IJOH

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Journal of Oral Health

ASIAN ACADEMY OF PREVENTIVE DENTISTRY

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THE INTERNATIONAL JOURNAL OF ORAL HEALTH

Contents

Message From Editor-in-Chief

Dear readers,

I hope this message finds you all in good health and high spirits. As the Editor-in-Chief of the International Journal of Oral Health (IJOH), I want to take a moment to express my deepest gratitude to all the authors and editors to the success of our publication.

This accomplishment is a testament to the unwavering dedication and hard work of our team of editors, authors, reviewers, and support staff. The collective expertise, passion, and commitment to excellence have enabled this issue of IJOH to maintain the high standards of quality and integrity, making it a leading platform for the dissemination of groundbreaking research and innovative clinical practices within the field of dentistry.

The 15th International conference of the Asian Academy of Preventive Dentistry was successfully held in Hong Kong, China from 8th to 11th November 2023. This was a special meeting for the AAPD as it was organized first time in Hong Kong. More than 289 delegates from over 18 countries and 63 universities have attended the meeting. In addition, we have received more than 180 posters for presentations, of which a diverse range of topics encompassed various aspects of dentistry.

In this issue, we have encompassed a diverse range of topics, from child oral health, epidemiology & preventive dentistry to innovative dental material. I am delighted to present the latest issue to you and have full confidence in the ongoing success of the IJOH for making the continuing impacts on the dental community.

Sincerely,

Professor CH Chu

Editor-in-Chief

Proceedings of the
15th International Conference of the
Asian Academy of Preventive Dentistry

8-11 November 2023
Hong Kong SAR

Innovative Technology for Preventive Oral Care

Keynote & Invited Lecture Abstracts

Keynote Lecture

The Oralome and Translational Therapeutics

Prof. Lakshman Samaranayake, The University of Hong Kong, Hong Kong SAR

The oralome is the term given to the dynamic interactions that occur between the eco-community of oral microorganisms comprising over 1000 species of bacteria, fungi, viruses, archaea and protozoa that reside in our mouth i.e., the oral microbiome. Under normal circumstances, these microbes form a complex eco-biome that thrive in the dynamic oral environment in a healthy, symbiotic relationship with the human host. However, the microbial composition is significantly affected by ecological factors such as the host diet, oral hygiene and interspecies and inter-kingdom interactions, which in turn, can modulate the genesis of diseases such as caries and periodontitis. This presentation reviews the contemporary concepts of the oralome, including inter-species and host-microbial interactions and examines how these are modulated during the transition from a healthy (eubiotic) to a diseased (dysbiotic) oralome. The presentation concludes with a summary of new approaches for regenerating a healthy oralome through translational therapeutics such as antimicrobial peptides, matrix disruptors, epigenetic drugs, prebiotics and postbiotics.

A Sticky Target: Adhesion and Cohesion in Dental Biofilms

Prof. Nicholas Jakubovics, Newcastle University, UK

The formation of microbial biofilms on teeth is responsible for dental caries and periodontitis, two of the most prevalent diseases in human populations worldwide. In addition, biofilms develop on prosthetic materials such as dental implants, braces or dentures, potentially leading to infection of the soft tissues or irreversible hard tissue damage. Strategies to control the formation of oral biofilms include targeting the adhesion of micro-organisms to surfaces in the mouth or disrupting key cell-cell interactions that are critical for oral biofilm formation. Here, I will discuss new concepts for antimicrobial materials including modifications that mimic surface structures found in nature. The role of specific microbial adhesins in attachment to surfaces will also be considered. These adhesins also mediate microbial cell-cell interactions that are critical for growth in the oral cavity. Blocking of adhesion or jamming cell-cell communication represent promising approaches to prevent the adhesion and colonisation of oral micro-organisms and the subsequent development of oral diseases. Further, a recently discovered group of ultrasmall bacteria may represent a new weapon in the arsenal for combatting disease-associated biofilms. Maintaining oral health is a complex challenge and successfully exploiting new innovations will require multi-disciplinary teams of basic researchers, clinicians and social scientists working together to maximise the benefits for people across the globe.

Symposium 1
Child Oral Health

Importance of Infant Oral Care and Early Counseling for ECC Prevention

Prof. Yasmi Crystal, New York University, USA

The worldwide high prevalence of early childhood caries (ECC) in young children soon after the eruption of primary teeth, calls for implementation of preventive practices as early as possible. Infant oral care that includes individualized caries risk assessment, early detection of risk factors and counseling for parents and caregivers to establish behaviors likely to promote oral health, as well as implementation of primary prevention strategies, are imperative for prevention of ECC. The scientific basis for policies and best practices that support infant oral care will be discussed, as well as barriers and alternatives to implement early visits in high-risk communities.

Is Breastfeeding a Risk or Protective Factor for Early Childhood Caries?

Prof. Waranuch Pitiphat, Khon Kaen University, Thailand

The benefits of breast milk are numerous for both children and mothers. Several organizations including the World Health Organization and the United Nations Children's Fund recommend continuing breastfeeding for up to 2 years or more as desired. However, dental caries has been suggested as the only negative health outcome related to prolonged breastfeeding. The association between breastfeeding and early childhood caries has long been a subject of debate. While some studies reported that prolonged breastfeeding could be a risk factor for caries development in primary dentition, others showed that breastfeeding was either protective or had no effect on early childhood caries. This presentation aims to summarize the current evidence and biological mechanisms linking breastfeeding duration with early childhood caries. Methodological issues in the design and analysis of prolonged breastfeeding and caries association will also be discussed.

Symposium 2
Ageing & Oral Health

Optimal Oral Health for Older People: Toward Healthy Ageing in Asia

Prof. Hiroshi Ogawa, Niigata University, Japan

The population of older people is the fastest growing age group in Asia. Older people today have higher expectations about oral health than did previous generations. Positive attitudes toward oral health are more common among young older people than in the older groups. Moreover, current trends indicate that edentulousness will be reduced among older adults and that functional dental restorations that require high levels of maintenance will become more common. Therefore, the dental profession requires bold policy action to help older people recognize that oral health contributes to healthy longevity and to enable the realization of the United Nations' Decade of Healthy Ageing. This lecture highlights global perspectives about the promotion of oral health among the older population to achieve healthy ageing. The lecture focuses specifically on which goals of the 8020 movement have been reached in Japan so far: how oral health can be integrated in existing health care systems and how future action can be managed to ensure additional years of life in a state of good health. The lecture will also include a discussion of research priorities for optimizing oral health to achieve healthy ageing in Asia.

Ageing and Oral Health: It's All in the Balance

Prof. André Ritter, University of Washington, USA

Estimates from the World Health Organization confirm that lifespans are getting longer, particularly in healthy populations. Globally, life expectancy has increased by more than 6 years between 2000 and 2019 – from 66.8 years in 2000 to 73.4 years in 2019 and continue to trend up despite the effects from the COVID-19 global pandemic. It is also estimated that healthy individuals are retaining their teeth longer in life. Combined, these two trends indicate that oral health care will become increasingly important for a large number of the global population. Ageing is also associated with changes in lifestyle, diet, and overall health management, including increased consumption of OTC and prescribed medications used to manage and enhance overall health. These medications can also impact oral health. Therefore, it is critically important to understand the impact of ageing on oral and craniofacial health. This presentation will review key indicators for oral health and summarize our current knowledge about how oral health is impacted by ageing as well as current strategies for prevention and management of oral diseases and conditions commonly associated with ageing.

Symposium 3
Advance in Caries Management

Preventive Dentistry in Modern Dental Practice

Dr. Chao Ji, Private Practice, Hong Kong SAR

Caries and periodontal disease are the two commonest oral diseases. As dental professionals, we all understand the effectiveness of professional prophylaxis and meticulous biofilm removal in the prevention of caries and periodontal disease. On the other hand, conventional prophylaxis could be uncomfortable to patients and might damage the tooth structures, which lowers patients' compliance and consequently the clinical benefits. Is there an ideal way to combine the clinical efficacy and patient comfort? This lecture will discuss about the preventive dentistry in modern dental practice with Guided Biofilm Therapy (GBT) Protocol.

Recent Advances in Caries Removal Methods: "Preserve Precious Tooth Substrate"

A/Prof. Hamdi Hamama, Mansoura University, Egypt

Cariology is a very dynamic branch of dental sciences exhibits rapid development. In this lecture, we will go through a journey among recent caries removal methods and principals. This development involves early-detection of dental caries, assessment of caries-risk factors, remineralization of early caries lesions, selective caries removal techniques, as well as bonding to caries-affected dentine. Furthermore, the topic of selective caries removal will be comprehensively discussed. In addition, the lecture will cover the current scientific evidence about cavity preparation end-point. The educational outcomes include (1) updating the attendee knowledge about recent cariology concepts, (2) discussing about how these recent concepts impact clinician's daily practices, and (3) demonstrating the currently available debates about cavity preparation end-point. Providing essential information about Selective Caries Removal Concept.

Innovation in Oral Health – Changing the Game

Prof. Jukka Matinlinna, The University of Manchester, UK

Very recently, four innovative major advances and proofs of concept in clinical dentistry have been suggested and published. Are these openings game changers: 1) Certain novel tiopronin-protected gold nanoparticles on demineralized dentin have shown potential in resin-dentin bonding to increase dentin collagen cross-linking, increase biodegradation resistance and decreasing proteases inhibition. 2) High-intensity focused ultrasound application, HIFU, to condition dentin surfaces might strengthen resin-dentin bonding, enhance interface integrity, and substitute the use of acid-etching. 3) An experimental novel quaternary ammonium silane, QIS, based root canal irrigation solution has shown potential to facilitated a toxic effect against the E. faecalis biofilm. Moreover, the irrigant solution didn't affect negatively fibrillar collagen network. In a complex root canal system, this novel irrigant might show reasonable therapeutic effect against biofilm infection. 4) Finally, a novel dioctadecyl-dimethylammoniumbromide, QA, and riboflavin based beneficial formulation is exhibiting promising protease activity inhibition and antimicrobial properties with collagen, without compromising resin-dentin bonding.

Symposium 4
Epidemiology & Preventive Dentistry

Epidemiology – The Building Blocks in Preventive Dentistry

A/Prof. Mun Loke Wong, National University of Singapore, Singapore

Globally, oral diseases remain common chronic conditions which affect many individuals and populations. Dental caries and periodontal disease are the two most prevalent oral conditions which can exert significant impact on individuals causing pain and discomfort, affecting their function and compromising their quality of life. With an increasingly ageing population, preventive dentistry plays an especially important role in helping older adults retain healthy natural teeth and maintain a functional dentition. In addition, the financial impact of managing oral diseases at the individual and population level must not be underestimated. Given the high prevalence of dental caries and periodontal disease and their impact on individuals and populations, prevention of these oral conditions and others, remains high on the agenda of public health plans. The effective prevention of oral diseases requires a multi-pronged approach anchored upon sound epidemiological principles. Epidemiology therefore provides important building blocks upon which preventive dentistry can be built. This presentation aims to (1) reinforce an understanding of epidemiology and its role, (2) highlight challenges in leveraging epidemiology as a key enabler, and (3) explore innovations and opportunities in epidemiology, especially in light of emerging technologies, in shaping the conceptualisation, planning and design of strategies and programmes to advance efforts to prevent oral diseases. Armed with an appreciation of the role of epidemiology as well as the associated challenges and opportunities when it is used as an enabler for prevention, the dental fraternity can effectively leverage it to prevent oral diseases and help individuals and populations achieve healthy smiles across the lifespan.

Longitudinal Changes in Individual and Regional Influencing Factors of Early Childhood Caries among 5-year-old Children in China, 2005—2015

Prof. Shuguo Zheng, Peking University, China

This study aimed to analyze the risk factors of primary dental caries among 5-year-old children in China from 2005 to 2015 by comparing the data from the 3rd and the 4th National Oral Health Epidemiological Survey. The contents of clinical examinations and questionnaires on oral epidemiology in 2005 and 2015 were integrated to keep the variables consistent between the databases of the two national surveys. Four categories of 16 explanatory variables were identified, including socio-demographic characteristics, Early childhood factors, Oral health behaviors and Self-perception of oral health. The samples from the two epidemiological studies were weighted using post-stratification method. A zero-inflated negative binomial regression model was used for multivariate analysis. A total of 24014 subjects (11099 in 2005 and 12915 in 2015) were included in the two oral epidemiological databases. The mean dmft increased from 3.60 (95%CI: 3.52-3.68) in 2005 to 4.35 (95%CI: 4.27-4.43) in 2015. The overall utilization of oral health services among 5-year-old children was still insufficient, and the main purpose of seeking dental care was still seeking treatment. Guardian's education level, feeding pattern, age to start brushing teeth, time of last dental visit, toothache experience in the past year, self-rated oral health were significantly associated with caries status of 5-year-old children in China. These results were helpful for enhancing and improving oral public health strategies for comprehensive prevention and control of Early Childhood Caries, laying further foundation for accomplishing the goal of oral health promotion in children.

