L. R. Amir<sup>1</sup>, C. Kadota-Watanabe<sup>2</sup>, T. Ogawa<sup>2</sup>,  
S. Hak<sup>3</sup>, N. Nuraini<sup>3</sup>, K. Moriyama<sup>2</sup>

<sup>1</sup>Oral Biology, Faculty of Dentistry Universitas Indonesia, Jakarta Pusat, DKI Jakarta, Indonesia.

<sup>2</sup>Department of Maxillofacial / Neck Reconstruction, Tokyo Medical and Dental University (TMDU), Tokyo, Japan.

<sup>3</sup>Birth Defect Integrated Center, Harapan Kita Children and Women's Hospital, Jakarta, Indonesia.

**Objectives:** Cleft lip and palate (CL/P) is a complex multifactorial disorder and one of the most common congenital orofacial malformations. Alveolar bone defect reconstruction using mesenchymal stromal cells (MSCs) have been previously reported. However, the characteristics of MSCs from CL/P patients was unclear. Understanding of its characteristics is of importance for their potential clinical use. The present study aimed to evaluate the characteristics of dental pulp stromal cells (DPSCs) from non-syndromic cleft lip and palate patients (NSCL/P) in comparison to healthy matched controls.

**Methods:** DPSCs were isolated from 12 teeth. MSCs immunotyping, cell proliferation capacity and osteogenic differentiation was tested. Human Homeobox (HOX) and osteogenesis genes expression were analyzed with RT2 Profiler PCR Array.

**Results:** Cell proliferation of DPSCs from NSCL/P at day 1, 3 and 7 was comparable with control ( $p > 0.05$ ). Similarly, cell population expressing MSCs specific markers of CD73, CD90 and CD106 was comparable between the two groups tested. Population doubling time was  $1.15 \pm 0.27$  and  $1.35 \pm 0.31$  for DPSCs from NSCL/P and healthy control, respectively ( $p = 0.18$ ). No different was found in the ALP, Col1A1, and Runx2 mRNA expression following 21 days of osteogenic induction. RT2 Profiler PCR Array of osteogenesis genes revealed significant differences in the expression of IGF1, Col10A1, FGFR1, MMP2 and PHEX genes. While gene differentially expressed in the two-group tested for HOX showed EN1, HOXC9, SHOX and CUX1 genes. The fold regulation threshold for osteogenesis and HOX genes was 2 ( $p < 0.05$ ).

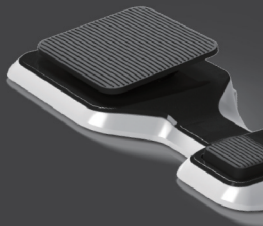
**Conclusions:** Differences exist between homeobox and osteogenesis genes between DPSCs from NSCL/P patients and their matched controls. Nonetheless, in vitro DPSCs culture showed comparable results with regards to cell proliferation and osteogenic differentiation. The present study highlights the potential use of DPSCs from NSCL/P patients for bone defect reconstruction.

