

TOHOKU UNIVERSITY GRADUATE SCHOOL OF DENTISTRY

The International Oral Health Symposium 2026

Programme of Abstracts

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Tohoku University Graduate School of Dentistry

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K1 KEYNOTE LECTURE

Life-course informed oral health preventive strategies to maximise equitable healthy ageing

Ankur Singh

The University of Sydney

Presenting author: Assoc. Prof. Ankur Singh, The University of Sydney, Australia



ABSTRACT

Population ageing is accelerating globally, bringing renewed attention to healthy ageing—the process of developing and maintaining the functional ability that enables wellbeing in older age. Good oral health is fundamental to this goal, supporting nutrition, communication, social participation and overall wellbeing. Yet oral health remains insufficiently integrated into healthy ageing frameworks, metrics and preventive strategies. Oral diseases are cumulative across the life course. Their onset, progression and consequences reflect exposures and opportunities for prevention occurring from childhood through working age and into later life. Missed opportunities for timely prevention and treatment can therefore accumulate, resulting in tooth loss, impaired oral function and other adverse outcomes that may constrain healthy ageing. Importantly, both oral health and healthy ageing are socially patterned. Social disadvantage can shape exposure to oral disease risks, access to preventive care and treatment, and ultimately the capacity to enter older age with good oral health and function. This talk will examine critical evidence gaps that must be addressed globally, and particularly in Australia, to better integrate oral health within strategies for equitable healthy ageing. Drawing on life-course epidemiological theories, it will consider how accumulation of risk, critical and sensitive periods, and social pathways can inform the timing and targeting of preventive interventions. The talk will argue for a shift from predominantly managing oral disease in later life towards identifying preventive opportunities across the life course that can maximise oral function, reduce inequalities and support healthy ageing at the population level.

BIOGRAPHY

Associate Professor Ankur Singh is the Chair of Lifespan Oral Health at the University of Sydney and a former Australian Research Council DECRA Fellow (2023-2025). He is a clinically trained dentist with research training in population oral health and social epidemiology, holding an MSc in Dental Public Health from University College London and a PhD from the University of Adelaide. His research program examines social inequalities in oral health across the life course, applying causal inference methods to longitudinal cohorts and prospective simulation modelling to quantify the population health and equity impacts of interventions. He is President of the Global Oral Health Inequalities Research Network at the International Association for Dental Research, Associate Editor of Community Dentistry and Oral Epidemiology and Australian Dental Journal, and a member of the Journal of Dental Research Advisory Board.

K2 KEYNOTE LECTURE

Glass Ionomer Cement for Caries Control: An Evidence-Based Update

Ollie Yu

Assistant Dean (Knowledge Exchange and Development); Clinical Assistant Professor in Cariology, Faculty of Dentistry, The University of Hong Kong

BDS, MDS (Huazhong Sc & Tech); PhD (HK); FDS RCSEd; FDS RCS Eng; FDS RCPS (Glasg); FHEA; FICD

Presenting author: Prof. Ollie Yu, The University of Hong Kong, Hong Kong SAR



ABSTRACT

The World Health Organization (WHO) have added glass ionomer cement (GIC) to the WHO Model List of Essential Medicines since 2021, which represents the most efficacious, safe and cost-effective medicines for priority conditions. With this recent WHO endorsement, an increase in the use of GIC is plausible. GIC, including conventional glass ionomer cement (CGIC) and resin-modified glass ionomer cement (RMGIC), are commonly used as dental sealants and dental restorative materials in preventive and restorative dentistry. Although there are concerns about moisture sensitivity, low mechanical strength and compromised aesthetic, GIC has several advantages, including adhesion to tooth structures, biocompatibility, simple clinical operation and long-lasting fluoride release. Based on laboratory data regarding sustained fluoride release, CGIC and RMGIC have been associated with caries prevention. In this lecture, we will discuss the clinical application of GIC in preventing and managing dental caries with the support of most updated evidence.

BIOGRAPHY

Professor Ollie YU is the Assistant Dean (Knowledge Exchange and Development) and a Clinical Assistant Professor at the Faculty of Dentistry, The University of Hong Kong. She has authored over 110 articles in peer-reviewed international journals. Professor Yu's team has presented more than 50 studies at international conferences and received multiple prestige awards such as IADR Innovation in Oral Care Award, IADR Colgate Research in Prevention Travel Award, IADR Cariology Research Group Award, AAPD Outstanding Researcher Award, IADR-SEA Research Category Award, and SEAAD Innovation award. She serves as Assistant Specialty Chief Editor of Frontiers in Oral Health, and is an editorial board member of International Dental Journal, BMC Oral Health and Scientific Reports. She also serves as the vice president of the Society of Preventive Dentistry of Hong Kong. She has been invited to deliver lectures and workshops at over 20 international and regional conferences. Prof Yu's clinical and research interest are centred on Cariology and Restorative Dentistry, with a particular focus on caries microbiome, caries detection, and prevention and management of dental caries and dental erosion.

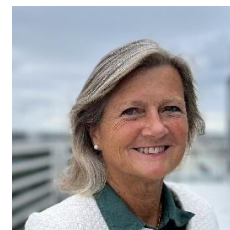
K3 KEYNOTE LECTURE

Long-Term Outcome after Multidisciplinary Treatment of Patients with Cleft Lip and Palate

Agneta Karsten

Division of Orthodontics, Department of Dental Medicine, Karolinska Institutet

Presenting author: Prof. Agneta Karsten, Karolinska Institutet, Sweden



ABSTRACT

Background: In Sweden, patients born with cleft-lip-and palate are treated in multidisciplinary teams consisting of plastic surgeons, orthodontists, speech and language pathologists among others. The patients are treated from birth till adulthood and recorded every fifth year to follow up growth, dental development and occlusion, speech as well as quality of life.

Material and Methods: Dental casts, photos, cephalograms, radiographs from patients with completed growth and finished treatments have been evaluated and analysed with the GOSLON yardstick, cephalometric analyses, speech evaluations and the Bergland index. Oral health impact profile 14, Jaw functional limitation scale 20 and Oral esthetic scale have been delivered at the last follow up meeting at 19 years of age.

Results: Long-term results show that for most patients a good to acceptable result has been achieved regarding facial growth, occlusion, speech and quality of life after finished treatment.

Conclusion: For most patients born with cleft-lip- and palate the long-term-outcome after treatment in a multidisciplinary team is good regarding facial growth, occlusion, speech and quality of life.

BIOGRAPHY

Agneta Karsten is Professor and Head of the Division of Orthodontics, Department of Dental Medicine, Karolinska Institutet in Stockholm, Sweden.

She got her dental degree from Karolinska Institutet in 1986. She did her postgraduate studies in Orthodontics and a Master of Odontology in 1990 at the University of Bergen, Norway. She defended her doctoral thesis at the Karolinska Institutet 1995, became Associate Professor in 2005 and full professor in Orthodontics at the Karolinska Institutet in 2024.

Her main focus of research is on the field of cleft lip- and palate. She has been head of the jaw orthopedic division of the craniofacial team in Stockholm for more than twenty years. She runs an international postgraduate program in orthodontics and is a board member of Network of Erasmus Based European Orthodontic Postgraduate Programmes (NEBEOP). She lectures nationally and internationally. She is on the Editorial Board of the European Journal of Orthodontics. She is a board member of the Swedish Dental Society.

K4 KEYNOTE LECTURE

Feasibility of a screening tool for pre-antiresorptive therapy dental assessments

Mathew Lim

Melbourne Dental School, The University of Melbourne, Australia

Presenting author: Dr. Mathew Lim, The University of Melbourne, Australia



ABSTRACT

In Australia, poor bone health continues to result in significant personal morbidity and economic burden to the healthcare system. In 2023, minimal trauma fractures accounted for about 50% of the total health costs associated with suboptimal management of bone health, with less than 1 in 3 patients with osteoporosis on pharmacologic therapies. Medication-related osteonecrosis of the jaw is a rare, but potentially debilitating adverse effect associated with anti-resorptive therapies, including nitrogen-containing bisphosphonates and Denosumab. Significant awareness of this condition has resulted in guidelines recommending a dental assessment to be completed prior to commencement on these therapies. Unfortunately, completion of this assessment and the dental treatment recommended continue to be one of the barriers to optimal pharmacologic management for bone health. Given the limited access to oral health professionals in acute medical settings, this study aimed to analyse the factors that influenced anti-resorptive clearances provided by dentists, thereby guiding the development a tool for dental assessments that could be administered by a physician or nurse. This presentation will share the initial findings on the determinants in these assessments and the feasibility of a physician or nurse-administered tool.

BIOGRAPHY

Adjunct Clinical Associate Professor Mathew Lim is one of only 30 registered specialists in special needs dentistry in Australia, specialising in the management of patients with complex health issues and disabilities. He holds academic appointments as the School of Translational Medicine, Monash University and Melbourne Dental School, University of Melbourne, where he is Discipline Lead of Special Needs Dentistry, Convenor of the Doctor of Clinical Dentistry program in Special Needs Dentistry, Co-coordinator of the final year of the Doctor of Dental Surgery program, and Associate Director – Research International. Mathew also holds clinical appointments at several of Melbourne's major hospitals, including the Royal Melbourne Hospital and The Alfred, where he is also Director of Dental Services. As a clinician researcher, Mathew's research interests centre around supporting health equity using mixed methods approaches. These aim to support clinicians to manage patients with more complex needs through educational approaches, developing evidence for clinical protocols, and translational solutions to barriers in health systems.

K5 KEYNOTE LECTURE

Anti-Inflammatory Strategies for Colitis-Induced Treatment-Resistant Apical Periodontitis

Masahiro Saito

Tohoku University Graduate School of Dentistry, Department of Ecological Dentistry, Division of Operative Dentistry

Presenting author: Prof. Masahiro Saito, Tohoku University, Japan



ABSTRACT

As human life expectancy increases, preserving natural dentition through endodontic therapy has become increasingly critical for maintaining proper masticatory function and preventing systemic diseases. Standard root canal treatment effectively resolves apical periodontitis (AP) in the majority of cases by removing infection and allowing natural tissue repair. However, some cases fail to heal even after conventional retreatment, a condition known as treatment-resistant AP. Emerging clinical studies suggest that systemic conditions, including autoimmune, cardiovascular, and lifestyle-related diseases, heavily contribute to this treatment resistance.