Symposium 5
Innovation in Oral Health

Innovation Approach in Oral Health Care

Prof. Edward Chin Man Lo, The University of Hong Kong, Hong Kong SAR

Provision of traditional oral health care has been highly dominated by professional dental personnels, in particular dentists, and the quality of dental treatments varies among different dentists. With advances in technology and its application in dental care, new innovative approaches in providing oral health care services have developed recently. Besides, over the years, there has been a continue shift towards having more patient involvement in deciding on health care choices and participation in implementation of treatment. The use of digital technology and remote dentistry makes ways for Innovative approaches in provision of oral health care. The fast development of artificial intelligence (AI) and its potential application in oral health care services will be discussed in this presentation.

Fluorescence-based Technology for Screening and Diagnosis of Oral Disease

Prof. Baek Il Kim, Yonsei University College of Dentistry, Republic of Korea

The progression of the disease can be divided into a preclinical and a clinical phase based on the patient's subjective symptoms. In the clinical phase, it is easy to identify both patients and clinicians because there are clear symptoms that patients can clearly recognize, However, in the preclinical phase, early detection is difficult because it is asymptomatic. However, detection of the preclinical phase has the advantage of being able to block and prevent disease progression at an early stage. So, in the medical field, many efforts have been made to detect minute changes in the human body at this time. On the other hand, in traditional dentistry, surgical intervention has been mainly performed after using a dentist's visual inspection and radiographic test as representative diagnostic methods in the clinical phase. However, in the field of general medicine, various screening tests that can easily identify subtle changes in the preclinical phase as well as essential diagnostic tests in the clinical phase have been developed.

Since traditional dentistry has focused on image evaluation using visual inspection and radiograph, it would be advantageous for new screening and diagnosis technologies in dentistry to be image-based. Many of the developed technologies are fluorescence-based technologies that have already been commercialized and used in dental clinical settings. Among these technologies, this presentation will focus on QLF (Quantitative Light induce Fluorescence). QLF technology is an oral screening and diagnosis technology that can detect various fluorescence reactions from oral tissue. QLF uses visible blue light instead of radiation as a light source, so it is safe for the human body and easy to use in clinical settings. This technology has two major functions. The first function is to evaluate the mineral content of the tooth, and the second function is to detect bacterial activity from dental biofilm. By utilizing these two functions, it can be used not only for screening tests to detect pathogenic dental biofilms, but also for diagnosing incipient dental caries, secondary caries, tooth cracks, oral malodor and periodontal inflammation. This presentation will introduce the latest research results of QLF that can be used as a new screening and diagnosis technologies emerging in dentistry.

Symposium 6
Laser in Dentistry

Laser-induced Dental Analgesia: Theory and Practice

Dr. Ambrose Chan, Private Practice, Australia

With a rapidly increasing global population, there is an alarming increase in the occurrence of dental caries and the persistent fear of dental procedures, and in particular, pain. Most importantly, such fear is often leading to an increase in dental avoidance, irregular dental visits and poor oral health. Armfield et al., describes such pain-driven conventional Dentistry and its associations in a "Vicious cycle": a painful dental experience is likely to leave patients with a "bad" memory which would deter them from regular dental visit for early disease detection and prevention. In light of that there is a growing demand from the young, aged and those who are medically-compromised patients for a non-drug, non-invasive and anxiety-free, painless and regenerative treatment alternatives. Development of a holistic strategy would promote frequent dental attendance and provide an opportunity to educate patients early in the disease process, better treatment and prevention. This lecture addresses the holistic strategy of laser-induced dental analgesia, as an alternative, that may contribute to a positive patient experience with reduced need for injected local anaesthesia during restorative dentistry, and then focuses on the possible mechanisms of its effectiveness that may allow quantitative optimization of its delivery.

Lasers in Ankyloglossia and Myofunction

Dr. Kenneth Luk, Private Practice, Hong Kong SAR

Ankyloglossia (tongue tie) is restriction of tongue movement. It is comonly associated with poor pronunciation in speech. The tongue also plays an important role in feeding, swallowing, breathing and sleep.
Sleep apnoea or sleep disorder is a hot topic that is gaining great attention in medicine and dentistry. In Hong Kong, there are 100,000 children diagnosed with sleep disorder. Dental arch underdevelopment is one of the factors related to Obstructive Sleep Apnea. In newborn, tight frenum in upper lip and tongue may restrict movements affecting breast feeding ability. Lasers can relieve frenum in a bloodless and stress-free manner to facilitate good tongue movement and function. The rise of the released tongue against the palate during swallowing signifies the myofunction habituation to ensure good oral facial growth and airway.

Lasers in Minimal Intervention Dentistry (MID)

Dr. Shigeyuki Nagai, Private Practice, Japan

When the MID was declared at the FDI Vienna General Assembly in 2002(Revised by FDI General Assembly Poland in 2016), the declaration already mentioned the use of lasers as a useful tool to be limited to the removal of friable enamel and infected dentine. Lasers are widely used not only for caries removal as stated in the FDI declaration, but also for caries diagnosis and prevention. In daily dental practice, the timing of caries intervention and its diagnosis are important. Preventive dentistry must avoid caries and at the same time avoid excessive cutting treatment. It is known that the use of lasers increases the resistance to dental caries (improved acid resistance). Various lasers are used to improve the acid resistance of tooth structures. Although it has been reported that the acid resistance is improved only by laser irradiation and other research has shown that the combined use of fluorine results in higher acid resistance than laser irradiation only. The use of lasers in Minimal Intervention Dentistry will be discussed.

Symposium 7
Minimally Invasive Dentistry

Optimal Intervention Dentistry

Prof. John Featherstone, University of California San Francisco, USA

"Minimal Intervention Dentistry" and "Minimally Invasive Dentistry" are names that are used internationally that mean different things to different people. This presentation will clarify these names and describe how "Optimal Intervention Dentistry" includes both. The concept of the "Caries Balance" is the basis for successful "Optimal Intervention Dentistry" which includes 1) caries risk assessment, 2) chemical therapy based upon the level of risk, 3) minimally invasive restorative dentistry to conserve optimal tooth structure, 4) working with patients for maximum compliance. Optimal Intervention Dentistry leads to much better patient health outcomes and improved long term oral health.

Minimally Invasive Dentistry

Prof. Andrea Zandona, Tufts University, USA

Our increasing understanding of dental caries supports shifting caries management away from a purely restorative approach. Dental Caries is a biofilm mediated diet modulated disease process. An effective caries management approach must address the disease driving factors such as diet and biofilm as well as enhance protective factors. Minimally Invasive Dentistry focuses on tissue preservation, from preventing disease from occurring and intercepting its progress, to restorations placed with as little tissue loss as possible. This lecture, grounded on the concepts of the International Caries Classification and Management Systems (ICCMS) (CariesCare) will discuss clinical approaches to minimal intervention including non-operative caries management and selective caries excavation.

Symposium 8
Community Dental Care

The Use of Digital Technology for Oral Health Survey and Community Oral Health Promotions: An Indonesian Experience

A/Prof. Melissa Adiatman, Universitas Indonesia, Indonesia

Digital technology, including mobile applications, electronic data collection tools, and telehealth services, has greatly improved the efficiency, accuracy, and accessibility of oral health surveys. Real-time data collection, analysis, and visualization capabilities enable rapid identification of oral health needs and facilitate evidence-based decision-making. Additionally, digital platforms allow for targeted interventions and monitoring of oral health outcomes, resulting in more effective and tailored approaches to community oral health promotions. Dental caries is a prevalent oral health issue globally, especially in under-served populations with limited access to oral healthcare. Remote caries detection technologies, using smartphone intra-oral photographs enable efficient diagnosis, referral, and treatment planning, improving oral health outcomes for under-served patients. In Indonesia, the utilization of digital technology has been instrumental in expanding the reach and impact of community oral health programs, especially during the pandemic. These programs encompass oral health education, preventive interventions, and remote consultations. By leveraging digital platforms, oral health information and resources can be disseminated widely, even to underserved areas with limited access to dental care. This promotes awareness, encourages preventive practices, and empowers individuals to take charge of their oral health. The Indonesian experience highlights the case-studies of digital technology integration into oral health surveying and community oral health promotions. This approach increased the effectiveness of oral health initiatives. The lessons learned from the Indonesian context can serve as valuable insights for other countries seeking to adopt similar strategies to enhance their oral health systems.

Caries Prevention for Young Children in Vietnam: A National Challenge

A/Prof. Hoang Trong Hung, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam

Until 1990, both the prevalence and severity of dental caries among children in Vietnam were serious, the highest figures were found in Ho Chi Minh city. At that time, two dental public health programs were implemented in the country, the school based oral health care program and the water fluoridation. The water fluoridation program was just implemented in two cities in southern Vietnam. Vietnam National Oral health surveys that were conducted in year 1990, 2000 and 2019 showed dental caries among young children in its country almost not changed during last 30 years, especially untreated dental caries. In contrast, the surveys in Ho Chi Minh city, where water fluoridation has been implemented since 1990, indicated a significant decrease dental caries experience among young children living in fluoridated areas of this city. However, along with the overall decrease in dental caries, its skewed distribution became more and more prominent among very young children. Although the effectiveness of caries reduction was found in the fluoridated city, but prevalence of s-ECC seems not changed in this city from 1990 until now. This review recognized that the current public oral health programs had not enough to protect dental caries for young children and the new challenge of caries prevention is how to establish strategies to manage caries dental caries in high-risk groups living in specific communities of the country.

Enhancing Asian Dental Undergraduates' Interest in Community Engagement Activities through South East Asia Association for Dental Education (SEAADE) Regional Competition

Prof. Abdul Kadir Rahimah, University of Malaya Centre of Addiction Sciences, Malaysia

Epidemiological data showed most part of Asia remained to be a region where poor oral hygiene practices is common, access to oral care is limited thus resulting in a high prevalence of oral diseases, particularly dental caries and periodontal diseases. Given the situation, most dental schools in the region included dental public health and preventive dentistry as core modules in their curriculum. One learning outcome of the course curriculum is the conduct of Oral health Promotion and Education activities in a selected community. Given the diverse population, religious beliefs and culture of Asia, dental students are encouraged to think globally but applying the concept of community engagement locally deemed suitable to the community they are engaged with. This presentation showcases the South East Asian Association for Dental Education's (SEAADE) effort since 2005, in enhancing dental students' interest and appreciation in their dental public health activities through SEAADE Student Community Engagement Competition.

Symposium 9
Laser in Dentistry

Prevention and Control: Integrating Laser Therapy for Dental Patients

A/Prof. Qian Li, Peking Union Medical College Hospital, China

At present, various wavelengths of lasers have been widely used in the diagnosis, treatment, and prevention of dental diseases. Laser can be used for caries prevention by irradiating. Laser assisted root canal disinfection reduces the probability of inflammation progression and increases tooth preservation rate. Laser can play a role in inhibiting bacteria growth and promoting tissue healing during the nonsurgical treatments, periodontal surgery, and maintenance period of periodontal disease. Low energy laser therapy is used to early lip herpes, avoid local exudation and blistering, relieve pain and discomfort, and shorten the course of the disease, promote the healing of aphthous ulcer and erosive lichen planus, and alleviate the pain of burning mouth syndrome as while. The general advantages of laser surgery, such as decreased bleeding, reduced post-operative pain and less edema, have led to a continuous interest in laser applications for bone cutting and soft tissue procedures in a minimally invasive surgical approach. As well as a simplification of the full implant procedure and enhanced methodologies for the treatment of peri-implantitis. This lecture will explain the application of lasers allow a minimally approach of these procedures and a better clinical outcome.