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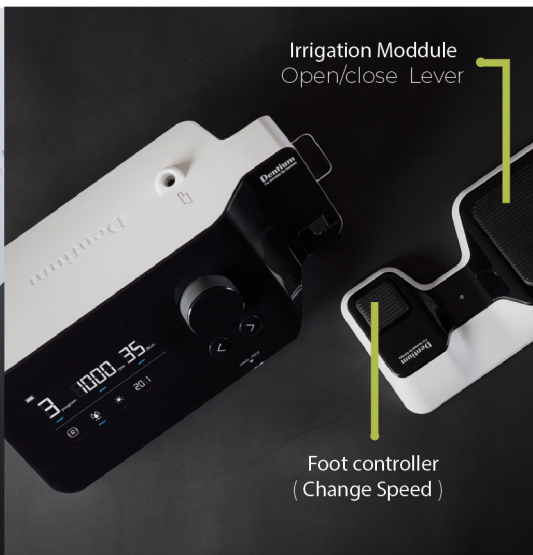
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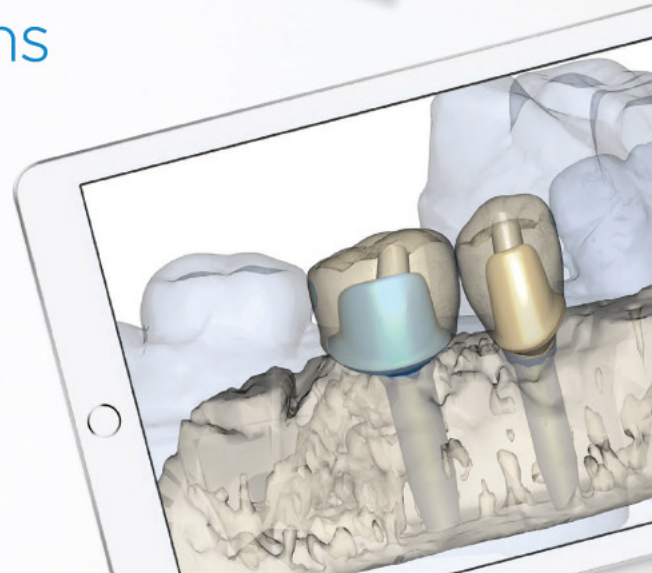
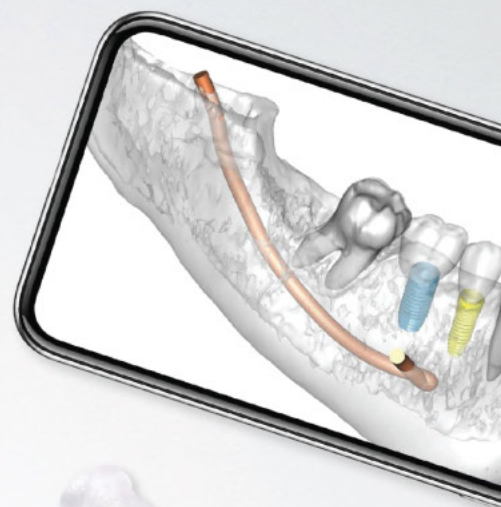


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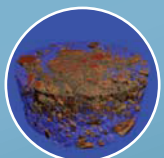
Rat femur



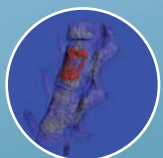
Rat ,segmented



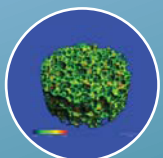
Tooth showing root canal



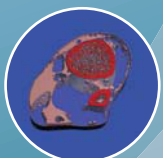
Frozen soil & ice



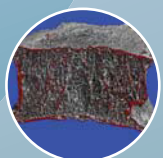
Mouse spine with transparent cortex



Scaffold, thickness map



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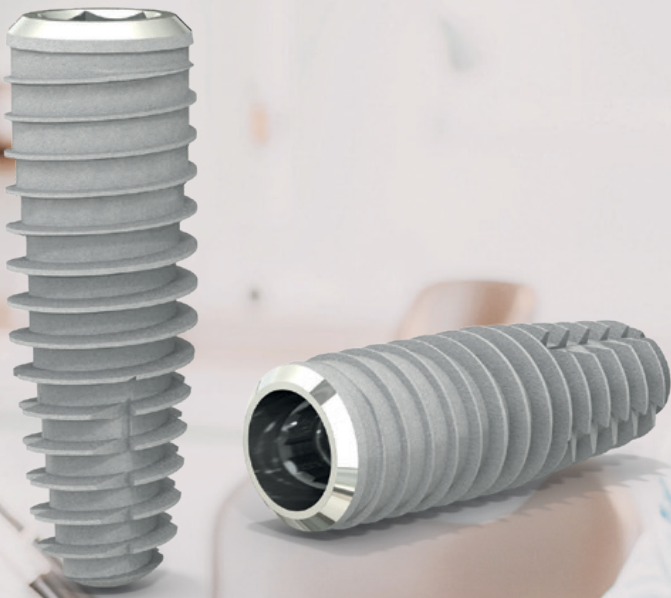
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