To clarify this complex relationship, we developed an experimental model of AP accompanied by colitis, investigating how inflammatory bowel disease directly affects AP pathology. This model demonstrated that colitis-induced immune dysregulation within the jawbone marrow significantly exacerbates bone destruction, primarily driven by an increase in inflammatory neutrophils. Furthermore, we found that the application of a local drug delivery system utilizing targeted anti-inflammatory therapeutics in addition to standard treatment can effectively reduce this bone loss. This talk will present our recent findings regarding how AP interacts with systemic disease and discuss future dental strategies for managing therapy-resistant AP.

BIOGRAPHY

1988–1994 Instructor, Department of Operative dentistry, Kanagawa Dental College

1994–1996 Visiting Fellow, School of Medicine, Department of Pathology, University of Washington, Seattle, WA

1996–2002 Instructor, Department of Operative Dentistry and Endodontics, Kanagawa Dental College

2002–2006 Assistant professor, Department of Operative Dentistry and Endodontics, Kanagawa Dental College

2006–2009 Assistant professor, Department of Molecular and Cellular Biochemistry, Osaka University Graduate School of Dentistry

2009–2013 Associate professor, Faculty of Biological Science, Tokyo University of Science

2013 Professor, Division of Ecological Dentistry, Department of Restorative Dentistry, Tohoku University, Graduate School of Dentistry

Chief, Department of Endodontics, Tohoku University Hospital

2019 Vice-Chairman, Clinical Research Committee, Vice-Director, Clinical Research, Innovation and Education Center, Special Assistant of Hospital Director, Tohoku University Hospital

2022 Vice-Director of Dental Division, Tohoku University Hospital

2026 Special Assistant of Hospital Director, Tohoku University Hospital

K6 KEYNOTE LECTURE

From Fats to Bone: Applications for Oral & Maxillofacial Regeneration

Bee Tin GOH

National Dental Centre Singapore

Presenting author: Clin. Assoc. Prof. Goh Bee Tin, National Dental Centre Singapore, Singapore



ABSTRACT

Currently, autogenous bone is considered the gold standard as a graft material for reconstruction of bone defects. This implies that the patient is subjected to additional surgery and its associated morbidities and expenses. Allografts and xenografts are alternatives, but they have unpredictable results and subject the patient to risks of disease transmission and adverse immune reactions. Bone regeneration using tissue engineering principles holds promise to obviate these shortcomings. Our team at the National Dental Research Institute Singapore has been collaborating with bioengineers and material scientists to develop novel devices and innovative approaches to bone regeneration for application in the oral and maxillofacial region. The techniques are kept simple, minimally invasive and relatively inexpensive so they may be easily adopted in clinical practice. This presentation will share preclinical studies on the use of adipose-derived mesenchymal stem cells extracted and implanted at the time of the primary surgery for bone regeneration.

BIOGRAPHY

Clinical Assoc Prof Goh Bee Tin is Chief Executive Officer, National Dental Centre of Singapore, Chair, Oral Health Academic Clinical Programme, SingHealth Duke NUS and Founding Director, National Dental Research Institute Singapore. Cl A/Prof Goh obtained her Bachelor of Dental Surgery from the National University of Singapore (NUS) in 1993. She then went on to specialize in the field of Oral & Maxillofacial Surgery, obtaining her Dental Fellowship with the Edinburgh Royal College of Surgeons in 1996 and Master of Dental Surgery from NUS in 1997. She was admitted as a Fellow of the Academy of Medicine, Singapore in 2000. In that same year, she was sent on a government scholarship for advanced training in cleft lip and palate and orthognathic surgery in Canada. In 2004, she furthered her training in craniofacial implantology in Sweden and the United Kingdom. She obtained a PhD in 2009 from Radboud University Nijmegen in the Netherlands for her novel research work on modular endoprosthesis for mandibular reconstruction. Cl A/Prof Goh is also appointed Clinical Associate Professor at the NUS Dental Faculty and Duke NUS Medical School, and Adjunct Associate Professor at the Nanyang Technological University. She is active in teaching and training postgraduate students. Her research interests include bone bioengineering, oral & maxillofacial device development and novel techniques in mandibular reconstruction. Cl A/Prof Goh received the Osteopore Innovation Award, SingHealth GCEO Outstanding Clinician Researcher Award, Duke NUS Master Academic Clinician, Duke NUS Dean's Excellence Award (Leadership) and the National Day Awards, Public Administrative Medal (Bronze) for her academic achievements and contributions to public healthcare.

K7 KEYNOTE LECTURE

Digital Dentures: From Design to Future

Juha Song

School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, Singapore

Presenting author: Assoc. Prof. Juha Song, Nanyang Technological University, Singapore



ABSTRACT

Digital and additive manufacturing are opening new possibilities for the fabrication of patient-specific dentures with improved design flexibility and streamlined production. Beyond manufacturing accuracy, however, the performance of digitally fabricated dentures depends on the integration of multiple components and their mechanical response under functional loading. In this keynote, I will present our work on the development of a digitally fabricated denture platform and discuss how computational and mechanical analyses can support prosthesis design and optimization. Selected results will illustrate how simulation can provide insight into structural behavior and help guide design decisions in digitally manufactured dentures. I will also discuss future directions, including more integrated computational workflows, improved material and structural design, and the potential use of AI-assisted approaches for patient-specific optimization. Together, advances in additive manufacturing and computational design may enable the next generation of dentures with improved performance, efficiency, and functionality.

BIOGRAPHY

Juha Song is an Associate Professor in the School of Chemistry, Chemical Engineering and Biotechnology at Nanyang Technological University (NTU), Singapore. Her research develops multi-material additive and digital manufacturing platforms for functional biomedical devices, with a focus on how interfacial design and material properties can be engineered into next-generation dental prostheses and beyond. Her group combines structural and interfacial design, materials characterization, and advanced fabrication—spanning digitally manufactured dental prostheses, microneedle-based devices, and structurally engineered biomaterials—to create devices that are personalized, functionally integrated, and manufacturable at scale.

Oral Presentations

Young Researcher Sessions 1 – 4 · O1 – O15

O1 ORAL PRESENTATION

Oral Health and the Oral Microbiome in Cancer Prevention

Margaret Sällberg Chen

Division of Pathology, Dept of Laboratory Medicine, Karolinska Institutet, and Medical Unit Cell Therapy and Allogeneic Stem Cell Transplantation (ME CAST), Theme Cancer, Karolinska Comprehensive Cancer Center, Karolinska University Hospital, Stockholm, Sweden.

Presenting author: Prof. Margaret Sällberg Chen, Karolinska Institutet, Sweden



ABSTRACT

Cancer remains a leading cause of death worldwide, and outcomes for gastrointestinal (GI) cancers remain poor despite therapeutic advances. Many GI cancers, including pancreatic, liver, and colorectal cancer, are strongly linked to chronic inflammation. Growing evidence indicates that poor oral health contributes to this inflammatory burden. Epidemiological studies also consistently associate periodontal disease, tooth loss, and dysbiotic oral microbiota with increased risk of GI cancers, highlighting the importance of the oral-gut axis in tumor development. In our cross-sectional, peri-diagnostic, and longitudinal clinical studies, we combine 16S rRNA sequencing with high-resolution metagenomics to identify oral microbial signatures associated with cancer risk and host immune status. To move beyond descriptive associations, we use experimental models to examine how tumor-associated pathobionts, microbial metabolites, and intracellular bacteria influence genomic instability, immune dysregulation, and metabolic reprogramming in human cells and tissues. Our findings suggest that host-microbe interactions can be further shaped by antimicrobial immune pathways relevant for training of cancer-protecting immunity. Together, our results support integrating microbiome-based risk stratification with genomic and clinical biomarkers to improve early detection and prevention strategies, reinforcing the critical role of oral health in cancer prevention and precision health.

BIOGRAPHY

Margaret Sällberg Chen is a Professor of Clinical Oral Immunology at Karolinska Institutet and an Adjunct Professor at Karolinska University Hospital, ME CAST, Theme Cancer, in Stockholm, Sweden. She holds a DDS and a PhD in Oral Microbiology and Virology from KI and completed postdoctoral training in the US at The Scripps Research Institute, focusing on oncopathogens, adaptive immunity, and immune repertoire profiling. She also holds a Visiting Professor position at the National University of Singapore. At KI, she is a research group leader and serves as Director for Doctoral Education and Chair of the KID Doctoral Funding Steering Group. Her research investigates immune protection in infections and cancer, with emphasis on noninvasive prognostic markers, oral- and gut microbiota-immune interactions, and emerging precision medicine approaches.

O2 ORAL PRESENTATION

Single-cell and spatial transcriptomic insights into oral carcinogenesis: a systematic review

Bernadette Quah^{1,2}, Joel Azriel Yongfeng Seow³, Lei Zheng², Narayanan Gopalakrishna Iyer⁴, Margaret Sällberg Chen¹

¹Karolinska Institutet, ²National University of Singapore, ³Ministry of Health Holdings Pte Ltd, ⁴National Cancer Centre Singapore

Presenting author: Dr. Bernadette Quah, Karolinska Institutet, Sweden



ABSTRACT

Objective: To summarise recent advances in single-cell and/or spatial transcriptomics analyses of oral potentially malignant disorders (OPMDs) in oral carcinogenesis.

Methods: A systematic review across PubMed, Embase and Cochrane Library was performed to identify studies that included single-cell (scRNA-seq) or spatial transcriptomics (ST) technologies on OPMDs and malignant transformation.

Results: Of 202 screened articles, 10 studies comprising 131 patients and 217 samples were included. scRNA-seq and ST was applied in seven and five articles respectively, in which five analysed leukoplakia, while actinic cheilosis, oral submucous fibrosis, proliferative verrucous leukoplakia was analysed in one each, and two unspecified. 10x Genomics Chromium for scRNA-seq and 10x Genomics Visium for ST were mostly used (85.7%, 60%), followed by Nanostring GeoMx. These technologies identified: (1) cellular heterogeneity and cell clusterings in lesion microenvironment; (2) changes in cell state, genes, functional pathways and cell-cell interactions; (3) cell subpopulation and processes involving immune cell suppression, ECM remodeling or proliferation, and (4) potential biomarkers that are associated with malignant progression.