The Role of Lasers in the Prevention of Oral Cancer

Prof. Sajee Sattayut, Khon Kaen University, Thailand

The prevention of oral cancer has been a challenging situation for oral health care providers. The occurrence of oral cancer was known to be related to trigger factors and genetic instability in keratinocytes. Therefore, multidimensional approaches are needed to prevent oral cancer. According to the clinical studies and action research conducted by lasers in dentistry research group, Khon Kaen University, lasers play important parts in every level of oral cancer prevention. In primary prevention, low-intensity laser therapy based on photobiomodulation can reduce inflammation of oral tissue and promote wound healing besides the elimination of risk factors. This laser therapy is less complicated and can be used in primary care. For secondary prevention, using high-intensity laser therapy for tissue biopsy provides less surgical complication. This is also an immediate care of oral potentially malignant disorders in case of excisional biopsy. For the lesions which need a long-term treatment and follow up such as erosive type lichen planus and leukoplakia or erythroplakia with epithelial dysplasia, photodynamic therapy and low-intensity laser therapy can control the malignant transformation of the lesions. In the tertiary level of prevention for early invasive oral squamous cell carcinoma, using laser for wide excision combined with either photodynamic therapy or low-intensity laser therapy results in less invasive surgery, minimal mortality and gaining more patient satisfaction and acceptance. Using lasers based on integrated oral health promotion and curative care is a method of preventing oral cancer allowing oral health care providers to control the oral potentially malignant disorders.

Poster Presentation Abstracts

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Session 7

Session 1

S1-101

Effect of RATEA16 Hydrogel on Regulating Acidic Microenvironment in Periapical Periodontitis and Promoting Osteogenesis

Haisheng Cao, Xiaozhe Wang, Shuguo Zheng

Department of Preventive Dentistry, Peking University School and Hospital of Stomatology, China

Objectives: To investigate the ability of RATEA16 hydrogel on pH regulation and the influence on osteogenesis of stem cells from apical papilla (SCAPs) in an acidic environment.

Methods: The ability of RATEA16 to regulate acidity was measured by a pH meter. Taking SCAPs as the research object, we regulated the medium pH (4.5, 5.5, 6.5, 7.5) to simulate the physiological and pathological pH environment. Then, the proliferation, migration, and osteogenic differentiation of SCAPs under an acidic environment and co-culture with RATEA16 were evaluated by cell proliferation assay, wound healing assay, Alkaline phosphatase (ALP) staining, and Real-time qPCR.

Results: SCAPs could not survive in a pH 4.5 environment. RATEA16 could significantly improve the ability of cell proliferation and cell mobility of SCAPs in an acidic environment (pH 5.5, 6.5) ($p<0.001$). The semi-quantitative results of ALP staining showed that the staining of the RATEA16 group was deeper than that of the medium group under a pH 5.5 environment. The results of RT-qPCR showed that the expression of *ALP* and *OSX* in the RATEA16 group was significantly higher than that in the medium group under an acidic environment ($p<0.001$).

Conclusions: RATEA16 hydrogel can improve cell proliferation, migration, and osteogenic differentiation of SCAPs in an acidic environment by adjusting environmental pH. It could provide a new idea for treating refractory periapical periodontitis and other inflammatory bone defects.

S1-102

Characterisation of New Material Based on 20% AgNCls/PMAA for Arresting Caries-affected Dentine

María Belén Cabalén[1,2], Gustavo Fabián Molina[2], Michael F Burrow[2]

1. Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Argentina
2. Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR

Objectives: To test a novel non-restorative treatment method for arresting dentin caries based on silver nanoclusters (AgNCls) synthesized in polymethacrylic acid (PMAA).

Methods: Synthesis of AgNCls was performed by photoreduction of $AgNO_3$ in PMAA with 355 nm/wavelength light. Cytotoxicity was assessed using the MTT assay; antibacterial effect was determined for minimum inhibitory concentration (CIM), minimum bactericidal concentration (MBC) and colony forming (CFU) of *Streptococcus mutans* (*S. Mutans*) and *Lactobacillus acidophilus* (*L. Acidophilus*); dentine color changes were measured using a spectrophotometer; surface hardness was measured using Vickers hardness test. Evaluation of the shear bond strength (SBS) of a glass ionomer (GIC) to demineralized dentine was undertaken. Silver ion penetration into dentine was traced using SEM-EDX and Laser Induced Breakdown Spectroscopy (LIBS). 38% Silver Diammine Fluoride (SDF) was the control. Specific statistical analyses were carried out for each test.

Results: Cell viability of 92-89% was found after 24-72 hours respectively. MIC and MBC were determined from 1.25% and 2.5% dilutions, respectively. Log CFU counts in 1.25% concentration were significantly lower than in the control groups. Demineralised dentine surfaces treated with AgNCls/PMAA presented color stability and the highest microhardness values. The highest SBS values of GICs were also reported for this treatment group. Presence of silver was detected constantly throughout the whole depth of the artificial lesions.

Conclusions: 20% AgNCls/PMAA presented acceptable cytotoxicity, excellent antibacterial effect, did not stain, improved SBS of GIC and achieved recovery of surface hardness with the penetration of silver ions throughout the depth of the lesion.

Remineralising Initial enamel caries using GAPI peptide

Olivia Lili Zhang, Chun Hung Chu
Faculty of Dentistry, The University of Hong Kong, Hong Kong SAR

Objectives: To evaluate the effect of GAPI peptide on initial enamel caries.

Methods: Enamel blocks were challenged by *Streptococcus mutans* (*S. mutans*) biofilm to create artificial carious lesions. The enamel blocks were treated with the GAPI peptide or deionised water (Control). After 21-day biochemical cycles, the confocal laser scanning microscopy (CLSM), colony-forming units (CFUs) counting and scanning electron microscopy (SEM) were used to assess the viability, growth kinetics and morphology of the biofilm. Micro-computed tomography, SEM-energy dispersive spectroscopy, microhardness tester, SEM and X-ray diffraction (XRD) were used to evaluate the lesion depth and mineral loss, calcium-to-phosphorus ratio, Knoop's microhardness, enamel surface morphology and crystal characteristics of enamel lesions.

Results: *S. mutans* confluently grew on the surface of the enamel treated with water but not for enamel treated with GAPI. In addition, some *S. mutans* cell structure on enamel treated with GAPI was damaged. The dead-to-live ratios on enamel treated with GAPI and water were 0.80 ± 0.13 and 0.42 ± 0.09 ($p<0.001$). The Log CFUs enamel treated with GAPI and water were 6.90 ± 0.69 and 8.10 ± 0.47 ($p=0.002$). The lesion depth of enamel treated with GAPI and water were 142 ± 11 µm and 178 ± 20 µm ($p<0.001$). The mineral loss of enamel treated with GAPI and water were 1.10 ± 0.09 gcm^{-3} and 1.48 ± 0.06 gcm^{-3} ($p<0.001$). The calcium-to-phosphorus ratio of enamel treated with GAPI and water were 1.71 ± 0.02 and 1.67 ± 0.03 ($p=0.006$). The Knoop's microhardness of enamel treated with GAPI and water were 301.75 ± 21.51 and 241.85 ± 17.09 ($p<0.001$). SEM surface micrographs showed a uniformly remineralised prismatic pattern on enamel treated with GAPI but not on enamel treated with water. The hydroxyapatite on enamel treated with GAPI was better crystallised than that on enamel treated with water.

Conclusions: This study demonstrated the remineralising effect of GAPI peptide on initial enamel caries.

The Synthesis of a Novel Magnetic Nanoparticles for Dental Caries Prevention

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1. West China Hospital of Stomatology, Sichuan University, China
2. National Engineering Research Center for Biomaterials, Sichuan University, China
3. University of Maryland School of Dentistry, USA

Objectives: To synthesize a novel antibacterial material for controlling plaque and preventing dental caries.

Methods: The novel dental materials were synthesized by grafting antiseptic dimethyl dodecyl methacrylate (DMADDM) onto magnetic nanoparticles. The structure and characterizations of the nanomaterials were detected. In order to test its anti-caries ability under magnetic field, biofilm models of caries-related bacteria and saliva were established *in vitro*. Colony-forming unit counting and lactic acid detection were performed to analyze the quantity and metabolic changes of caries-related pathogenic bacteria. 16S rDNA Sequencing was used to analyze the changes in microbial community diversity in saliva-derived biofilms samples.

Results: The nanoparticle $Fe_3O_4@SiO_2@DMADDM$ was synthesized with a particle size of 200-300 nm. It combines the properties of directional movement and the antibacterial capabilities. Under the guidance of magnetic field, it inhibited the formation of caries-related bacteria biofilm. The sterilization rate increased with the increase of concentration until 16mg/mL ($p<0.05$). The lactic acid production was significantly by materials at a concentration of 8mg/mL ($p<0.05$). The proportion of caries-related bacteria (*Streptococcus*, *veillonella*, *Neisseria*, etc.) in salivary biofilm was also shown to be depressed by $Fe_3O_4@SiO_2@DMADDM$.

Conclusions: A novel antibacterial material $Fe_3O_4@SiO_2@DMADDM$ is successfully synthesized. It has great potential for preventing and controlling caries by inhibiting the bacteria biofilm formation and bacterial metabolism. It is also able to reduce the proportion of caries-related pathogenic bacteria. These properties demonstrate its clinical potential for caries prevention and control.

S1-105

Fluoride and Silver Ion Release from Resin Composite Restorations with Silver Diamine Fluoride Conditioning

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Objectives: To assess the fluoride and silver releasing ability of resin composite (RC) restorations with the condition of 38% silver diamine fluoride (SDF).

Methods: 40 dentine blocks of 4*4*3 mm3 with cavity of 2*2*2 mm3 was prepared. The dentine blocks were allocated into 2 groups. Group 1-38% SDF conditioning and RC restoration; Group 2-RC restoration; In Group 1, the cavity was conditioned with SDF for 3 minutes then treated with a one-step bonding agent and filled by RC. In Group 2, the cavity was treated with a one-step bonding agent and filled by RC. The blocks were immersed in 5 mL of distilled water (pH 7.0) individually for 360 days. Fluoride and silver concentration in storage solution were measured for 360 days using an ion analyzer and ion chromatography, respectively.

Results: The mean and standard deviation of accumulative fluoride releasing in Group 1 and 2 for 360 days were 1.74±0.42 mg/L and 0.62±0.02 mg/L, respectively. The daily fluoride release in Group 1 were highest on day 1 and dropped to a lower level on day 7. The stable low-level fluoride release was maintained until day 360. The fluoride release in Group 2 was stable low-level for 360 days. The mean and standard deviation of accumulative silver releasing in Group 1 and 2 for 360 days were 2.31±0.05mg/L and 0±0 mg/L, respectively. The RC restorations with SDF conditioning showed significantly higher fluoride and silver releasing compared to resin composite restorations without SDF conditioning ($p<0.05$).

Conclusions: The SDF conditioning can increase the fluoride and silver release of resin composite restorations without SDF conditioning.

S1-106

Dental Pulp Stem Cell Response to Silver Diamine Fluoride: An *In Vitro* Study

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Objectives: To evaluate the response of dental pulp stem cells (DPSCs) to silver diamine fluoride when used as an indirect pulp capping agent in deep cavities.

Methods: DPSCs were allocated into 3 groups and treated with 0.0001% SDF (Group SDF 10X), 0.00001% SDF (Group SDF 1X), and no treatment (Control). The concentration was determined according to the concentration of the SDF in dental pulp when used as an indirect pulp capping agent in deep cavities. The morphology of the cells was observed by a light microscope. Cell viability evaluation was done using a CCK-8 assay. Cell toxicity was evaluated with a live/dead assay using a fluorescence microscope. Quantitative evaluation of mineralization and inflammation gene expression levels (ALP, DSPP, DMP-1, IL-1, IL-6, and IL-8) was done using real-time polymerase chain reaction (RT-PCR).

Results: Examination under a light microscope showed the DPSCs' morphology was not affected by the different concentrations of SDF. CCK-8 assay showed there was an increase in the cellular viability in Groups SDF 10X and SDF 1X. Live/dead staining showed that there was no significant difference in cell toxicity among all the groups. The RT-PCR results show an upregulation in the expression of the tested mineralization and inflammatory genes following the increase in the concentration of SDF in the culture media.

Conclusions: 0.0001% or 0.00001% SDF did not affect the morphology and viability of DPSCs. SDF may act as a modulator of mineralization and inflammation in DPSC, which help in tertiary dentine formation.

S1-107

Knowledge, Attitudes and Practices towards Silver Diamine Fluoride among Dentists in Vietnam

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Objectives: The objective of this study is to explore the knowledge, attitudes and practices towards silver diamine fluoride (SDF) therapy among dentists in Vietnam.

Methods: The mixed method study consists of a quantitative study (questionnaire survey) and a quantitative study (in-depth interview). The quantitative study invited participants attending the national annual dental meeting for an online closed-ended questionnaire survey. The qualitative study invited dentists using snowball sampling for an individual in-depth interview. Descriptive analysis and thematic data analysis were performed to analyse the quantitative and qualitative data, respectively.