Conclusion: scRNA-seq and ST offers mechanistic insights into tissue microenvironment beyond those achievable with bulk transcriptomic approaches. Larger studies and functional validations await to confirm subcellular and architecture features associated with OPMD oncogenic progression and causative factors.

BIOGRAPHY

Dr Bernadette Quah is an Academic Fellow and Associate Consultant with the Department of Oral and Maxillofacial Surgery at the National University of Singapore (NUS) and National University Hospital, after graduating with a Master of Dental Surgery (Oral and Maxillofacial Surgery) from NUS in 2023. Her clinical practice currently lies in the field of oral and maxillofacial surgery and oral medicine, and her clinical, research and educational interests are in the field oral medicine and maxillofacial pathology, specifically in potentially malignant and malignant oral mucosal lesions. Currently a doctoral student with Karolinska Institutet, her doctoral research involves the investigation of the cellular and microbial landscape in oral carcinogenesis.

03 ORAL PRESENTATION

Microbial spatiotemporal dynamics in oral health: from metagenomics to single-cell phenome

Shi Huang

University of Hong Kong (HKU) Faculty of Dentistry

Presenting author: Dr. Shi Huang, The University of Hong Kong, Hong Kong SAR



ABSTRACT

Chronic oral infectious diseases, including dental caries and periodontitis, are driven by polymicrobial dysbiosis and represent substantial global health burdens increasingly linked to cardiovascular disease, diabetes, and adverse pregnancy outcomes. This presentation showcases a research journey advancing oral microbiome analysis from community-level metagenomics to cutting-edge single-cell metabolic phenotyping, bridging the critical gap between sequence-based taxonomic profiling and functional metabolic validation to enable precision dentistry and truly personalized therapeutics. First, I will demonstrate how longitudinal spatiotemporal monitoring of oral microbiota across diverse populations enables remarkably accurate prediction of disease onset—including Early Childhood Caries, periodontal deterioration, and healthy aging trajectories—establishing a robust scientific foundation for pre-symptomatic risk assessment and timely proactive interventions long before irreversible clinical tissue damage manifests in affected patients. Second, I will introduce 2bRAD-M technology, which achieves precise strain-level profiling of challenging low-biomass clinical samples by overcoming the long-standing bottleneck of host DNA contamination, thereby dramatically expanding microbiome diagnostic capabilities across diverse clinical, pediatric, and resource-limited settings worldwide where traditional sequencing methods often fail completely. Third, I will highlight single-cell Ramanomics integrated with the innovative culturomics platform for rapid, label-free functional characterization and intelligent sorting of live, metabolically active oral microbes—such as acid-producing, fluoride-resistant, or pathogenic strains—directly from complex clinical specimens. This groundbreaking approach enables targeted cultivation and truly personalized therapeutic strategies. By connecting microbial ecology with clinical translation, this research lays essential groundwork for precision oral care, from predictive early-warning systems to personalized culture banks and next-generation live biotherapeutic products that may ultimately reduce global oral health disparities.

BIOGRAPHY

Dr. Shi Huang is an Assistant Professor at the University of Hong Kong (HKU) Faculty of Dentistry and Assistant Director of the Global Hub of Future Dentistry. His research pioneers advanced multi-omics and single-cell technologies for human microbiome analysis, focusing on chronic oral disease prediction through spatiotemporal modeling, targeted probiotics mining and clinical translation, Raman-activated single-cell sorting, and ultra-low-biomass microbiome characterization. After earning his Ph.D. from the University of Chinese Academy of Sciences, he conducted postdoctoral research in Professor Rob Knight's internationally renowned laboratory at the University of California San Diego, where he developed foundational expertise in microbiome bioinformatics and established enduring global collaborations. Dr. Huang's interdisciplinary work has led to high-impact publications in leading journals including *Nature Methods* and *Cell Host & Microbe* (3), *Microbiome*, *mBio*, and *Journal of Dental Research*. He has been recognized as a Clarivate Highly Cited Researcher (top 1%) in both 2023 and 2024, and is a Finalist for the prestigious 2025 IADR Joseph Lister Award for New Investigators. An active academic editor for journals such as *mSystems* and *iMeta*, he also serves as a frequent invited reviewer for *Nature Portfolio* and other major international journals, and holds 7 invention patents. He has successfully secured and managed numerous competitive research grants including awards from the National Natural Science Foundation of China, the Hong Kong Health and Medical Research Fund, and the HKU Large Research Equipment Fund, demonstrating sustained leadership in driving cutting-edge dental microbiome research with significant translational potential for improving global oral health outcomes.

O4 ORAL PRESENTATION

Susceptibility of *Candida albicans* to caries-control agents: xylitol and fluoride

Haneen Raafat Fathi Mousa¹, Yuki Abiko¹, Satoko Sato¹, Jumpei Washio¹, Nobuhiro Takahashi²

1. Division of Oral Ecology and Biochemistry, Graduate School of Dentistry, Tohoku University, Sendai, Japan

2. Graduate School of Dentistry, Tohoku University, Sendai, Japan

Presenting author: Dr. Haneen Raafat Fathi Mousa, Tohoku University, Japan



ABSTRACT

Objectives: The caries-preventive effects of xylitol and fluoride have been demonstrated through their ability to suppress major cariogenic bacteria such as *Streptococcus mutans*, leading to their widespread use in oral health products intended for caries control. However, yeasts may not be similarly affected due to their distinct structural and metabolic profiles. Therefore, using *C. albicans*, the most frequently isolated oral yeast, known for its association with dental caries, we investigated the metabolism of xylitol, its precursor xylose, compared the resulting acid production with glucose, and explored effect of xylitol and fluoride on *Candida*'s glucose metabolism.

Methods: Acid production of *C. albicans* (JCM1537) from 10 mM glucose/xylose/xylitol was assessed by pH-stat system, and acidic end-products were quantified by HPLC analysis.

Results: *C. albicans* could metabolize xylose/xylitol, producing significantly less acid than glucose. However, no inhibitory effects were observed in the presence of glucose. Additionally, *C. albicans* showed resistance to high fluoride concentrations (up to 80 mM, like most commercial toothpastes).

Conclusion: *C. albicans* could metabolize xylose/xylitol, producing minimal acid that is unlikely cariogenic. However, its acid production was not inhibited by xylitol or fluoride. These findings suggest the need for novel anti-candidal approaches to control caries associated with this yeast.

BIOGRAPHY

Dr. Haneen Raafat Fathi Mousa is a researcher in the field of oral ecology and biochemistry. She graduated from Faculty of Dentistry, Ain Shams University in Egypt and completed a master's degree in dental public health and community dentistry at the same university, then received her Ph.D. from Tohoku University in Japan.

Dr. Mousa is currently working as a specially appointed assistant professor in the Division of Oral Ecology and Biochemistry at the Graduate School of Dentistry, Tohoku University, where her work focuses on exploring the cariogenic potential of *Candida* species from a biochemical perspective.

05 ORAL PRESENTATION

Area-Level Disadvantage and Oral Health Behaviours Among Australian Adolescents: A Multilevel Analysis

Haoyue Zhao¹, Matt Hopcraft¹, Ankur Singh², Nadia Kaunein¹

¹ University of Melbourne, Victoria, Australia

² University of Sydney, NSW, Australia

Presenting author: Dr. Nadia Kaunein, The University of Melbourne, Australia



ABSTRACT

Objectives: Oral health behaviours are important determinants of oral health outcomes and are influenced by both individual- and area-level factors. This study examined the associations of geographic remoteness and area-level socioeconomic deprivation with oral health behaviours among Australian adolescents aged 12–13 years.

Methods: This cross-sectional study analysed data from the Longitudinal Study of Australian Children (LSAC; Wave 7, 2015), including 3,381 adolescents aged 12–13 years. Multilevel logistic regression models were used to examine associations between area-level deprivation and remoteness with five oral health behaviours: dental attendance, toothbrushing frequency, fruit juice consumption, fast-food consumption, and sugar-sweetened beverage (SSB) consumption.

Results: Adolescents living in the most socioeconomically deprived areas had significantly higher odds of adverse oral health behaviours and reduced dental attendance compared with those in the least deprived areas. They were more likely to not visit a dentist within the previous year (OR=1.56, 95% CI: 1.24–1.96), brush their teeth less than twice daily (OR=1.43, 95% CI: 1.14–1.78), and consume fruit juice (OR=1.30, 95% CI: 1.06–1.61), fast food (OR=1.63, 95% CI: 1.31–2.04), and SSBs (OR=1.59, 95% CI: 1.28–1.98) on the previous day. Adolescents from outer regional and remote areas had higher odds of not attending a dental visit within the past year (OR=1.23, 95% CI: 0.96–1.57) and lower odds of fast-food consumption (OR=0.91, 95% CI: 0.71–1.18), with minimal differences observed for toothbrushing, fruit juice, and SSB consumption.

Conclusion: Area-level socioeconomic deprivation demonstrated stronger and more consistent associations with adolescent oral health behaviours than geographic remoteness. Findings highlight the need for targeted public health strategies addressing socioeconomic inequalities to improve oral health behaviours and access to dental care among Australian adolescents.

BIOGRAPHY

Dr Nadia Kaunein is a Lecturer and Postdoctoral Research Fellow at the Melbourne Dental School and the Melbourne School of Population & Global Health. She has a background in dentistry, epidemiology and biostatistics, and completed her PhD in oral cancer. Her work focuses on oral epidemiology, population oral health and quantitative methods, with a strong interest in reducing oral health inequities. Nadia is interested in using epidemiological and biostatistical approaches to generate evidence that is useful for both clinical research and public health.

O6 ORAL PRESENTATION

Disability status and oral healthcare affordability among working-age Australians

Upul Cooray; Gagandeep Kaur; Saman Khalatbari-Soltani; Barbara Janssen; George Disney; Ruby Cole; Ankur Singh

The University of Sydney

Presenting author: Dr. Upul Cooray, The University of Sydney, Australia



ABSTRACT

Oral healthcare is often financed outside universal medical coverage, leaving working-age adults exposed to out-of-pocket costs. Adults with long-term disability may face added financial, physical, and service barriers, yet longitudinal evidence remains limited. We estimated the effect of time-varying long-term disability on oral healthcare unaffordability among Australian adults aged 25 to 65 years, using Household, Income and Labour Dynamics in Australia data from waves 18 to 22 (2018-2022). Disability was self-reported at waves 18 to 21 and defined as any long-term condition, impairment, or disability restricting everyday activities for at least six months. The outcome was avoidance of dental treatment because of cost at wave 22. We applied targeted maximum likelihood estimation for longitudinal modified treatment policies, contrasting sustained disability, no disability, and reductions in its odds against the natural course. Among 9635 adults (50.9% female; mean age 44 years), 4.1% reported unaffordability at follow-up. Sustained disability increased risk (risk ratio 1.60; 95%CI 1.15-2.22), while no disability reduced it (0.59; 0.45-0.77). Reducing the odds of disability by 50% and 25% lowered risk by 28% (0.72; 0.65-0.81) and 17% (0.83; 0.78-0.89), respectively. Long-term disability appears to raise oral healthcare unaffordability, warranting policy attention to disability trajectories and adult dental coverage.

BIOGRAPHY

Dr Upul Cooray is a dental public health researcher and epidemiologist, currently a Research Fellow in Oral Epidemiology at the University of Sydney, School of Dentistry. His research addresses the socioeconomic determinants of health and the reduction of health inequalities, with particular expertise in advanced methods for extracting robust causal evidence from observational data. He earned his PhD in Dental Public Health from Tohoku University, Japan, following an MSc in Dental Public Health from University College London and a Bachelor of Dental Surgery from the University of Peradeniya, Sri Lanka. His career spans clinical dentistry and research across Sri Lanka, the United Kingdom, Japan, Singapore, and Australia, including prior roles as Assistant Professor at Tohoku University and Research Fellow at the National Dental Centre Singapore. His methodological work encompasses causal inference, target trial emulation, modified treatment policies, doubly robust estimation, and simulation modelling, underpinned by a strong commitment to reproducible research.

07 ORAL PRESENTATION

Assessing the Determinants of Successful Ageing in Mainland China

Rita Suen, May Wong, Tracey Zhou, Colman McGrath

Faculty of Dentistry, the University of Hong Kong

Presenting author: Dr. Rita Suen, The University of Hong Kong, Hong Kong SAR



ABSTRACT

Aims: To examine how predictors (age, gender, education, smoking, drinking, and edentulism) associate with overall successful ageing and its five domains (no major chronic diseases, no disabilities, no depression, high cognition, and active social engagement) amongst older Chinese adults.

Methods: Descriptive statistics and logistic regression analyses were performed using 2018 China Health and Retirement Longitudinal Study (CHARLS) data, based on Rowe and Kahn's model of successful ageing.

Results: Overall successful ageing was significantly associated with all predictors except drinking. Age and education were linked to both overall successful ageing and its five domains; notably, participants aged 65–74 reported fewer depressive symptoms than those aged 60–64, while lower education correlated with lower diagnosed chronic disease rates.

Edentulism significantly reduced the likelihood of overall SA (AOR=0.67, $p=0.016$) and four individual domains of SA: no disabilities (AOR=0.79, $p<0.001$), no depression (AOR=0.78, $p<0.001$), high cognition (AOR=0.79, $p=0.007$), and active social engagement (AOR=0.84, $p<0.001$).

Conclusion:

Oral health such as edentulism is key determinant of successful aging and its subdomains other than diseases in mainland China, highlighting the importance of integrating oral healthcare into public healthy ageing strategic planning in achieving the fullness of successful ageing.

BIOGRAPHY

Rita Suen is a dental public health researcher based in Hong Kong, affiliated with The University of Hong Kong. Her research focuses on successful ageing. She has contributed to several key observational and epidemiological studies, including operationalization of successful ageing within oral health contexts, oral health behaviours among institutionalized adults with intellectual disabilities, and dental health statuses across underserved communities in Hong Kong. Her work emphasizes integrating oral healthcare into broader public health policies with the goal of universal successful ageing.

O8 ORAL PRESENTATION

Integrating Oral Health into Surgical Pathways

Hanako Suenaga

Sydney Dental School, the University of Sydney

Presenting author: Dr. Hanako Suenaga, The University of Sydney, Australia



ABSTRACT

Perioperative oral management for patients undergoing major general surgery under general anesthesia could reduce postoperative complications, yet global implementation requires robust multi-dimensional evidence. Building on initial frameworks established with Tohoku University, this project investigates the interplay between oral disease burden, Oral Health Literacy (OHL), healthcare system pathways, the oral microbiome, and surgical outcomes.

We hypothesize that low OHL, leading to oral dysbiosis and impaired oral function, impairs recovery, which can be mitigated through targeted preoperative care. Patients are recruited prospectively prior to elective general surgery at the Westmead hospital preadmission clinic (PAC). Participants complete questionnaires and dental screenings, with medical record reviews and perioperative oral sampling.

Our multi-dimensional analytical framework operates across three levels:

Clinical: Evaluating associations between OHL, oral function, and surgical recovery.

Biological: Investigating oral microbiome dynamics and specific microbial mechanisms influencing surgical outcomes, including postoperative infective complications.

Healthcare Structural: Cross-analyzing international care pathways to address implementation barriers.

As part of this Sydney–Tohoku collaborative network, we invite partner institutes to expand this multi-center framework through joint data collection, tool validation, and prospective international trials—shaping evidence-based perioperative care worldwide.

BIOGRAPHY

Dr. Hanako Suenaga, DDS, PhD, is a Senior Lecturer at Sydney Dental School, The University of Sydney, and holds an affiliate appointment as Adjunct Associate Professor at Tohoku University Graduate School of Dentistry. She holds general and prosthodontic specialist registrations in both Australia (AHPRA) and Japan. She serves as an Associate Editor for the Journal of Prosthodontic Research and on the Editorial Board for Scientific Reports, combining an active clinical practice with a strong track record in academic research and teaching.

Her current clinical practice underpins the authenticity of her teaching and assessment design, serving as the Doctor of Dental Medicine (DMD) Year 2 Course Coordinator for Introduction to Integrated Clinical Care and Coordinator for Orofacial Pain curriculum development across DMD1–4 at the Sydney Dental School.

Her primary research focuses on developing and implementing innovative dental care strategies to improve systemic health in surgical and oncology patients. Additionally, she investigates the mechanobiological bone response around prostheses and its impact on oral pathology, including MRONJ.

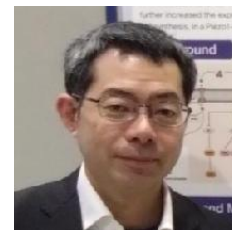
09 ORAL PRESENTATION

Bone tissue regeneration therapy utilizing calcium phosphate-based gene transfection carriers

Taichi Tenkumo

Tohoku University Graduate School of Dentistry, Division of Advanced Prosthetic Dentistry

Presenting author: Assoc. Prof. Taichi Tenkumo, Tohoku University, Japan



ABSTRACT

Various strategies for tissue regeneration therapy have been extensively investigated. Among these, the transplantation of cell-activating factors or bio-activated cells in combination with biomaterial scaffolds has been widely adopted. In general, tissue healing progresses through three distinct phases: the inflammatory, proliferative/reconstructive, and maturation/remodeling phases. However, the bioactivity of administered cell-activating factors typically diminishes over time, making it challenging to maintain their efficacy during the later reconstructive and remodeling phases. Therefore, achieving the sustained and long-term release of active factors remains a critical challenge.

To address this issue, we focused on gene delivery technology to establish a system that continuously supplies necessary factors during the reconstructive phase by inducing host cells infiltrating the scaffold to endogenously express and secrete the target cell-activating factors. To implement this strategy, we developed calcium phosphate nanoparticles encapsulating therapeutic nucleic acids and applied them to bone tissue regeneration. In this presentation, we report our cumulative findings and discuss the efficacy of this approach.

BIOGRAPHY

After graduating from Tohoku University School of Dentistry in 2002, I served at Hokkaido University Hospital until 2011, earning my board certification in periodontology. Following a visiting fellowship at the University of Duisburg-Essen, I returned to Tohoku University Graduate School of Dentistry in 2013, where I now serve as an Associate Professor. My research focuses on bone regeneration and developing biomaterials, including nano-hydroxyapatite/collagen bone substitutes and calcium phosphate-based nucleic acid drugs. I also co-developed a silver-UVA/visible light radical sterilization therapy for periodontal care.

O10 ORAL PRESENTATION

AI-Guided Synthetic Membranes for Bone Regeneration

Hemant Unadkat, Charles Lau Chau Sang, Somasundaram Prasad, Ankush Raut, Mark Goh Jin Hong, Leonardo Saigo, Hanry Yu, Bee Tin Goh

National Dental Centre Singapore; Duke-NUS Medical School Singapore

Presenting author: Dr. Charles Lau, National Dental Centre Singapore, Singapore



ABSTRACT

Collagen-based membranes remain the clinical gold standard for guided bone regeneration, yet their biological variability, xenogeneic origin, and limited design tunability constrain predictable translation. We developed a synthetic, bioresorbable, drug-free, cell-free, and growth-factor-free membrane platform in which surface topography itself provides regenerative instruction. Using the Cellompic discovery platform, we screened 160 distinct microtopographies on clinically relevant polymeric substrates for oral-regenerative cellular responses. Explainable ensemble machine learning, integrating XGBoost, LightGBM, and LIME-based interpretability, was used to rank candidate designs and identify predictive surface features while preserving proprietary design details. Two lead topographical membrane candidates were translated into bioresorbable prototypes and benchmarked against collagen-based guided bone regeneration membranes. The selected membranes demonstrated approximately 30% superior regenerative performance compared with collagen membranes and, in a non-human primate oral defect model, showed favourable tissue compatibility, stable barrier function, and enhanced regeneration. This work establishes a first-in-field, explainable AI-guided strategy for discovering synthetic regenerative membranes and advances a clinically translatable alternative to collagen membranes for orofacial bone regeneration.

BIOGRAPHY

Dr Charles Lau is a Senior Research Fellow at the National Dental Centre Singapore (NDCS) and Adjunct Research Fellow at Duke-NUS Medical School, with multidisciplinary training in chemistry, biomaterials and bioengineering. His current research focuses on biomaterials, tissue engineering and preclinical models for periodontal, alveolar bone and oral-maxillofacial regeneration, with particular emphasis on translating regenerative technologies towards clinical application. His work encompasses 3D-printed bioresorbable scaffolds for bone regeneration, stem-cell-based regenerative strategies, biomaterial-mediated periodontal regeneration, and patient-specific implants for mandibular reconstruction, supported by clinically relevant large-animal models.