Results: The survey invited 788 dentists and 173 dentists completed the questionnaire. Among them, 131 (131/173, 76%) dentists knew SDF and 53 (53/131; 40%) dentists have used SDF for caries management. The two main advantages they considered for SDF therapy were non-invasive (109/131; 83%) and simple (104/131; 79%). The main disadvantage was tooth staining (94/131; 72%). The most preferred teeth for SDF therapy were primary posterior teeth (121/131; 92%). The qualitative study interviewed 16 dentists to reach data saturation. They learnt about SDF from out-curriculum resources as an effective agent for caries management. They understood the advantages (simple, non-invasive, time-saving) and disadvantages (tooth-staining, ammonia-smell) of SDF therapy. They used SDF to arrest caries on uncooperative children. They also used SDF as outreach care for people living in rural areas.

Conclusions: Most dentists in Vietnam know SDF therapy for caries management and its advantages and disadvantages. They are supportive of SDF use to manage caries, especially for children and outreach service.

S1-108

Copper Materials for Caries Management: A Scoping Review

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Objectives: To evaluate the response of dental pulp stem cells (DPSCs) to silver diamine fluoride when used as an indirect pulp capping agent in deep cavities.

Methods: DPSCs were allocated into 3 groups and treated with 0.0001% SDF (Group SDF 10X), 0.00001% SDF (Group SDF 1X), and no treatment (Control). The concentration was determined according to the concentration of the SDF in dental pulp when used as an indirect pulp capping agent in deep cavities. The morphology of the cells was observed by a light microscope. Cell viability evaluation was done using a CCK-8 assay. Cell toxicity was evaluated with a live/dead assay using a fluorescence microscope. Quantitative evaluation of mineralization and inflammation gene expression levels (ALP, DSPP, DMP-1, IL-1, IL-6, and IL-8) was done using real-time polymerase chain reaction (RT-PCR).

Results: Examination under a light microscope showed the DPSCs' morphology was not affected by the different concentrations of SDF. CCK-8 assay showed there was an increase in the cellular viability in Groups SDF 10X and SDF 1X. Live/dead staining showed that there was no significant difference in cell toxicity among all the groups. The RT-PCR results show an upregulation in the expression of the tested mineralization and inflammatory genes following the increase in the concentration of SDF in the culture media.

Conclusions: 0.0001% or 0.00001% SDF did not affect the morphology and viability of DPSCs. SDF may act as a modulator of mineralization and inflammation in DPSC, which help in tertiary dentine formation.

S1-109

DMADDM Changes the Interaction Between *Streptococcus mutans* and *Streptococcus gordonii*: From Competition to Cooperation

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Objectives: Dimethylaminododecyl methacrylate (DMADDM), a novel quaternary ammonium salt, has significant bactericidal effect to prevent dental caries. However, the bactericidal mechanism and its effect on oral microecology remain unknown. The objective of this study is to investigate the effect of DMADDM on the interactions between dual-species bacteria.

Methods: The interaction between *Streptococcus mutans* and *Streptococcus gordonii* was studied using a spot model and quantitative PCR. In microecology, the cooperation criterion and the biodiversity effect were used to define the level and type of the interaction. Moreover, we used transcriptome analysis to investigate the mechanism of interaction changes.

Results: *S. mutans* and *S. gordonii* have a competitive interaction in oral biofilm. However, the cell quantity of two strains in the co-culture increased compared with mono-culture after DMADDM-treated. The spot model demonstrated that the interaction changed from competition to cooperation or competition weakening. Based on the biodiversity effect, the interaction was mostly a positive complementarity effect, implying promotion and cooperation. The quorum sensing system is critical in the interaction change by transcriptome analysis. The expression of genes *comD*, *comE*, and *comX* of *S. mutans* in co-culture was up-regulated after DMADDM-treated. Similarly, the expression of cariogenic gene *gtfB* was increased. However, *S. gordonii* significantly downregulated *vicR* gene expression related to quorum sensing.

Conclusions: We proposed bacteria response to the bactericidal effect of DMADDM by activating the quorum sensing in the community for the first time. This challenges the application prospect of antimicrobials. The effects on microecology need long-term research in the complicated application environment.

S1-110

Inhibitory Effects of Nano Silver Fluoride Sustained-release Elastomerics on *Streptococcus mutans* Biofilm Formation

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Objectives: Biofilm formation around brackets used in orthodontic treatment increases the risk of dental caries owing to the ease of biofilm accumulation and difficulty in its removal. To address this problem, this study developed nano silver fluoride sustained-release elastomerics (NSF-RE) and evaluated their inhibitory effects on *Streptococcus mutans* (*S. mutans*) biofilm formation.

Methods: Three coating solutions were prepared by mixing different concentrations of ethyl cellulose (EC) and polyethylene glycol (PEG) in dichloromethane containing NSF. The solution without EC and PEG was denoted "NSF", the solution containing EC (20mg/ml) alone was denoted "NSF-E", and the solution containing both EC (20mg/ml) and PEG (10mg/ml) was denoted "NSF-EP". The elastomerics were dipped in each coating solution and dried to prepare NSF-RE. To evaluate the inhibitory effect of NSF-RE on *S. mutans* biofilm formation, specimens were prepared by attaching the elastomerics to the surface of a hydroxyapatite disc. After 64h of biofilm formation, the biofilm thickness and live/dead cell ratio were evaluated via confocal laser scanning microscopy, and the biofilms were harvested to yield colony-forming units (CFUs).

Results: Compared to the negative control, NSF-E and NSF-EP significantly inhibited the biofilm formation in all evaluations *(p<0.001)*. NSF-EP was the most effective in inhibiting the biofilm formation. NSF-E reduced the biofilm thickness, live/dead cell ratio, and CFUs by 67%, 87%, and 43%, respectively; NSF-EP reduced the respective parameters by 83%, 96%, and 57%.

Conclusions: The elastomerics coated with NSF-EP, a mixture of EC and PEG, were the most effective in inhibiting *S. mutans* biofilm formation.

S1-201

Biomineralization-inspired Anti-caries Strategy Based on Multifunctional Nanogels as Mineral Feedstock Carriers

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Objectives: A material that stably combines remineralization and antimicrobial properties for clinical use is still far from being available for the treatment of dentin caries. To achieve this goal, a bio-inspired multifunctional nanogel with antibacterial and biomineralization properties was developed in this study.

Methods: First, p (NIPAm-co-DMC) (PNPDC) copolymers were synthesized from N-isopropylacrylamide (NIPAm) and 2-methacryloyloxyethyl-trimethyl ammonium chloride (DMC), and then PNPDC was mixed with γ-polyglutamic acid (γ-PGA) to form nanogels by physical cross-linking. Finally, PNPND/PGA nanogels were used as templates for the mineralization of calcium phosphate (Cap), forming Cap-loaded PNPDC/PGA nanogels. The structural, size, and Cap loading situation of the nanogels were characterized by transmission electron microscopy (TEM), X-ray diffraction, fourier transform infrared spectroscopy (FTIR) and nanoparticle tracking analyzer.

Results: The results showed that PNPDC/PGA nanogels were synthesized successfully and that Cap was loaded into the nanogels. The nanogel particles measured approximately 200 nm and immediately occluded dental tubules with a depth of 10 μm. At body temperature, the Cap-loaded PNPDC/PGA nanogels underwent volumetric shrinkage and promoted Ca2+ release within 2 days, and they effectively promoted the remineralization of demineralized dentin and type I collagen in in vitro models. Moreover, the nanogels inhibited the proliferation and biofilm formation of Streptococcus mutans with high biocompatibility.

Conclusions: Cap-loaded PNPDC/PGA nanogels are a multifunctional biomimetic system with antibacterial and dentin remineralization effects. This strategy of using antibacterial nanogels as mineral feedstock carriers offered fresh insight into the clinical management of caries.

S1-202

pH-Responsive Tertiary Amine Material Provides First Line of Defense against *Helicobacter Pylori* in Oral Cavity

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Objectives: Oral cavity plays an essential role in the transmission and infection of helicobacter pylori (*H.pylori*) by serving as a reservoir for it. Dodecylmethylaminoethyl methacrylate (DMAEM) is a pH-responsive tertiary amine material that can be incorporated into dental materials. This study aimed to investigate the antibacterial effects of DMAEM against *H.pylori*.

Methods: The minimum inhibitory concentration (MIC) and minimum bactericidal concentration (MBC) of DMAEM against *H.pylori* at pH 5.5 and 7.4 were determined by broth microdilution assay and spot assay. Bactericidal kinetics were obtained by applying a range of DMAEM concentrations to the bacteria for different periods of time. The morphological characteristics of *H.pylori* was identified by scanning electron microscopy (SEM). Effects of DMAEM on bacterial metabolic activity and virulence gene expression was evaluated by alamar blue assay and quantitative real-time PCR. Anti-biofilm effects of DMAEM were evaluated by crystal violet staining.

Results: DMAEM inhibited *H.pylori* in a pH-responsive manner. The MICs of DMAEM against *H.pylori* at pH 5.5 and 7.4 were 16 μg·mL^{-1} and 64 μg·mL^{-1}, respectively; the MBCs were 32 μg·mL^{-1} and 128 μg·mL^{-1}, respectively. The bactericidal activity of DMAEM was time- and dose-dependent, and synergistic with low pH. DMAEM significantly inhibited the expression of *cagA*, *vacA*, *flaA*, and *ureB* in *H.pylori*, further reducing the survivability of *H.pylori* in an acid environment. SEM observation showed that after being treated with DMAEM, the surviving *H.pylori* transformed from a normal arc-shape to a short rod or coccoid form.

Conclusions: DMAEM exerts an antibacterial effect against *H.pylori* in a pH-responsive manner, which may produce the first line of defence against *H.pylori* in response to pH changes in the oral microenvironment.

S1-203

Inhibition of Periodontitis by LFS: Targeting Pathogens, Inflammation, and Osteoclasts

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Objectives: The current interventions for combating periodontitis remain to be improved. There is a pressing need to identify drugs with fewer side effects for periodontitis treatment. Sulforaphene (LFS), extracted from Raphanus sativus, has been found to have the potential to inhibit inflammatory disease such as colitis. We investigated whether LFS own a therapeutic effect on periodontitis.

Methods: We conducted a study to investigate the impact of LFS on the growth of periodontal pathogens. And trap stainng was employed to reveal the effect of LFS on the formation of osteoclasts in the presence of inflammation. *In vivo*, a periodontitis model by silk ligation was established in mice. Subsequently, micro-CT was used to evaluate the effect of LFS on bone loss.

Results: LFS treatment was demonstrated to inhibit the growth (relative OD_{600}: 1.01 ± 0.10 in the LFS (0) group vs. 0.63 ± 0.05 in the LFS (5 µM) group) of *Porphyromonas gingivalis* (*P. gingivalis*). Trap staining revealed LFS impeded the differentiation of osteoclasts in the presence of IL-1β (number: 54.65 ± 8.67 in the LFS (0) group vs. 3.50 ± 1.29 in the LFS (5 µM) group). *In vivo*, micro-CT analysis demonstrated that LFS attenuated alveolar bone loss (BV/TV: 13.53 ± 2.36 in the periodontitis group vs. 24.15 ± 5.29 in the periodontitis + LFS group).

Conclusions: These findings collectively indicate that LFS owns inhibitory effects on *P. gingivalis* growth, osteoclast activity, and alveolar bone loss in the context of periodontitis.

S1-204

Injectable Self-healing Gelatin/tricalcium Phosphate Nanocomposites for Alveolar Bone Defect Treatment

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Objectives: To design an injectable self-healing nanocomposite material for alveolar bone defect treatment.

Methods: Three-dimensional porous nanocomposite materials were fabricated by mixing 15% gelatin nanoparticles (GNP)and tricalcium phosphate (TCP). The surface structure of GNP/TCP was assessed by scanning electron microscopy, and the crystal structure was analyzed by X-ray diffraction. The shear thinning characteristics and self-healing properties were verified by a rheometer. Human periodontal ligament stem cells were loaded onto the scaffold to evaluate the bioactivity of GNP/TCP. The cell viability, adhesion, and proliferation were assessed. Furthermore, the bone regeneration capacity of GNP/TCP materials was investigated in a rat alveolar bone defect model. Quantitative imageology analysis and qualitative histological evaluations were performed using micro-CT and H&E staining, respectively.

Results: GNP/TCP had the typical diffraction peaks of gelatin and TCP. The composite scaffolds showed shear thinning and self-healing properties, which can be applied to fill in the irregular bone defects. Cells spread quickly on the composite material and grew tenfold after 10 days with almost all cells alive. The bone volume was significantly higher compared to the control after 8 weeks in the rat model and more bone trabeculae were formed in the defect site.