O11 ORAL PRESENTATION

Pollen Microgel-Integrated Spheroids for Sustained Long-Term Viability

Jie Hao Tay, Sherry Wang, Juha Song

School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, Singapore

Presenting author: Dr. Jie Hao Tay, Nanyang Technological University, Singapore



ABSTRACT

Three-dimensional cell spheroids offer a more physiologically relevant alternative to conventional 2D culture by restoring cell-cell and cell-matrix interactions, tissue-like organization, and biological gradients. These features make spheroids valuable building blocks for disease modelling, drug testing, regenerative medicine, and biofabrication. However, their dense structure restricts nutrient and waste transport to the core, causing progressive loss of viability during long-term culture and limiting their use as functional tissue-building units. To address this, we developed pollen microgel-integrated composite spheroids that use hollow, bio-derived pollen particles as internal spacers to reduce core compaction while preserving spheroid architecture. The optimized camellia pollen composite formed reproducible spheroids with homogeneous cell attachment, centralized pollen incorporation, and a visibly less dense core than pure-cell controls. Most importantly, the composites maintained significantly higher cell viability after 21 days than pure-cell spheroids, demonstrating that internal structural engineering can sustain cell survival beyond the limitations of conventional spheroids. The selected composites also retained their overall structure during extrusion and exhibited greater live-cell fluorescence than dispersed-cell controls after printing. Together, these findings establish pollen microgels as a simple, renewable strategy to improve mass transport, long-term viability, and biofabrication readiness of spheroid-based tissue models, offering a scalable route toward durable tissue units for regenerative medicine and biofabrication.

BIOGRAPHY

Jie Hao Tay is a Research Fellow at the School of Chemistry, Chemical Engineering and Biotechnology, Nanyang Technological University, Singapore. His research focuses on biofabrication and tissue-engineering platforms, including composite spheroids, pollen-derived biomaterials, hydrogel and polymer bioinks, and embedded 3D printing. He develops material-processing and cell-culture strategies to improve mass transport, long-term viability, and manufacturability of engineered tissue constructs, integrating rheology, microscopy, histology, viability assays, and extrusion bioprinting.

O12 ORAL PRESENTATION

Transforming Natural Pollen Into Safe and Functional Microparticles for Tissue Engineering

Alexander Giovanni, Juha Song

School of Chemistry, Chemical Engineering and Biotechnology (CCEB), Nanyang Technological University, Singapore

Presenting author: Mr. Alexander Giovanni, Nanyang Technological University, Singapore



ABSTRACT

Pollen is an abundant natural resource that is largely discarded as waste, yet it offers a low-cost, sustainable alternative to the synthetic microparticles used in biomedical engineering, which are often expensive and difficult to produce. This study develops responsive, functional pollen-based microgels and evaluates their suitability for biomaterials and tissue-engineering applications. The primary objectives were to characterize cell-pollen interactions and to assess the safety and immunotoxicity of pollen-derived microparticles. To study cell attachment under controlled and reproducible conditions, we developed a PDMS-based platform for evaluating cell adhesion to pollen-based microparticles. Pollen microgels showed favorable safety profiles, with no significant immunotoxic response, and served as an effective substrate for cell attachment, indicating that they are both biocompatible and functionally suitable as a scaffold platform for cell culture. Building on this attachment capability, ongoing work is exploring the ability of pollen microgels to support spheroid formation, extending their application toward three-dimensional culture and engineered tissue models. Overall, this work highlights pollen as a promising, sustainable biomaterial platform and a cost-effective microparticle alternative for regenerative medicine and cell-based research.

BIOGRAPHY

Alexander Giovanni is a PhD candidate in the School of Chemistry, Chemical Engineering and Biotechnology (CCEB) at Nanyang Technological University (NTU), Singapore, under the supervision of Prof. Juha Song. His research focuses on biomaterials for tissue engineering, with a particular interest in pollen-based materials as a novel platform for functional scaffolds that support tissue regeneration and repair. He completed his Bachelor of Engineering in the Division of Bioengineering at CCEB, NTU, where he built a strong foundation in biomedical materials and engineering principles. His current work explores the translational potential of pollen-derived biomaterials, bridging fundamental materials science with clinical applications in regenerative medicine.

O13 ORAL PRESENTATION

A longitudinal study on orofacial muscles and obstructive sleep apnea

Mimi Yow, Jade Seah, Desmond Chia, Leong-Chai Leow

1. Mimi Yow, Senior Consultant, SingHealth Duke-NUS Sleep Centre and National Dental Centre Singapore
2. Jade Seah, Senior Sleep Physiologist, SingHealth Duke-NUS Sleep Centre
3. Desmond Chia, Senior Sleep Technologist, SingHealth Duke-NUS Sleep Centre
4. Leong-Chai Leow, Director, SingHealth Duke-NUS Sleep Centre



Presenting author: Clin. Assoc. Prof. Mimi Yow, National Dental Centre Singapore, Singapore

ABSTRACT

Introduction

Obstructive sleep apnea (OSA) is a common disorder with multiple chronic comorbidities and increased all-cause mortality. The global prevalence for adults is 1 in 3. The risk factors and causes are multifactorial, namely craniofacial anatomy, muscle reactivity, respiration control, and arousal threshold. The upper airway is a muscular tube from the posterior nares to the larynx. There is an interplay between upper airway patency, muscle reactivity, and respiratory stability during sleep. This study aims to show if muscle reactivity can be modifiable to used in the management of patients with OSA.

Method

Non-obese patients with moderately severe OSA confirmed by sleep studies. Patients who have refused all treatment modalities were offered orofacial myofunctional therapy (OMT) comprising a set of daily exercises of facial, tongue and throat muscles. They were followed up by post-OMT sleep studies in respiratory parameters during sleep stages using paired sample t-test for significant differences.

Results

After a mean period of daily OMT for 21.1 +/- 8.9 months, sleep study outcomes show highly significant reductions in OSA severity (AHI) during rapid eye movement (REM) sleep ($p=0.000$) and overall sleep ($p=0.008$), with improved lowest arterial oxygen level ($p=0.008$).

Conclusions

The impact of OMT is highly significant in reducing the severity of OSA during overall sleep and REM sleep, and improving the lowest arterial oxygen saturation in patients with moderately severe OSA.

BIOGRAPHY

Dr Mimi Yow is Senior Consultant in Orthodontics at the

SingHealth Duke-NUS Sleep Centre and National Dental Centre Singapore. She is Adjunct Associate Professor, Duke-NUS Medical School and Clinical Associate Professor, Graduate School of Dental Studies, National University of Singapore. She is co-chair of the Singapore Dental Sleep Medicine Education and Research Advisory Committee, Strategic Advisor of the SingHealth Duke-NUS Sleep Centre, and member of the World Sleep Education Task Force. Her research interests are in orthodontics, cleft lip and palate, bruxism, and sleep-disordered breathing.

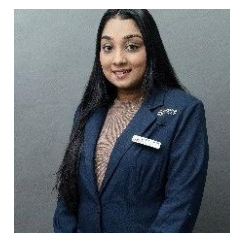
O14 ORAL PRESENTATION

Evaluation of Acceptance, Preference and Efficacy of D-IONIC (Dental IONIC) - A Novel Microneedle-based Dental Anaesthesia Delivery System

Zayim Razina, Goh Bee Tin

National Dental Centre Singapore (NDCS), National Dental Research Institute of Singapore (NDRIS)

Presenting author: Dr. Zayim Razina, National Dental Centre Singapore, Singapore



ABSTRACT

Needle-and-syringe administration remains the standard approach for dental local anaesthesia; however, needle-associated pain and fear frequently contribute to patient anxiety and dental avoidance. To address this challenge, we developed D-IONIC (Dental-IONIC), a novel microneedle (MN)-based anaesthetic delivery platform designed to provide painless, minimally invasive, and effective dental anaesthesia.

D-IONIC incorporates a conductive MN array composed of methacrylated hyaluronic acid (MeHA) doped with poly(3,4-ethylenedioxythiophene):polystyrene sulfonate (PEDOT:PSS), combined with iontophoresis (ITP) to enhance transmucosal drug delivery to alveolar nerves. The 150–200 μm conductive MNs penetrate the oral epithelium without reaching nerve endings while creating microchannels that facilitate drug transport and reduce mucosal resistance.

Using EMLA anaesthetic cream as a proof of concept, D-IONIC was evaluated in a rabbit model, where all eight rabbits achieved successful dental anaesthesia. D-IONIC demonstrated comparable efficacy, achieving approximately 80% of the anaesthesia duration of conventional injections ($p < 0.05$). In a preclinical safety and acceptance study of 23 healthy volunteers, 80% reported no anxiety after D-IONIC exposure, 90% described the intervention as comfortable to moderately comfortable, and over two-thirds preferred D-IONIC over traditional injections. These findings highlight D-IONIC as a promising alternative for reducing needle-related anxiety while maintaining effective dental anaesthesia. (198 words)

BIOGRAPHY

Dr. Zayim Razina obtained her PhD in Bioengineering from Nanyang Technological University and subsequently joined the National Dental Centre Singapore as a Postdoctoral Fellow. Her research focuses on the development of polymer-based microneedle technologies and advanced drug delivery systems for dental and oral applications, with an emphasis on minimally invasive approaches that improve therapeutic outcomes and patient experience.

Her work integrates biomaterials engineering, microfabrication, and translational research to design innovative medical devices and delivery platforms that address unmet clinical needs. Dr. Razina is particularly interested in translating emerging biomedical technologies from laboratory research into clinical practice to achieve meaningful impact in patient care.

She has authored multiple publications in internationally recognised peer-reviewed journals and has received several awards and accolades in recognition of her research contributions.

(The

O15 ORAL PRESENTATION

Microplastics in the Oral Cavity: Should We Worry?

Yanning CHEN

University of Hong Kong (HKU) Faculty of Dentistry

Presenting author: Prof. Crystal Yanning Chen, The University of Hong Kong, Hong Kong SAR



ABSTRACT

The widespread use of plastic products has resulted in the ubiquitous presence of nano- and microplastics (NMPs) across air, marine, and terrestrial environments, with increasing evidence of human exposure through ingestion, inhalation, and dermal contact. Accumulating studies have suggested possible associations between NMP exposure, tissue accumulation, and adverse biological effects. The oral cavity first contacts NMPs and is involved in two of the three main pathways of NMP intake into the human body. However, the oral environment has not yet been the focus of investigations regarding the effects of NMPs on the human body.

NMPs may enter the oral cavity through food, beverages, or even air. In addition, dentistry itself may contribute to local NMP release, as polymer-based materials are widely used in restorative, prosthodontic, orthodontic, and preventive care. Resin-based composite restorations, for example, are subjected to continuous mechanical wear, hydrolytic degradation, enzymatic activity, thermal fluctuation, and cyclic occlusal loading in the complex intraoral environment. These factors may contribute to surface deterioration, material decomposition, and potential plastic-based particle release. Other acrylic- or plastic-based dental materials, including dentures, orthodontic appliances, night guards, aligners, and plastic-containing oral healthcare products, may also represent potential sources of NMPs in the oral cavity.

This lecture will provide an overview of the sources and intake pathways of NMPs relevant to the oral environment, discuss their potential implications for general and oral health, and summarise current evidence regarding NMP release from dental materials and oral healthcare products. The presentation aims to raise awareness of this emerging topic and highlight future research needs in dental materials science and oral health.

BIOGRAPHY

Professor Yanning Chen is a Clinical Assistant Professor (Cariology) in Restorative Dental Sciences at the Faculty of Dentistry, The University of Hong Kong. Professor Chen's research expertise spans AI-empowered dental solutions, experimental and numerical material evaluation, CAD/CAM digital workflows, and dental education. Professor Chen has published 15 peer-reviewed research papers in renowned dental journals such as Dental Materials, Journal of Dentistry, International Dental Journal, and Journal of Prosthetic Dentistry, as well as 10 conference abstracts, obtaining over 500 citations and a H-index of 11. Professor Chen's significant research contributions have been recognized by several accolades, including the Academy of Dental Materials (ADM) 2022 Student Travel Award and being shortlisted twice for the IADR-SEA Hatton Award Competition Senior category (2021 and 2023).

Poster Presentations

Poster Session · P1 – P11

P1 POSTER PRESENTATION

Biochemical Characterization of Nitrate/Nitrite Metabolism by Oral *Rothia* Species

Rei Shibata^{1,2}, Jumpei Washio¹, Kazuko Ezoe¹, Hiroyasu Kanetaka², Nobuhiro Takahashi³

1.Tohoku University Graduate School of Dentistry, Division of Oral Ecology and Biochemistry

2.Tohoku University Graduate School of Dentistry, Division of Orthodontics and Dentofacial Orthopedics

3.Tohoku University Graduate School of Dentistry

Presenting author: Dr. Rei Shibata, Tohoku University, Japan



ABSTRACT

Recently, attention has focused on the fact that the oral microbiome (OMB) converts dietary nitrate (NO₃⁻) into nitrite (NO₂⁻), which exhibits antibacterial and vasodilatory effects, potentially preventing oral and cardiovascular diseases. Our previous studies clarified that *Actinomyces*, *Veillonella*, *Neisseria*, and *Rothia* species are major nitrite producers, and that environmental factors regulate nitrite production in *Actinomyces* and *Veillonella*. However, the effects on the nitrate/nitrite metabolism of *Rothia* species—which utilize diverse substrates like glucose, lactate, and ethanol—remain poorly characterized. This study aimed to clarify how these substrates and pH influence *Rothia*'s nitrate/nitrite metabolism.

R. aeria(JCM11412), *R. dentocariosa*(JCM3067), and *R. mucilaginosa*(JCM10910) were cultured aerobically. Nitrite-producing (1.0 mM KNO₃) and -degrading (0.1 mM KNO₂) activities were quantified using Griess reagent. We evaluated the effects of 0.5% glucose, 1.0 mM lactate, 11 mM ethanol, and varying pH on these activities.

In all strains, nitrite-producing activity significantly increased in the presence of metabolic substrates (glucose, lactate, and ethanol). Meanwhile, pH conditions had minimal effect. Nitrite-degrading activity was negligible compared to production.

In conclusion, *Rothia* species function primarily as nitrite producers in the oral cavity. Their production is substantially enhanced through coupling with the metabolism of various substrates, including glucose, lactate, and ethanol.

BIOGRAPHY

I graduated from the School of Dentistry, Tohoku University, in March 2022 and obtained dentist license on the same year. After completing a one-year clinical residency at Tohoku University Hospital, I enrolled in the PhD program at Tohoku University Graduate School of Dentistry in April 2023. Currently, I balance clinical practice with basic research on the metabolic functions of the oral microbiome.

P2 POSTER PRESENTATION

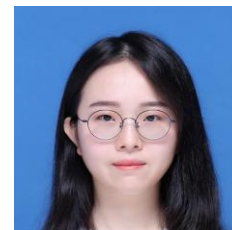
Differential Effects of Propionate on Normal and Oral Cancer Cells

Xu Wenhui¹, Jumpei Washio¹, Kazuko Ezoe¹, Satoko Sato¹, Yuki Abiko¹, Nobuhiro Takahashi²

1.Tohoku University Graduate School of Dentistry, Division of Oral Ecology and Biochemistry

2.Tohoku University Graduate School of Dentistry

Presenting author: Ms. Xu Wenhui, Tohoku University, Japan



ABSTRACT

In recent years, attention has been paid to interactions between the oral microbiome(OMB) and oral host cells. Although the mechanisms are not yet fully understood, metabolites derived from the OMB are considered potential contributing factors.

This study focused on propionate, a major oral microbiome-derived metabolite. Propionate is primarily produced through lactate metabolism by indigenous oral bacteria, particularly *Veillonella* spp. While *Veillonella* spp. has been suggested to correlate negatively with the staging of oral squamous cell carcinoma (OSCC), the underlying mechanisms remain unclear. Therefore, this study aimed to elucidate whether and how propionate affects normal epithelial cells (HaCaT) and OSCC cells (HSC-3).

When cultured with propionate under both aerobic and hypoxic conditions, the growth of both cells was inhibited. Notably, this inhibitory effect occurred earlier and at lower concentrations in HSC-3 cells, especially under hypoxic conditions. Furthermore, while glucose metabolic activity in HaCaT cells was only slightly inhibited by propionate, that in HSC-3 cells was markedly inhibited, suggesting that this differential modulation of glucose metabolism may contribute to its growth-inhibitory effects.

In conclusion, propionate produced by oral bacteria may preferentially inhibit the proliferation of OSCC cells, especially under hypoxic conditions that resemble the tumor microenvironment, potentially contributing to its anti-cancer activity.

BIOGRAPHY

I am a PhD candidate in the Department of Oral Ecology and Biochemistry at Tohoku University since April 2024. My current research focuses on the interactions between the oral microbiome and host cells, with particular interest in their roles in oral health and disease.

I received my bachelor's and master's degree in oral and maxillofacial surgery from Shandong University in 2019 and 2022, respectively. I also obtained dental license and completed a 3-year standardized residency training program during this period.

P3 POSTER PRESENTATION

Detection and Identification of Putative Oral Bacteria on Smartphone Touchscreens

Anna Wakui^{1,2}, Yuki Kato¹, Haruna Sato¹, Nanami Kubo¹, Ayaka Misumi¹, Miho Kawachi^{1,3}, Manami Imai¹, Takashi Abe¹, Yuki Abiko⁴, Jumpei Washio⁴, Nobuhiro Takahashi⁴, Takuichi Sato¹

¹Division of Clinical Chemistry, Niigata University Graduate School of Medicine, Dentistry and Health Sciences, Niigata, Japan; ²Niigata University of Health and Welfare, Niigata, Japan; ³The Nippon Dental University School of Life Dentistry at Niigata, Japan; ⁴Tohoku University Graduate School of Dentistry, Sendai, Japan

Presenting author: Dr. Takuichi Sato, Niigata University of Health and Welfare, Japan



ABSTRACT

Objectives: This study aimed to compare bacterial communities on smartphone touchscreens and finger skin. **Methods:** After obtaining informed consent, smartphone touchscreens and the skin of all five fingers were swabbed using sterile cotton swabs from nine healthy subjects. Samples were suspended, inoculated onto CDC Anaerobe Blood Agar plates, and incubated under anaerobic and aerobic conditions at 37°C. Bacterial species were identified by 16S rRNA gene sequencing. **Results:** Bacterial counts recovered from smartphone surfaces were $(6.2 \pm 9.2) \times 10^2$ and $(2.5 \pm 5.1) \times 10^2$ CFU/mL under anaerobic and aerobic conditions, respectively. Under anaerobic conditions, *Cutibacterium* (65.5%), *Streptococcus* (13.3%), *Staphylococcus* (8.9%), and *Corynebacterium* (7.4%) were predominant. Bacterial counts from finger skin were higher, at $(3.7 \pm 8.3) \times 10^3$ and $(6.5 \pm 9.5) \times 10^2$ CFU/mL under anaerobic and aerobic conditions, respectively. *Cutibacterium* (74.1%) and *Staphylococcus* (22.8%) were predominant under anaerobic conditions. **Conclusions:** Bacterial loads on smartphone surfaces were slightly lower than those on finger skin, despite the absence of disinfection. These findings suggest that frequently touched surfaces may transiently harbor human-associated microbiota but are less favorable for sustained microbial colonization.

BIOGRAPHY

April 2026–present: Lecturer, Department of Medical Technology, Niigata University of Health and Welfare, Niigata, Japan

March 2023: Ph.D., Niigata University, Japan

April 2022–March 2026: Assistant Professor, Department of Medical Technology, Niigata University of Health and Welfare, Niigata, Japan

P4 POSTER PRESENTATION

Genomic Basis of Clonal Purification and Signaling in PC12 Subclones

Jikun Li¹, Tada-Aki Kudo¹, Kanako Tominami¹, Kenji Iemura², Takuya Noguchi³, Yohei Hayashi⁴, Satoshi Izumi¹, Hajime Sato⁵, Guang Hong⁶, Keiko Gengyo-Ando¹

¹Division of Oral Physiology, Tohoku University Graduate School of Dentistry, Sendai 980-8575, Japan.