Conclusions: An injectable self-healing composite material composed of gelatin and TCP was successfully prepared. The composite material had good biocompatibility, enhanced the adhesion, proliferation, and osteogenic differentiation of human periodontal ligament cells, and exhibited excellent bone repair effects in the rat alveolar bone defect model. Therefore, it has the potential clinical application to repair alveolar bone defects.

S1-205
Defining the Gut Microbiota in SD Rats with Chronic Apical Periodontitis

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Objectives: This study was to establish the Chronic Apical Periodontitis (CAP) model in Sprague-Dawley (SD) rats, and explore the changes in the total number, diversity and structural characteristics of the gut microbiome in SD rats after establishing CAP model.

Methods: Ten healthy male SD rats were randomly divided into CAP group and Control group (n=5). The first and second molars of the upper and lower jaws of the SD rats were opened and the cavity was opened, and a suspension containing *Porphyromonas gingivalis* (*P. gingivalis*) was sealed in the CAP group. After 12 weeks, the animals were sacrificed, and the part of the intestinal ileum to the colon was isolated. The contents of the intestine were washed and the contents of the intestine were subjected to 16S rRNA pyrosequencing.

Results: Compared with the Control group, the Chao index and Simpson diversity index of the gut microbiome of SD rats in the CAP group increased, and the Shannon indices decreased ($p<0.01$). Principal component analysis suggested that at the genetic level, there was a significant difference between the two groups, and the second principal component contribution rate was 24.38%. At the departmental level, *Ruminococcaceae* and *Coriobacteriaceae* were decreased significantly, whereas *Prevotellaceae* and *Bacteroidaceae* was increased in abundance in CAP group compared to Control group.

Conclusions: Chronic apical periodontitis infection caused by *P. gingivalis* presented more number, less diverse and the structural changes of gut microbiome. In the species structure of the *Pg*-CAP group, the abundance of *Ruminococcaceae* was the most significant.

S1-206
A Novel Therapeutic Effect of *N*-Acyl Homoserine Lactonase Est816 on Peri-Implantitis

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Objectives: *Porphyromonas gingivalis* (*P. gingivalis*) is one of the major causes of peri-implantitis. Biofilm formation of *P. gingivalis* is mainly regulated by *N*-acyl homoserine lactone (AHL). AHL lactonase could hydrolyse the homoserine lactone ring and inhibit bacterial biofilm formation. Here, this study investigated the novel therapeutic effect of AHL lactonases (Est816) on peri-implantitis *in vitro* and *in vivo*.

Methods: The properties of Est816 on suppressing *P. gingivalis* biofilm formation was evaluated by scanning electron microscope (SEM) and Live/Dead staining. Exopolysaccharides (EPS) measurement and the real-time reverse transcription polymerase chain reaction (RT-qPCR) assay were used respectively to verify the effects of Est816 on virulence expression. Biocompatibility of periodontal ligament stem cells (PDLSCs) in presence of Est816 on titanium substrates was determined by CCK-8 assay. Enzyme-linked immunosorbent assay (ELISA) and RT-qPCR were applied to investigated the effects of Est816 on PDLSCs inflammation responses to *P. gingivalis*. The effects of Est816 on peri-implantitis were evaluated by micron-scale computed tomography (micro-CT), the hematoxylin and eosin (H&E) and tolonium chloride staining in beagle dogs.

Results: Est816 exhibited prominent anti-biofilm effects against *P. gingivalis* and reduced EPS production and virulence factor expression. CCK-8 assay demonstrated that Est816 had high biocompatibility. Secretion of IL-1β, IL-6 and TNF-α of *P. gingivalis*-stimulated PDLSCs was significantly inhibited by Est816. Notably, Est816 effectively inhibited alveolar bone absorption and inflammatory response of peri-implantitis. Meanwhile, Est816 effectively enhanced osteocyte adhesion to the implant surface and reduced inflammatory responses in adjacent soft tissue.

Conclusions: *N*-acyl homoserine lactonase Est816 significantly inhibited *P. gingivalis* biofilm formation, suggesting Est816 as a novel adjunct treatment for peri-implantitis.

S1-207

Diagnostic Test Accuracy for Caries Around Direct Restorations: A Systematic Review and Meta-analysis

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Objectives: To evaluate the accuracy of clinically available diagnostic methods for dental caries around direct restorations.

Methods: A systematic search of literature was performed on electronic databases (Pubmed, Web of Science, Scopus, Medline, Embase, Cochrane Library) without language restrictions to include studies published before 20 July 2023. Risk of Bias was evaluated under QUADAS-2 guidelines. The pooled sensitivity, specificity, and overall accuracy parameters were assessed with R 4.3.1 language and environment for statistical processing.

Results: 45 studies including 4 *in vivo* and 41 *in vitro* studies were included from 2177 screened studies for meta-analysis. 4005 teeth with direct restorations were assessed. Diagnostic methods adopted in included studies were visual examination (V; n=15), tactile examination (T; n=3), intra-oral radiography (IR; n=30), cone-beam computed tomography (CBCT; n=8), quantitative light-induced fluorescence (QLF; n=5), laser fluorescence (LF; n=11), and digital imaging fibre-optic transillumination (DIFOTI, n=1). The respective pooled sensitivity and specificity were 0.60 (95% Confidence Interval (CI) 0.48-0.72) and 0.66 (95% CI 0.54-0.76) for V; 0.31 (0.25-0.39) and 0.95 (0.78-0.99) for T; 0.65 (0.60-0.70) and 0.82 (0.76-0.86) for IR; 0.79 (0.62-0.90) and 0.91 (0.71-0.98) for CBCT; 0.57 (0.45-0.69) and 0.58 (0.50-0.65) for QLF; 0.58 (0.46-0.69) and 0.84 (0.79-0.88) for LF; 0.63 and 0.95 for DIFOTI.

Conclusions: V, T, IR, CBCT, QLF, LF, DIFOTI were employed for the diagnosis of caries around direct restorations. Within the limitations of this study, none of the diagnostic methods demonstrated satisfactory accuracy. The results of T, IR, CBCT, LF showed large variation among studies and should be interpreted with caution.

S1-208

Using Technology to Detect and Manage Gum Inflammation among Older Adults in a Community Setting

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Objectives: Periodontal disease is a prevalent human disease that significantly impacts oral and general health, well-being, and quality of life, particularly among older adults. Limited access to dental care exacerbates the problem. This study aims to evaluate the accuracy and patient satisfaction of an artificial intelligence (AI)-powered, smartphone-based photographic mHealth system for detecting and managing gum inflammation among older adults in a community setting.

Methods: Participants were recruited through a community dental outreach program. Intraoral photographs were taken using a smartphone by an assistant, and a dentist assessed and labelled gingival health as healthy, questionable, or diseased. The AI system analysed the photographs, and its accuracy in diagnosing gum inflammation was measured by comparing its diagnosis with the dentist's labels. The AI-analyzed photographs assisted in delivering oral hygiene instructions to participants, and their acceptance and perception were assessed through two 4-scale questions.

Results: Forty-four older adults were recruited. The AI system diagnosed 20,146 healthy sites and 1,043,943 diseased sites, achieving 96% sensitivity and 82% specificity. All participants rated the AI-assisted oral hygiene instructions as "very useful" or "useful" and rated the whole process as "very satisfactory" or "satisfactory."

Conclusions: Using an AI-powered mHealth system on smartphones is an accurate and well-accepted approach to identifying and managing gum inflammation among older adults in a community setting. It has the potential to bridge the gap in access to dental care.

Periodontal Condition and Liver Serum Marker Levels Among Japanese Population Older Adults

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Objectives: Previous studies indicated a relationship between periodontal and liver conditions. However, limited information explained periodontal conditions and liver serum markers, particularly in a very aging population. Furthermore, periodontal inflamed surface area (PISA), a more potent method, was infrequently used to define the periodontal condition in those studies. Therefore, the current study aims to assess the periodontal condition according to PISA and liver inflammatory serum levels in healthy Japanese older adults.

Methods: This cross-sectional study is part of a cohort survey in Niigata City, Japan. We collected information on demographic, personal habits, and dental history using questionnaires. Liver inflammatory serums (ALT, AST, ALP, and GGT) were collected through blood tests. Periodontal condition was examined using PISA, then participants were grouped based on PISA quartiles. A Chi-square and Kruskal Wallis test was used to do a comparison between groups. Furthermore, we used Spearman's correlation analysis to investigate the relationship between periodontal conditions and liver serum levels.

Results: A total of 273 older adults, 141 males and 130 females, aged 77 years old have consented to participate in this study. There was a significant difference in exercise habit ($p=0.002$), number of teeth ($p=0.007$), ALT ($p=0.023$), and AST levels ($p=0.020$) between PISA groups comparison. Further, we found a correlation between PISA and liver serum markers (Spearman's correlation coefficient, r=0.149; $p=0.013$ for ALT and r=0.136; $p=0.024$ for AST).

Conclusions: Our findings showed that older people with greater number of periodontal inflammation exercised less frequently and were found to have lower ALT and AST values.

Associations Between Masticatory Ability, Oral Health Habits, and Physical Function: A Cohort Study

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Objectives: This study aimed to examine relationships between masticatory ability, oral health habits, and physical function over a one-year period among community-dwelling older adults.

Methods: In this prospective study, we collected data from questionnaires and clinical oral examinations of 146 participants aged 65-84 in Japan between 2018 and 2019. The primary outcome was a change in physical function, measured by subjective evaluation scores over one year. Participants with impaired physical function at baseline were excluded. Masticatory ability was assessed using subjective and objective measures of bite strength and chewing ability. Oral health habits were evaluated based on four self-reported items: chewing habits, brushing frequency, use of interdental cleaning appliances, and dental checkups. Logistic regression was conducted to determine relationships between these variables and the decline in physical function.

Results: The median age of the participants was 73 years, with 53% being male. The median number of teeth was 26. During the one-year follow-up period, the incidence rate of physical function deterioration was 21%. After adjusting for age, sex, BMI, medical history, and using the denture, self-reported biting difficulty and poor chewing habits were found to predict a decline in physical function (odds ratio [OR]: 6.0, 95% confidence interval [CI]: 1.4-25.1 and OR = 6.5, 95%CI = 2.4-17.2).

Conclusions: Our findings suggest that subjective masticatory ability and poor oral health habits are associated with the deterioration of physical function in community-dwelling older adults.

S1-301

Oral Function Status and Associated Factors in Japanese Older Adults Receiving Regular Dental Care

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Objectives: This study aimed to assess the oral function of older adults receiving regular outpatient dental care and determine possible factors related to it.

Methods: This cross-sectional study evaluated older adults, grouped according to age, who regularly attend the preventive dental clinic of a university hospital. We identified systemic comorbidities, social withdrawal, and oral health-related quality of life subjectively using questionnaires and measured seven oral functions (oral hygiene, xerostomia, occlusal support, oral motor function, tongue pressure, masticatory performance, and dysphagia) objectively. We used chi-square tests and binary logistic regression for statistical analysis.

Results: In this study, we recruited 127 participants (mean age: 75.9 ± 6.0 years; 40 males and 87 females). The prevalence of oral hypofunction is 48.3% among pre-old (65-74-year-olds) and 71.0% among the old (75-90-year-olds). We found that older adults who are living alone, taking long-term medications, and suffering from multiple metabolic syndrome conditions have reduced oral function. Furthermore, binary logistic regression analysis revealed that older adults with diminished oral function showed a higher risk of metabolic syndrome conditions (OR 4.6, 95% CI 1.3-16.6), long-term medication use (OR 3.9, 95% CI 1.1-13.5), and social withdrawal (OR 3.4, 95% CI 1.1-10.8).

Conclusions: Reduced oral function in older adults increases the risk of metabolic syndrome conditions, long-term medication use, and social withdrawal. This suggests that maintaining oral function in older adults might be advantageous for a healthier social lifestyle and better quality of life.

S1-302

Oral Health Attitudes and Behavior between Pre-clinical and Clinical Dentistry Students

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Objectives: To compare the oral health attitudes and behaviors of the preclinical and clinical dentistry students.

Methods: A cross-sectional research design using convenience sampling was used. The Hiroshima University - Dental Behavior Inventory (HU-DBI) questionnaire, which consists of 20 items in a dichotomous format, was administered to pre-clinical and clinical dentistry students in 2023. One point was given in favor of good oral health attitudes and behavior. Higher scores signify better oral health attitudes and behavior. The difference in the scores was analyzed using the Mann-Whitney U test. All tests had a significance value set to 0.05.

Results: A total of 119 preclinical and 106 clinical students completed the questionnaire. The overall mean scores of answers favoring good oral attitudes and behavior were slightly higher in preclinical (M=7.17, SD=1.37) than clinical students (M=7.15, SD=1.24). Mann-Whitney U test showed no significant difference (z=-0.412, p=0.681).

Conclusions: Based on the results of HU-DBI questionnaire, the oral health attitudes and behaviors of the preclinical and clinical dentistry students were similar. According to the World Health Organization in 2020, the Philippines faces a significant burden of oral diseases such as untreated dental caries, severe periodontal disease, and edentulism. Oral health care providers play a role in promoting positive oral health attitudes and behaviors in the community by acquiring necessary skills and knowledge for practicing oral health promotion. Dentistry students, as future oral health care providers, can promote positive attitudes and behaviors through training and experience that can equip them to contribute to improving oral health in the community.

S1-303

Development and Initial Validation of the Health Belief Model Scale for Early Childhood Caries

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Objectives: This study aimed to develop a Health Belief Model (HBM) scale to measure the health beliefs in preventive behaviors for early childhood caries (ECC). The scale targets parents with young children in Hong Kong.

Methods: The item pool was set up by adapting other HBM scales to measure the parents' health beliefs towards their children's ECC. After the face and content validation, a scale of 30 items under six HBM domains was designed. The questionnaire was distributed to the parents who participated in the study. The collected data were randomly divided into two equal halves. Explorative factor analysis (EFA) to identify the latent constructs underlying the measured variables and confirmative factor analysis (CFA) to crosscheck the constructs gained from EFA were conducted using each half of the data. The reliability of the final model was checked.

Results: A total of 628 completed questionnaires were obtained. The result of EFA shows that six factors explained 53.7% of variances. Twenty-seven items were loaded on the proposed domains; three items were not, with factor loadings ranging from 0.44 to 0.89. No cross-loading was found on all the items. The 30 items were submitted into CFA, and a total of 21 items under six domains remained in the final model (CMIN/df=1.78, GFI=0.92, CFI=0.96, RSMEA=0.05). The Cronbach's alpha value of the final model was 0.78.

Conclusions: This developed HBM scale shows acceptable reliability and validity, which can be used to measure the parents' health beliefs towards their children's ECC.

S1-304

Oral Hygiene Intervention Using Picture Cards to Strengthen Executive Function of People with Intellectual Disabilities

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Objectives: The aim of this study was to evaluate the effectiveness of toothbrushing instructions using picture cards and dental hygienist support as executive function aids for people with intellectual disabilities (ID) at commuting welfare facilities (CWFs).

Methods: In this single group study, a dental hygienist provided individualized support for 13 people with ID at 2 CWFs. To compare plaque removal outcomes, their oral hygiene status was evaluated after brushing teeth at a total of 6 time points during the pre-intervention and post-intervention periods, using the oral hygiene index's Debris scores (DS). The amount of toothbrushing support (ATBS) was measured at 6 time points during the intervention period, using a 7-point Likert scale ranging from "toothbrushing without aid" to "refuse". All evaluations were performed by a dental hygienist. During the intervention period, 20 picture cards of brushing sites (partially modified) from the Tokyo Metropolitan Oral Health Center for Persons with Disabilities were used. The data were analyzed by repeated measure ANOVA and Wilcoxon signed-rank test.

Results: DS was significantly lower one week after the end of the intervention than during the pre-intervention period ($p<0.05$) and then returned to values similar to those before the intervention. ATBS was significantly lower at the final point than at the initial point of the intervention ($p<0.05$).

Conclusions: This study shows that the presentation of toothbrushing sites by using picture cards and toothbrushing instructions/support provided by a dental hygienist as executive function aids reduced the amount of toothbrushing support and improved oral hygiene status.

S1-305

Caries Patterns in 21st-century Preschool Children—A Systematic Review and Meta-analysis

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Objectives: This systematic review aims to describe the current primary tooth caries patterns among preschool children and compare the differences in the prevalence among different tooth types.

Methods: A systemic search and screening from six electronic databases was conducted by four independent reviewers. Only studies that investigated the caries pattern among preschool children and commenced later than the year 2000 were included. Data on the prevalence of caries at tooth- and surface-specific site levels were extracted. Meta-analyses and comparisons were carried out with the software Stata using the random-effect model.

Results: A total of 2642 records were screened, and 43 observational studies were included. The occlusal surface of mandibular primary molars was identified to be the most caries predilection site (19.0%-22.2%). The distal surfaces of the mandibular first molars (15.3%, 95% CI: 11.3, 19.3) and the mesial surface of the maxillary central incisors were also found susceptible to dental caries (14.8%, 95% CI: 8.5, 21.1) but caries hardly affected the lingual surface of lower anterior teeth (0.2%-0.3%). At the tooth level, caries pattern on the left and right sides was rather symmetrical. The overall caries prevalence in preschool children was significantly higher in the upper dental arch than in the lower dental arch (OR 1.464, 95% CI: 1.370, 1.565).

Conclusions: The caries distribution showed a distinctive symmetrical pattern in the contralateral side with a significantly higher prevalence on the occlusal and approximal surface of mandibular molars and the mesial surface of the maxillary central incisor.

S1-306

Oral Health Status and Oral Health-related Behaviours of Hong Kong Students with Visual Impairment

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Objectives: Limited information is available on the oral health status of children with disability. The study aimed to investigate the oral health conditions and perceived barriers to dental care services of visually impaired students in Hong Kong.

Methods: All students from Ebenezer School and Home for the Visually Impaired were invited. Written parental consent was obtained. Information on sociodemographic background, oral health-related behaviours and barriers to dental care was collected through the online parent-reported questionnaire. Dental caries and oral hygiene were assessed using Decayed Missing and Filled Teeth (DMFT) and Visible Plaque Index (VPI), respectively. Chi-square test and Mann Whitney U test/ Kruskal Wallis H test were used to analyse the association between caries experience and oral hygiene status, respectively, with their sociodemographic factors and oral health behaviours.

Results: A total of 73 participants were recruited and 57.5% were male. Their mean (SD) age was 12.9 (4.7) years. Their mean DMFT score (SD) was 1.0 (1.8) and 43.8% had caries experience. The mean VPI (SD) was 0.76 (0.30). Their caries experience was significantly associated with the snacking habit (p=0.013), while oral hygiene status was associated with gender (p=0.048). Almost half of the parents (43.8%) reported obstacles when seeking dental care, and uncooperative behaviour of the child is the most commonly reported barrier (62.5%), followed by cost (46.9%) and difficulty to find a dentist (46.9%).

Conclusions: Dental caries is prevalent among school students with visual impairment. Their oral hygiene status is unsatisfactory. The uncooperative behaviour of the children is the most commonly reported barrier to seeking dental care.

S1-307

Antibiotic Periodontal Treatment Effects on Mild Cognitive Impairment-Blood-based Biomarkers in Type 2 Diabetic Patients

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Objectives: To investigate the effect of antibiotic periodontal treatment on Mild Cognitive Impairment (MCI) risk in type 2 diabetes patients (DM).

Methods: The 24-week study included twenty-seven patients with type 2 DM and periodontitis who received periodontal treatment every two weeks for weeks 2 to 6 of the study. Only the intervention group received antibiotic periodontal treatment (Periofol 2%). Periodontal Inflamed Surface Area (PISA) score was used to measure periodontal inflammation. Periodontal examination and 10ml of blood sampling for evaluation were performed at baseline, week 12th, and week 24th in both groups. The risk of MCI was assessed through Amyloid-β sequester proteins (Apolipoprotein A1 (ApoA1), Complement 3 (C3), and Transthyretin (TTR)) from the blood samples using MCI PLUS Screening Test (MCBI Co, Ltd., Japan). The outcome of this study is the changes in periodontal status, inflammation parameters, and MCI risk. The within-group comparison was analyzed using Wilcoxon Signed Rank test, while the between-group comparison was analyzed using Mann-Whitney U-test.

Results: A significant improvement in the PISA ($p<0.01$; $p<0.00$) and Periodontal Pocket Depth score ($p<0.01$; $p<0.00$) were shown in both intervention and control groups in the 24th-week examination. The IL-6 ($p<0.01$) and C3 ($p<0.05$) significantly decreased in the intervention group, while the TTR level was significantly increased ($p<0.00$) in the control group. Regardless of the inverse change, the Mann-Whitney U-test showed significant differences between intervention and control groups in ApoA1 ($p<0.025$).

Conclusions: Although periodontal status was improved in both groups, the ApoA1 and C3 in the intervention group showed inverse changes.

S1-308

Autogenous Raw Tooth Particles Versus Xenograft For Alveolar Ridge Preservation: A Prospective Controlled Clinical Trial

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Objectives: The use of extracted teeth to process a bone grafting material has been recently introduced. However, the common method poses significant time and cost to obtain this type of graft. The aim of this study was to evaluate the clinical performance of autogenous Raw Tooth Particles (RTP), a grafting material made from a ground tooth using basic equipment, for alveolar ridge preservation, to limit bone loss following tooth extraction.

Methods: RTP graft was made from extracted teeth after removing the soft tissue, decay/restoration, and pulp. The intact tooth structure was cut into pieces and ground with a hand bone mill. Sixteen patients, with 16 extraction sites, were divided equally between the study and the control group (Bio-Oss®xenograft). Radiographic measurements (in millimetres) were taken at the baseline and at the 4-month follow-up period.

Results: Alveolar ridge width loss was 1.07±0.65 and 0.70±0.24 for the test and the control group, respectively. Regarding the height, the study group showed a buccal and lingual loss of 0.73±0.57 and 0.91±0.91, respectively, while this was 0.54±0.35 and 0.72±0.32 for the Bio-Oss® group. There was no statistically significant difference between the groups.

Conclusions: No core biopsies were taken from the grafted sites to evaluate the efficacy of this material in promoting bone regeneration, which should be done in future studies. Within the limitations of this study, it is concluded that the RTP graft seems to be an effective material for bone augmentation, which offers an alternative graft for the clinician when available.

S1-309

Erosive Tooth Wear of Non-institutionalised Older Adults in Hong Kong: A Cross-sectional Study

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Objectives: The study aimed to examine erosive tooth wear (ETW) and its associations with dental conditions and oral hygiene habits among non-institutionalised older adults in Hong Kong.

Methods: This cross-sectional study recruited dentate adults aged 60 or above from nine elderly daycare centres in the five main districts of Hong Kong. The study consists of a questionnaire survey and a clinical examination. A researcher used a questionnaire to collected the participants' demographic information, oral hygiene habits such as toothbrushing habits and dental visit behaviour. A calibrated examiner performed an oral examination in the daycare elderly centre to assess the ETW using modified basic erosive wear (mBEWE) criteria. Oral hygiene was recorded using visible plaque index. Prosthetic and oral mucosal status were recorded using the World Health Organization criteria. Logistic regression was used to examine the correlation between ETW and the dental conditions and oral hygiene habits.

Results: This study recruited 433 dentate adults and 333 adults were female (77%). Their age ranged from 60 to 99 and their mean age was 74 (SD = 7). They all had ETW (mBEWE > 0). Over half of them (57%) had mBEWE score of 3, indicating severe ETW. Analysis showed increasing age (OR = 1.030, p = 0.029) and older adults with untreated dental caries had higher odds (OR = 1.822, p = 0.002) of presenting severe ETW. No other associations were found between the ETW and the factors studied.

Conclusions: Hong Kong non-institutionalised older adults aged 60 or above had ETW and more than half of them had severe ETW. Increasing age and having untreated dental caries were associated with severe ETW.

S1-310

Comparison of Lesions Colour Changes in Different Application Time With 38% Silver Diamine Fluoride

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Objectives: To investigate the colour changes of early childhood caries lesions after 38% silver diammine fluoride (SDF) solution therapy with increasing treatment application time.

Methods: The design was a stratified-randomised, double-blind, active-controlled, parallel-group clinical trial with nine treatment arms. The trial recruited 495 3- to 5-year-old kindergarten children with caries, who received 38% SDF to treat each carious lesion surface. The children were stratified by caries status, randomised by blocks, and allocated to nine groups of SDF application times: 3, 5, 10, 15, 30, 45, 60, 120, and 180 s. Colour of the caries lesion was assessed with reference to PANTONE colour plates and classified into one of the followings: yellow (7401U); light brown (1245U); dark brown (4635U); and black (Black U) at the tooth-surface level at 6 months post-initial treatment.