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Presenting author: Ms. Jikun Li, Tohoku University, Japan.

ABSTRACT

Background & Objective: Cellular heterogeneity within established cell lines can lead to functional divergence during subcloning. We previously developed a unique physical stimulation protocol termed temperature-controlled repeated thermal stimulation (TRTS) and established distinct PC12 subclones with contrasting response phenotypes: PC12-P1F1, which exhibits enhanced differentiation, and PC12-P1D10, which exhibits suppressed differentiation. To elucidate the genetic factors underlying their differential responses, we performed whole-genome sequencing (WGS) and comparative variant profiling of the parental PC12 line and these subclones. **Results:** Common background variants relative to the rat reference genome (rn6) were first filtered out. Comparative analysis with the parental line identified distinct sets of gained and lost variants. Gene Ontology (GO) and pathway analyses using Metascape across the four subgroups revealed distinct functional signatures. Focusing primarily on the hyper-responsive PC12-P1F1 line, we found that variants potentially associated with repression, which were present in the parental population at variant allele frequencies (VAFs) of approximately 0.20–0.30, were completely absent (VAF 0.00) in PC12-P1F1. This pattern suggests clonal selection during subcloning that may have reduced inhibitory influences on differentiation-related signaling. Concurrently, novel variants in genes such as *Bmp2* and *Adm* were uniquely acquired in PC12-P1F1, potentially contributing to enhanced differentiation signaling. **Conclusion:** The enhanced sensitivity of PC12 subclones to physical stimulation such as TRTS may involve a combination of the loss of potentially repressive variants during clonal selection and the acquisition of novel variants associated with differentiation-related signaling.

BIOGRAPHY

Jikun Li is a first-year Ph.D. student in the Department of Oral Physiology at Tohoku University Graduate School of Dentistry. Her research lies at the intersection of mechanobiology and cell fate determination, focusing on osteoblast and neural cell regeneration. Currently, her work centers on two primary directions: (1) elucidating intracellular decoding mechanisms in osteoblast signal transduction under frequency-regulated repeated micro-vibration (FRMV) stimulation, and (2) uncovering the genomic drivers of clonal purification and signaling cascades in PC12 subclones. Through combining physical stimulation and genomic profiling, she aims to advance mechanistic insights for regenerative therapies.

P5 POSTER PRESENTATION

Local Immunomodulation Enhances Bone Healing of Carbonate Apatite Bone Substitute

Ahmed Nasser Mohamed Hassan, Masato Nakano, Yuya Kamano, Masahiro Saito

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Presenting author: Dr. Ahmed Nasser Mohamed Hassan, Tohoku University, Japan



ABSTRACT

Background / Introduction: Carbonate apatite, commercially available as Cytrans Granules® (Cytrans®), is an osteoconductive bone substitute that can be gradually replaced by newly formed bone. However, early inflammatory reactions after implantation may limit its regenerative potential. This study evaluated whether local immunomodulation with tacrolimus or dexamethasone could reduce early inflammation and enhance bone healing around bone substitute.

Materials and Methods: Early inflammatory responses were assessed using a subcutaneous ectopic implantation model in 8-week-old C57BL/6 mice. Untreated, tacrolimus-treated, or dexamethasone-treated bone substitutes were implanted and harvested 1 day after implantation for hematoxylin and eosin staining. Bone regeneration was evaluated in critical-size calvarial defects in 8-week-old Wistar rats using Cytrans® bone substitute at 3 and 6 months using micro-computed tomography and histological analysis.

Results: Tacrolimus- and dexamethasone-treated bone substitutes reduced inflammatory cell infiltration compared with untreated controls. In the calvarial defect model, Dexamethasone and tacrolimus-treated Cytrans® enhanced bone regeneration, with increased bone volume compared to control group.

Discussion / Conclusion: Local immunomodulation reduced early implantation-associated inflammatory cells infiltration in ectopic transplantation model and improved the bone regenerative microenvironment. Tacrolimus-loaded Cytrans® may enhance the osteoconductive performance of carbonate apatite bone substitutes.

BIOGRAPHY

Ahmed Hassan graduated from the Faculty of Oral and Dental Medicine, Cairo University, in 2018. He is currently a PhD student at the Graduate School of Dentistry, Tohoku University. His research focuses on bone regeneration, biomaterials, and osteoimmunology, with particular interest in modulating inflammatory responses to improve bone substitute-mediated healing. His broader research interests include bone immunology, regenerative therapy, and bioinformatics.

P6 POSTER PRESENTATION

Osteoimmunomodulatory Therapeutics for Medication-Related Osteonecrosis of the Jaw

Lalith Prabha Ethiraj, Lau Chau Sang, Swee-Hin Teoh, Bee Tin Goh

National Dental Centre Singapore

Presenting author: Dr. Lalith Prabha Ethiraj, National Dental Centre Singapore, Singapore



ABSTRACT

Medication-Related Osteonecrosis of the Jaw (MRONJ) is a debilitating side effect in patients receiving antiresorptive agents (e.g., bisphosphonates and denosumab) or antiangiogenic agents for osteoporosis and metastatic bone disease. MRONJ is characterized by exposed necrotic bone in the maxillofacial region, accompanied by impaired mastication, infection of the exposed bone, and chronic pain. MRONJ can develop after tooth extraction or spontaneously from local periodontal infections. Managing MRONJ is challenging because it can be asymptomatic for long periods, often leading to underdiagnosis until the disease progresses and the patient experiences significant morbidity, such as impaired oral function. Existing care is largely palliative, with no definitive treatment plan due to limited understanding of MRONJ's pathogenesis.

Recent research on MRONJ suggests that it is not only a disorder of osteoclast suppression and impaired angiogenesis but also a disease of persistent pro-inflammatory immune dysregulation, characterized by sustained M1 macrophage activity and impaired M2 transition. Biomaterials that induce M2 polarization may reverse a hostile inflammatory microenvironment and promote angiogenesis, osteogenesis, and soft tissue healing. Our present work focuses on this approach that would simultaneously modulate the immune response and promote osteogenesis, potentially improving both the quality and rate of bone regeneration.

BIOGRAPHY

Dr. Ethiraj Lalith Prabha is an Oral and Maxillofacial Surgeon & Research Fellow at the National Dental Centre Singapore (NDCS), and an Adjunct Research Fellow at Duke-NUS Medical School. She holds a PhD from Nanyang Technological University (2023), where her research focused on developing innovative zebrafish models to study bone diseases and osteonecrosis of the jawbone. Her research spans translational bone biology, regenerative medicine, and the integration of artificial intelligence into digital pathology workflows. She has received multiple accolades, including the 2026 Khoo Pilot Award and 2024 Clinician Investigator Development Award from SingHealth Duke-NUS, as well as the Best Oral Presentation Award at the 2021 European Calcified Tissue Society Conference. Most recently, she was the runner-up at the 2025 IADR-SEA Hatton Awards at the Asia Pacific Regional (APR) session held in Delhi, India. Dr. Lalith's ongoing work includes developing AI-assisted diagnostic tools, biomaterial scaffolds for enhanced bone healing, and novel imaging methods for early detection of malignancy in oral tissues. Dr. Lalith has published in leading journals including the International Journal of Molecular Sciences, Frontiers in Cell and Developmental Biology, and European Journal of Histochemistry. She remains committed to bridging clinical practice and scientific innovation in oral health.

P7 POSTER PRESENTATION

Temperature-Controlled Repeated Thermal Stimulation Induces BMP-Dependent Osteoblast Differentiation

Xiang Li¹, Tada-aki Kudo¹, Hirotaka Ishigaki^{1,2}, Kanako Tominami¹, Jikun Li¹, Satoshi Izumi¹, Kenji Iemura³, Hajime Sato⁴, Yohei Hayashi⁵, Takuya Noguchi⁶, Keiko Gengyo-Ando¹, Guang Hong²

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Presenting author: Ms. Xiang Li, Tohoku University, Japan



ABSTRACT

Background: Physical stimulation is an attractive drug-free approach for promoting bone regeneration. We previously developed temperature-controlled repeated thermal stimulation (TRTS), a programmed mild heating method that induces neurite outgrowth in PC12 cells. Here, we examined the effects of TRTS on osteoblast differentiation. **Methods:** Mouse pre-osteoblast-like MC3T3-E1 cells were cultured in growth or differentiation medium and exposed to TRTS at 39.5 °C for up to 18 h/day using a programmable glass heating plate. Osteoblast differentiation was assessed by alkaline phosphatase (ALP) activity and Alizarin Red staining, and early changes in the expression of differentiation marker genes were analyzed by real-time PCR. The involvement of bone morphogenetic protein (BMP) signaling was examined using a BMP signaling inhibitor. **Results:** TRTS did not reduce cell proliferation but enhanced ALP activity and mineralization. TRTS also significantly upregulated the expression of Alpl and Sp7, and this upregulation was suppressed by the BMP signaling inhibitor. **Conclusion:** These results suggest that TRTS induces osteoblast differentiation in a BMP signaling-dependent manner. TRTS may therefore have potential applications in future bone regeneration technologies, including alveolar bone regeneration.

BIOGRAPHY

Xiang Li is a first-year PhD student in the Division of Oral Physiology, Tohoku University Graduate School of Dentistry, Japan, under the supervision of Dr. Tada-aki Kudo. He is interested in two areas of research: bone regeneration using physical stimulation, and neuroprotection. He completed his undergraduate dental education, including one year of clinical training, at Shanxi Medical University, China, where he conducted research on titanium implant surface modification to promote osteogenesis. Since he joined Dr. Kudo's laboratory in 2025, he has been investigating the mechanisms of osteoblast differentiation induced by temperature-controlled repeated thermal stimulation (TRTS) and exploring strategies to protect neurons from mitochondrial oxidative stress. His poster at IOHS 2026 focuses on TRTS-induced, BMP-dependent osteoblast differentiation and its potential application to alveolar bone regeneration.