Results: A total of 495 children with 2,358 decayed tooth surfaces received SDF application at baseline, and 477 (96.4%) children with 2,268 surfaces (96.1%) were evaluated at the 6-mo examination. The colour of SDF on the carious lesions becomes darker and darker with increasing 38% SDF application time. The caries arrest rates have correlation with colour changes (p<0.001). Dark and dark brown carious lesions had higher chance of becoming arrested after treated with 38% SDF (p<0.001).

Conclusions: Longer SDF application time was more effective with in arresting active caries in primary teeth and aggravated pigmentation on the carious lesions. The darker the carious lesion have higher chance to be arrested after applied 38% SDF.

S1-401

Plasma Cell Mucotitis: A Rare Disease Entity with Unique Clinical and Histopathological Features

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Objectives: The objective of this case report is to highlight a unique case of plasmacytoid periodontitis in a young woman and emphasize the importance of early diagnosis and prompt treatment.

Methods: A 32-year-old woman with gingival hyperplasia and cheilitis was clinically examined, revealing deep periodontal pockets, severe gingival inflammation, and bone loss. Histopathological and radiographic examinations were conducted to confirm the diagnosis of plasmacytoid periodontitis.

Results: The patient was treated with a combination of non-surgical periodontal therapy, systemic antibiotics, and oral hygiene instructions. After two months of treatment, significant improvements in clinical parameters were observed.

Conclusions: This case report contributes to the existing literature on plasmacytoid periodontitis and underscores the need for a multidisciplinary approach involving periodontists, histopathologists, and microbiologists. The key takeaway is that plasmacytoid periodontitis should be considered in the differential diagnosis of severe periodontitis, and a biopsy should be performed for confirmation. Early diagnosis and timely intervention are crucial for effective management of this rare form of periodontal disease.

S1-402

Patient Reported Outcomes of Fixed Four- or Six-implant Supported Prosthesis: 1-7 years Follow-up

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Objectives: To explore patients' satisfaction and oral health-related quality of life (OHRQ0L) in edentulous patients treated by all-on-4 or all-on-6 implant-supported fixed prostheses rehabilitation with 1-7 years follow-up.

Methods: Patient-reported outcome measures (PROMs) regarding aesthetics, phonetics, chewing comfort, stability, cleanability, and overall satisfaction were examined at 57.65 ± 10.43 months after immediate prostheses restoration in a cross-sectional survey. OHRQ0L and psychological impact were evaluated using the Oral Health Impact Profile (OHIP). Comparison of treatment duration, complications, patient satisfaction, and quality of life between all-on-4 and all-on-6 groups were analyzed using Chi-square test and Mann-Whitney U test. Potential influence of patient-related factors (treatment time, age, follow-up time, mechanical complications, implant number) on PROMs were analyzed via Nonparametric test.

Results: Both of all-on-4 arall-on-6 implant-supported prostheses showed no significant difference in high scores of total satisfactions, total value of OHIP-14, aesthetics, chewing comfort, cleanability, and stability ($P>0.05$). However, allon-4 group had a significantly lower phonetic satisfaction score than all-on-6 group (9.56 ± 1.12 vs 9.94 ± 0.35, $P<0.05$), as well as those significant differences were observed in psychological discomfort and social disability, though all-on-4 group performed better in handicap ($P<0.05$).

Conclusions: Overall, both all-on-4 and all-on-6 fixed implant-supported restorations resulted in high levels of patient satisfaction 1-7 years after immediate prostheses placement. Specifically, all- on-6 implant strategy provides better satisfaction in phonetic, psychological and social aspects.

Caries Prevention Using Silver Diamine Fluoride: A 12-Month Clinical Trial

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Objectives: This clinical trial aimed to compare the caries-preventive effect of the annual application of 38% silver diamine fluoride solution (SDF) with 5% sodium fluoride varnish (FV) to the anterior primary teeth of children. The hypothesis was that SDF was superior to FV at 1 year. The secondary objectives were to determine the child's cooperation and the parent's satisfaction and assess adverse effects.

Methods: We recruited 688 3- to 4-year-old children and randomly allocated them to receive SDF or FV (positive control) on their 6 upper anterior teeth. Tooth-surface status was recorded using the index of the decayed, missing, and filled surface. A trained observer rated the child's cooperation as "totally cooperative" or "not totally cooperative." We used a questionnaire to determine the parent's satisfaction as "satisfied," "neutral," or "dissatisfied." Adverse effects (yes/no) were evaluated 1 day and about 1 year after treatment.

Results: Of the children, 434 (SDF, n = 209; FV, n = 225) completed the trial. The mean new decayed tooth surfaces developed for SDF and FV groups were 0.4 ± 1.5 and 0.4 ± 1.3, respectively ($p =0.65$). Child's cooperation for SDF and FV therapy was 71% (244/344) and 70% (241/344), respectively ($p=0.89$). Parent's satisfaction for SDF and FV therapy was 71% (148/209) and 69% (155/225), respectively ($p=0.29$). Adverse effects were found neither at 1 day nor at about 1 year after treatment for either treatment arm.

Conclusions: SDF is not superior to FV for caries prevention in primary upper anterior teeth at 1-year follow-up. Child's cooperation and parent's satisfaction were similarly high with SDF and FV therapy at 1-year follow-up. Neither short-term nor long-term adverse effects were observed.

Effect of Silver Diamine Fluoride upon the Microbial Community of Carious Lesions: A Scoping Review

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Objectives: To explore the effects of silver diamine fluoride (SDF) on the microbial community of carious lesions.

Methods: A systematic search of English-language publications was performed in PubMed, EMBASE, Scopus, and Web of Science. Gray literature was searched in ClinicalTrials.gov and Google Scholar. Original studies evaluating the effect of SDF treatment on the microbial community of human carious lesions were included.

Results: This study included seven publications reporting the effects of SDF on microbial community of dental plaque or carious dentin, including the microbial biodiversity, relative abundance of microbial taxa, and predicted functional pathways of the microbial community. The studies on microbial community of dental plaque reported that SDF did not have a significant effect on both the within-community species diversity (alpha-diversity) and inter-community microbial compositional dissimilarity (beta-diversity) of the plaque microbial communities. However, SDF changed the relative abundance of 29 bacterial species of plaque community, inhibited carbohydrate transportation and interfered with the metabolic functions of the plaque microbial community. A study on the microbial community in dentin carious lesions reported that SDF affected its beta-diversity and changed the relative abundance of 14 bacterial species.

Conclusions: SDF showed no significant effects on the biodiversity of the plaque microbial community but changed the beta-diversity of the carious dentin microbial community. SDF could change the relative abundance of certain bacterial species in the dental plaque and the carious dentin. SDF could also affect the predicted functional pathways of the microbial community.

Methods to Minimize Staining Caused by Silver Compounds in Caries Treatment: A Systematic Review

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Objectives: The objective of this study is to review the means of decreasing tooth staining by silver compounds for caries control.

Methods: Two independent researchers searched the English literature published in three databases (PubMed, Scopus, and Web of Science). The keywords were (tooth decay OR dental caries) AND silver AND (staining OR discoloration). The researchers examined the titles and abstracts of publications reporting the use of silver compounds for caries control. They then retrieved and analyzed the full text of the identified publications for inclusion in this study.

Results: The initial search identified 1275 publications, of which 34 publications met the inclusion criteria. The methods used were categorized as follows, silver diammine fluoride (SDF) followed by potassium iodide, masking using composite/glass ionomer cement restoration, silver nanoparticles, SDF with capping agents, bleaching, and biomimetic peptides. Most publications (30/34, 88%) were *in vitro* studies and only four publications were clinical studies.

Conclusions: There are three main ways to reduce the staining of silver compounds: traditional silver compounds plus reducing agents, substitution of silver nanoparticles, and masking with composite resins. Consistent evaluation of color changes and more clinical evidence are required to enable more people benefit from the use of silver compounds to lower caries risk.

Efficacy of Resin-based and Glass-ionomer Sealants in Fissure Penetration and Retention

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Objectives: To evaluate the penetration ability and micro-retention of glass-ionomer with different viscosities and resin-based sealants, and to assess whether conditioner pretreatment improves the micro-retention of glass-ionomer sealants.

Methods: A total of 24 caries-free and intact human third molars were collected and randomly divided into 4 groups, which Ketac^{TM} Molar Easymix with Ketac^{TM} Conditioner pretreatment; Ketac^{TM} Molar Easymix with no pretreatment; GC Fuji VII with no pretreatment; and Helioseal ® (with etching gel (Scotchbond^{TM}) pretreatment were used to seal off the occlusal fissures respectively. Specimens underwent thermocycling of 10,000 cycles between 5 and 55 °C (10 seconds each). Each tooth was further sectioned at 2 sites in a buccolingual direction, yielding 3 sectioned surfaces per sample for analysis.of penetration depth under scanning electron microscopy (SEM) at 40x magnification.

Results: The mean penetration depth of Helioseal® was the deepest (95.47% ± 8.81%) among the 4 types of sealants, followed by GC Fuji VII (93.18% ± 9.65%), Ketac^{TM} Molar Easymix with Ketac^{TM} Conditioner pretreatment (90.93% ± 10.57%), while Ketac^{TM} Molar Easymix with no pretreatment showed the lowest penetration depth (88.69% ± 11.33%). However, no statistically significant difference with respect to the penetration depths was found between the 4 groups ($p>0.05$).

Conclusions: The penetration ability and micro-retention of glass-ionomer sealants with different viscosities were similar to resin-based sealants. The conditioning protocol however did not lead to statistically significant difference in the micro-retention of glass-ionomer sealants.

Session 2

S2-101

A Case-control Study on Correlated Factors with Oral Mucosal Diseases in Adults

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Objectives: To investigate the correlated factors of adults with common oral mucosal diseases in a case-control study.

Methods: From November 2019 to January 2020, 100 cases of patients (aged 18–64) with common oral mucosal diseases in the Department of Oral Mucosal Disease, Peking University School and Hospital of Stomatology were randomly recruited, and were selected as the case group. A total of 100 cases without oral mucosal diseases, who visited the other departments in the same hospital at the same period of time, were recruited as the subjects in the control group. A structured questionnaire survey was conducted by two trained investigators in face-to-face interviews.

Results: In the case group, the most common oral mucosal diseases were oral lichen planus (OLP, 26%) and recurrent aphthous ulcer (RAU, 19%). The total number of patients with these two diseases accounted for 45%. From the results of multivariate logistic regression analysis, it was found that those who had poor psychological status (OR=24.19 ,95%CI: 6.27-93.36) were prone to oral lichen planus. Besides, those who occasionally eat spicy food（OR=13.730 ,95%CI: 1.68-111.98）, hard food (OR=28.439, 95%CI: 1.88-431.31) and poor psychological status (OR=14.335, 95%CI: 2.02-101.70) are prone to recurrent aphthous ulcer.

Conclusions: RAU and OLP were the most common oral mucosal diseases in adults. The risk factor of oral lichen planus is poor psychological status. Risk factors of recurrent aphthous ulcer include occasional consumption of spicy food, hard food and poor psychological status.

S2-102

Father's Attitude According to Mother's Perception to Improve Children's Oral Health in Denpasar-Bali

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Objectives: To determine the mother's perception of the father's attitude toward children's oral health.

Methods: An exploratory sequential mixed methods design was used in this study. In the qualitative study, interviews were conducted with 20 mothers of preschool children in Denpasar-Bali, then were analysed narratively. The quantitative study on 240 randomly selected samples, divided into 3 groups: conversation group, counselling, and control, followed for 2 months. Every participant got a module book. Questionnaires were used as research instruments. The results were analysed by Paired T-test and LSD Post Hoc test.

Results: The qualitative study found that fathers complained that children were fussy because they were not allowed to drink bottled milk while sleeping. Besides, fathers were angry when their children cried during toothbrushing by their mothers. The quantitative study showed that 92.5%, 93.8% and 100% of the father in the control, conversation group and counselling groups showed a positive attitude toward children's oral health care. There were significant differences in the father's attitude according to the mother's perception before and after treatment in all groups ($p<0.05$). There was a significant difference between the father's attitude among treatment and control groups and between the conversation and counselling groups ($p<0.05$).

Conclusions: According to mothers' perception, most fathers supported preschool children's oral health care, but they still found obstacles. Fathers showed increased support toward children's oral health in all groups after treatment. The biggest support is counselling, followed by a conversation group and then control.