P8 POSTER PRESENTATION

Oral frailty in older adults: A Scoping Review

Ryan Wai Hin Li, Jingyu Wang, Colman McGrath, Tong Wah Lim

Faculty of Dentistry, The University of Hong Kong

Presenting author: Mr. Ryan Wai Hin Li, The University of Hong Kong, Hong Kong SAR



ABSTRACT

Numerous screening tools were developed in the past decade to address the rising prevalence of oral frailty (OF). However, a standardized diagnostic method for OF has yet to be established. The aim of this review is to elucidate the prevalence and associated risk factors for OF in older adults globally. This review was conducted under the PRISMA-ScR guidelines using the Population, Concept, Context (PCC) framework. A literature search was performed across PubMed, Embase, Web of Science, and Scopus for studies published after the year 2000, up to May 2026. The initial database search yielded 11378 results. Additionally, 9 studies were manually identified. 6,860 remained after deduplication, and 57 were included after screening. While the literature predominately focused on East Asian cohorts (93.0%), studies from Europe (5.3%) and the Middle East (1.7%) were also featured. Most studies were cross-sectional (74.6%) and employed the OFI-8 (50.8%). The reported prevalences of OF ranged from 8.2% to 85.2%. Key risk factors of OF include physical frailty, malnutrition, and advanced age. This review underscores the necessity of establishing a standardized diagnostic pipeline for OF to minimize inconsistency and highlights a lack of longitudinal data to elucidate causal relationships between OF and associated risk factors.

BIOGRAPHY

Ryan Wai Hin Li is a Research Assistant in the Faculty of Dentistry at the University of Hong Kong. He holds an MSc in Genomics and Bioinformatics from the Chinese University of Hong Kong (2025) and a BSc in Biochemistry from the University of Hong Kong (2022). His current research interest lies in the diagnosis and prevention of oral diseases within the geriatric population.

P9 POSTER PRESENTATION

Pioneering Tele-dentistry for Care-Dependent Older Adults in Singapore

Christina PC Sim¹, Alethea Foong¹, Patricia SY Lee², Li-Yun Soh¹, Yu-Shien Yong¹, Li-Hnn Goh¹, Mila Nurjono²

¹ National Dental Centre Singapore

² Changi General Hospital

Presenting author: Clin. Assoc. Prof. Christina PC Sim, National Dental Centre Singapore, Singapore



ABSTRACT

Background: Care-dependent older adults in nursing homes, community hospitals and home care settings often face significant barriers to accessing dental services, resulting in unmet oral healthcare needs. To address these challenges, Singapore developed the Tele-Dentistry supported Oral Care for Seniors (T-DOCS) programme, a pioneering initiative that leverages digital technology to extend oral healthcare beyond traditional clinic settings.

Methods: T-DOCS combines oral health screening, intra-oral imaging, remote dental assessment, referral coordination and longitudinal monitoring. Healthcare workers and caregivers are trained to support preventive oral care and programme delivery. Alongside implementation, qualitative and quantitative studies were conducted to evaluate oral health needs and identify barriers and facilitators to tele-dentistry adoption.

Results: Early findings revealed substantial unmet oral healthcare needs among participating seniors, many of whom had cognitive impairment and limited access to conventional dental services. Qualitative evaluation identified challenges related to oral health awareness, workforce capacity and staff confidence, while management support, staff motivation and perceived benefits of tele-dentistry facilitated implementation. These findings informed programme refinement and implementation strategies.

Conclusion: T-DOCS demonstrates the feasibility of integrating tele-dentistry into community and long-term care settings. Ongoing work focuses on clinical outcomes, sustainability, cost-effectiveness and scalability to support healthy ageing in Singapore.

BIOGRAPHY

Clinical A/Prof Christina Sim is Senior Consultant in Restorative Dentistry and Director of Research at the National Dental Centre Singapore. She is also Clinical Associate Professor at the SingHealth Duke-NUS Oral Health Academic Clinical Program and the National University of Singapore (NUS) Faculty of Dentistry. She obtained her BDS from the NUS, MSc in Conservative Dentistry from the University of London, and PhD from the University of Melbourne.

Her clinical and research interests focus on preventive oral health, healthy ageing, population oral health, tele-dentistry and artificial intelligence-enabled approaches for early disease detection and prevention. She has secured more than S\$2 million in research funding and leads Singapore's pioneering Tele-Dentistry supported Oral Care for Seniors (T-DOCS) programme, which improves access to oral healthcare for dependent older adults through technology-enabled community care. Her work has contributed to national oral health initiatives, including the National Adult Oral Health Survey, and has been published in leading international journals.

CI A/Prof Sim serves as President of the International Association for Dental, Oral and Craniofacial Research (IADR) Southeast Asia Division and President of the IADR Asia Pacific Region. She is the recipient of numerous research, education and service awards, including the GCEO Outstanding Clinician Award 2025.

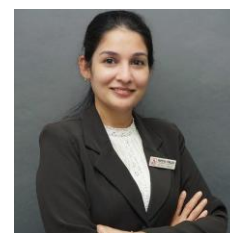
P10 POSTER PRESENTATION

Evaluating Salivary 1,5-Anhydroglucitol as Non-Invasive Biomarker for Type 2 Diabetes

Preethi Prajod, Weiying Lim, Christina PC Sim, Hemant Unadkat

National Dental Centre Singapore

Presenting author: Asst. Prof. Preethi Prajod, National Dental Centre Singapore, Singapore



ABSTRACT

Background: Current glucose monitoring methods are invasive and retrospective. 1,5-Anhydroglucitol (1,5-AG), an FDA-approved serum biomarker, captures glycemia over the preceding 1–2 weeks — a clinically distinct window between single-point glucose tests and HbA1c (3months). A salivary equivalent would allow non-invasive, scalable monitoring. However, serum thresholds cannot be extrapolated to saliva and require validation for use in saliva. Hence, this study aimed to assess the diagnostic potential of 1,5-AG in saliva in monitoring glucose in Type-2 diabetes mellitus (T2DM).

Methods: 84 subjects with T2DM and matched healthy controls provided fasting saliva samples under standardised conditions. Salivary 1,5-AG was quantified by colorimetric ELISA in duplicate, both spiked and unspiked to control matrix effects. Groups were compared using the Mann–Whitney U test, with linear regression against fasting plasma glucose (FPG) and HbA1c, and ROC analysis.

Results: Salivary 1,5-AG was significantly lower in T2DM than in controls (median 0.05 vs 0.06 $\mu\text{g}/\mu\text{L}$; $p < 0.001$) and inversely associated with FPG ($\beta = -0.295$) and HbA1c ($\beta = -0.368$). ROC analysis yielded an AUC of 0.74 (95% CI: 0.57–0.91), indicating moderate-to-good discrimination.

Conclusions: Salivary 1,5-AG demonstrates biological validity and preliminary diagnostic utility, supporting clinical calibration of actionable thresholds for non-invasive glycemic surveillance.

BIOGRAPHY

Assistant Professor Preethi Prajod obtained her doctorate in Oral Biology from the National University of Singapore and is currently a Junior Principal Investigator at NDRIS. Her research focuses on understanding oral–systemic health connections using advanced molecular, sequencing, and multi-omics technologies. She works to translate salivary research into patient care and to develop preventive strategies for systemic diseases. A central theme of her current work is the development of non-invasive salivary biomarkers for metabolic disease, including salivary 1,5-anhydroglucitol as a scalable tool for glycemic monitoring in type 2 diabetes. Dr Prajod has published high-impact papers in internationally recognised journals and has received awards from the International Association for Dental Research.

P11 POSTER PRESENTATION

Dentalox Universe: Development, Validation, and Evaluation of Immersive AI-Supported Proto-Metaverse Oral Health Education

Amirul Faiz Luai^{1*}, Nuraqilah Syahindah Syahrul Nizar Syahabuddin², Muadz Hazhar², Chan Yu Xin², Muhammad Taufiq Onn Muhamad Firdaus Onn², Al-Imran Shahrul Naing¹, Nurul Asyikin Yahya¹, Tanti Irawati Rosli¹

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Presenting author: Dr. Amirul Faiz bin Luai, Universiti Kebangsaan Malaysia, Malaysia



ABSTRACT

Objectives: Conventional oral health education (OHE) often relies on passive approaches that insufficiently engage younger generations. Validated, culturally appropriate metaverse-based OHE platforms remain scarce in Malaysia. This study aimed to systematically develop, validate, and evaluate an OHE module on Dentalox Universe, a Roblox-based proto-metaverse platform for children and early adolescents.

Methods: Guided by the ADDIE model, the study proceeded in four phases. Phase 1 developed twelve AI-assisted materials (posters, pamphlet, videos, Roblox game) with English–Malay–English translation. Phase 2 validated them: six dental experts applied the Content Validity Index (CVI); end users applied for the Malay PEMAT-M. Phase 3 refined and pilot-tested materials via a post-video quiz. Phase 4 assessed knowledge immediately pre- and post-implementation among 30 children in a community programme (exact McNemar test, $\alpha = 0.05$).

Results: Six posters and the pamphlet achieved excellent validity (S-CVI/Ave = 1.00); one scored 0.90 and one 0.70. Videos scored 0.88 and 0.92; the Roblox game scored 0.50, requiring major technical revision. PEMAT-M scores were 83.3% (print) and 66.7% (audio-visual/gamified), with mean quiz accuracy 85.7% and significant knowledge gain immediately post-implementation ($p < 0.01$).

Conclusions: Dentalox Universe is a promising AI-supported OHE platform, though technical refinement and beta-testing are required before broader implementation.

BIOGRAPHY

Dr. Amirul Faiz bin Luai is a lecturer in dental public health at the Department of Family Oral Health, Faculty of Dentistry, Universiti Kebangsaan Malaysia (UKM). He obtained his Doctor of Dental Surgery from Lincoln University College in 2018, served as a dental officer with the Ministry of Health Malaysia from 2019 to 2021, and completed his Master of Science in Dental Public Health at Universiti Teknologi MARA (UiTM) in 2022. In 2024 he earned a Postgraduate Certificate in Global Public Health and Policy with Distinction from Queen Mary University of London. He is currently completing his Doctor of Dental Public Health (DrDPH) at UiTM, with a thesis on Meta-OHE, a metaverse platform for oral health promotion and education supported by a grant from the Malaysia Digital Economy Corporation.

His research addresses digital health interventions, immersive technologies and artificial intelligence in dental education, oral health promotion, clinical preventive dentistry, and health policy. He has authored more than 14 indexed publications, peer-reviewed over 25 articles for journals including Cochrane, BMC Oral Health and BMC Public Health, presented at more than 20 conferences, and received four innovation and five research awards.