S2-103

Relationship Between Expected Social Outcome with Oral Hygiene Behavior and Oral Health Knowledge in Adolescents

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Objectives: To evaluate the relationship between expected social outcomes (ESO) with oral hygiene behavior (OHB) and oral health knowledge (OHK) in adolescents, also knowing the purpose of brushing their teeth.

Methods: Correlative analytic research design. A total of 233 samples were randomly randomized according to the criteria, aged 12-14 years and as public junior high school students in Jatinangor. Informed consent from parents and assent from students were collected prior to the study. Each group of students in each class was given an explanation on how to fill out the questionnaire online. The questionnaire has been culturally adapted in Indonesian, the questionnaire: OHB Index (7 items), ESO (6 items). and OHK (16 items) and purpose of brushing teeth (1 item).

Results: Average score: ESO 33.26 (good category), OHB Index 9.03 (moderate category), OHK 12.26 (good category) and 170 (73%) students brush their teeth with the aim of preventing cavities. A Spearman test is used to determine the relationship between ESO with OHB and OHK. The results show that there is a significant relationship between ESO and OHB with a positive correlation value of 0.575 (moderate strength) and also provide significant results between ESO and OHK with a positive correlation value of 0.262 (weak strength).

Conclusions: There is a relationship between ESO and OHB, as well as a relationship between ESO and OHK in adolescents. The more ESO score increases, the higher or better the OHB and OHK scores will be.

S2-104

Factors Associated with Tooth Loss in Patients with 28 or More and Less Teeth

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Objectives: Early prevention of tooth loss is extremely important. The factors associated with tooth loss are diverse and may vary depending on the number of teeth present. We aimed to examine whether factors related to tooth loss over a 5-year period differ between adults with $\geq$ and < 28 teeth.

Methods: A total 292 participants (193 men and 99 women) underwent the same health check-up, including internal medicine and oral examinations. The mean age and number of teeth at baseline were 49.7 ± 10.1 and 27.9 ± 2.4, respectively. Binomial logistic regression analysis was conducted using the loss of one or more teeth as the objective variable and factors related to tooth loss as explanatory variables.

Results: The incidence of tooth loss was 22.1% and 34.5% in patients with $\geq$ and < 28 teeth, respectively. Presence of ≥ 28 teeth was significantly associated with drinking habits (odds ratio [OR], 2.81; 95% confidence interval [CI], 1.37–5.77), and dental caries (OR, 3.19; 95% CI, 1.39–7.37). In contrast, presence of < 28 teeth was associated with periodontal pocket depth ≥ 6 mm (OR, 20.38; 95% CI, 1.72–240.89).

Conclusions: The preventive methods to be focused on vary depending on the number of teeth present. For individuals with ≥ 28 teeth, caries prevention is important, whereas for those with < 28 teeth, prevention of periodontal disease becomes crucial.

S2-105
Teeth Lifespan Curve for Koreans: An Oral Health Monitoring and Assessment Tool

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Objectives: This study tried to visualize oral health status using the concept of the growth curve in children. The Teeth Lifespan Curve was created using the functional teeth-for-age percentiles in Korean adults for this goal.

Methods: We utilized consolidated data from the Korean National Health and Nutrition Survey spanning 2012 to 2019. This representative cross-sectional health survey included individuals aged 16 to 89. The Filled and Sound Teeth Index (FST) was used as a functional measure that weights filled and sound teeth equally. The empirical percentiles of FST based on sex and age were calculated, smoothed, and fitted to the Lamda-Mu-Sigma (LMS) model to derive the teeth lifespan curves.

Results: Sex-specific functional teeth lifespan curves were derived. The curves showed averages and individual oral health patterns could vary. The LMS model facilitates the calculation of an individual's percentile, which can provide a more meaningful interpretation of the individual's oral health status relative to others. The risk of tooth extraction for the median Korean population increases dramatically around 60 years of age. Those representing the 10th percentile, being above the top 10 out of 100 individuals, are projected to maintain more than 21 teeth until the age of 80, while those below the 90th percentile, corresponding to the bottom 10 out of 100 individuals, retain fewer than 21 teeth by age 50.

Conclusions: The Teeth Lifespan Curve provides the oral health profile of the Korean population and individual oral health information. The curve can be used for improving patient education and planning health services.

S2-106
The Correlation Between Patients' Subjective Health Perceptions and Objective Oral Conditions

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Objectives: Maintaining optimal oral health is vital for overall well-being and quality of life. This study aimed to explore the relationship between objective oral conditions and patients' subjective perceptions of their oral health among individuals visiting a dental clinic.

Methods: Oral conditions of dental clinic attendees were assessed to ascertain the presence of periodontal disease, tooth decay, and tooth wear or loss. Moreover, participants completed surveys to evaluate their subjective oral health perceptions, self-reported oral symptoms, brushing frequency, and use of supplementary oral hygiene products. Statistical analyses were conducted to investigate potential associations between objective oral conditions and subjective oral health perceptions.

Results: Notable associations were found between periodontal disease and subjective health perception, and between Periodontal disease and reported symptoms. No significant links were found between periodontal disease and brushing frequency or hygiene product use. Poor perceived oral health increased periodontal disease risk over 8 times. Gum bleeding perception correlated with an 80% higher likelihood of periodontal disease. Males had 1.4 times higher risk than females. Not using hygiene products raised risk 1.4 times, and age increased risk by 3% per year. Brushing frequency showed no significant correlation.

Conclusions: Aligning subjective and objective oral health underscores the need for patient education and adjunctive hygiene tools like flossers to reduce periodontal disease risk. Education should emphasize diverse hygiene devices alongside proper brushing, as brushing frequency alone doesn't gauge oral hygiene. Integrating clinical evaluation and subjective perception enhances oral health understanding, guiding patient-centered management strategies.

Effectiveness of School-based Oral Health Promotion Programs in the Bangkok School for the Blind

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Objectives: The study aimed to develop an oral health promotion program for visually impaired adolescents and evaluate the effect of the program on oral health literacy and oral behaviors.

Methods: A total of 27 visually impaired adolescents were examined for visible plaque and caries status. Baseline data were collected by an online questionnaire including demographic characteristics, oral health knowledge, word comprehension, and oral health behaviors. The oral health promotion program included developing oral health literacy and tooth brushing skill via workshops and audio media, creating a supportive environment in school, developing an oral health policy, and reorienting oral health service. Participants were evaluated immediately after the intervention and 6 months follow-up.

Results: Caries prevalence (dmft>0) was 76.5% and the mean (SD) DMFT was 2.41 (2.09) and mean (SD) OHI-S score was 1.74 (0.84) at baseline. Comparing the baseline and post-intervention immediately, there were significant improvements in the knowledge about tooth decay ($p=0.044$), oral health care ($p=0.022$) and cariogenic food ($p<0.001$). After 6 months, there were significant improvements in knowledge about tooth decay ($p=0.005$), gingivitis ($p=0.040$) and cariogenic foods ($p=0.001$) when compared with the baseline. There were significantly more adolescents who understood the dental keywords after 6 months in the words "periodontitis", "sealant", "dental pulp", "cervical tooth region" and "dental plaque". The significant improvement in behavior was only seen in the use of fluoride in toothpaste ($p=0.034$).

Conclusions: School-based oral health promotion program can improve oral health literacy and behaviors in using fluoride toothpaste among visually impaired adolescent students.

Validity and Reliability of the Scale for Oral Health Literacy Related to Dental Caries Prevention for the Early Primary School Student

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Objectives: To develop an oral health literacy scale which specific to dental caries prevention.

Methods: A set of 15 statements related to dental caries prevention was developed and tested its quality among Grade 1 to Grade 3 students of Prathomnonsri School and Piriya Nawin School. The instrument's content validity, construct validity, and reliability of the instruments were evaluated by Indexes of Item-objective Congruence (IOC), Exploratory Factor Analysis (EFA), and Cronbach's coefficient alpha. Item analysis consists of considering the correlation analysis between each statement (Inter-item correlation) and analyzing the correlation between each statement and the whole set of statement (Corrected item-total correlation) questions. At least half of the selected statements have an Inter-item correlation between 0.3-0.7 and a corrected item-total correlation of +0.3 or higher. Statements that cannot reach the criteria were dropped.

Results: A total of 238 students participated in this study. The IOCs were 0.67-1.0. The EFA indicated data is factorability. Kaiser-Meyer-Olkin Measure of Sampling Adequacy 0.595 with Bartlett's Test of Sphericity Approximate Chi-square 224.568, df 36 (p-value<0.001). Six statements were dropped during the principal component analysis with Varimax rotation due to the cross-loadings and low factor loadings (less than 0.35). The EFA indicated three constructs: Tooth brushing (4 statements), Dental caries process (3 statements), and Cause of dental caries (2 statements). The Cronbach's coefficient alphas were 0.45-0.54. Six statements were dropped due to cross-loadings and very low factor loadings.

Conclusions: This nine-statement oral health literacy scale indicates good validity and acceptability reliability for exploring oral health literacy in dental caries prevention among the young students.

Factors Associated with Dental Pain in Children Aged 3-12 Years in Samut Prakan

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Objectives: To assess inequalities in dental pain and associated factors among children aged 3 to 12 years in Phraek Sa Town Municipality, Samut Prakan, Thailand.

Methods: This cross-sectional study was conducted on 1,299 children aged 3 to 12 years, who were enrolled in public and private school in Phraek Sa Town Municipality. The data were collected using self-administered paper questionnaires by parents. Relative and Slope Index of Inequality (RII and SII) and logistic regression were used.

Results: Out of the 1299 students surveyed, 28.8% of them had experienced dental pain in the past 6 months. Regarding socioeconomic status (SES), the findings revealed that dental pain was more prevalent among students from low SES backgrounds (RII=0.57; SE=0.10), low parental educational level (RII=0.63; SE=0.10), and low-income family (RII=0.52; SE=0.08). The logistic regression analysis demonstrated that students from upper-middle/higher class and lower-middle class experienced dental pain 0.69 times (95%CI: 0.51-0.95) and 0.73 times (95%CI: 0.50-1.05) less, respectively, compared to students from the upper-lower class. Additionally, students attending public schools, primary schools, and those with poor oral health-related behaviors were more prone to dental pain.

Conclusions: The research highlights the association between the prevalence of dental pain in children aged 3 to 12 years in Samut Prakan and the socioeconomic status of their families. To address these inequalities, it is recommended that relevant institutions gather and analyze data on the factors contributing to dental pain in children, enabling the formulation of effective policies aimed at improving oral health and overall well-being among children.

Exploration and Reflection on a Free Medical Service Centered on Oral Health Education

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Objectives: To explore the impact of the free medical service centered on oral health education on the oral health of adolescents, and try to provide a new way and reference basis for formulating oral health policies in remote mountainous areas.

Methods: In a school in Garzê Tibetan Autonomous Prefecture, Sichuan Province, three functional areas were designed for a free medical service: oral examination area, oral treatment area, and oral health education area. A cross-sectional survey was conducted on the participants, coordinators, users, and beneficiaries of the free medical service. Using the methods of literature review, on-site observation, and face-to-face in-depth interviews, collect and analyze the situation of free clinics, personnel benefits, and suggestions.

Results: 16 volunteers (including 3 dentists, 10 oral medicine students, and 3 nurses) spent 3 days to complete oral survey, oral health education, caries filling and dental sealant. A total of 174 students participated in. The permanent tooth caries rate is 85.06% (148/174), with an average caries rate of 2.20 ± 2.20. 313 Dental sealant and 89 resin filling were completed. A total of 8 oral health classes were offered, for the 174 students. All students were treated with fluoride foam for caries prevention.

Conclusions: The free medical service centered on oral health education provides basic medical services and popular science knowledge promotion for remote mountainous areas. This model can be replicated and promoted. It is necessary to continuously invest resources to promote oral health in remote areas with the goal of healthy oral cavity.

S2-111

Porphyromonas gingivalis Promotes Ferroptosis of Microglia via the Impairment of Mitochondrial Metabolism in Alzheimer's Disease

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Objectives: *Porphyromonas gingivalis* (*P.g*), the keystone pathogen in chronic periodontitis, was identified in the brain of Alzheimer's disease (AD) patients. Impaired mitochondrial metabolism has been associated with mitochondrial dysfunction in brain damage of AD. While the role of NADPH oxidase 4 (NOX4) been identified in brain damage, the mechanism by which NOX4 regulates nervous system injury in AD remains unclear.

Methods: 6 weeks' C57BL/6J and NOX4^{-/-} mice were used to establish the AD model by oral *P.g* administration for seven weeks. Combing cognitive and memory behaviors, Western blot, immunofluorescence staining, electron microscopy, metabolomic sequencing and pharmacological approaches and hippocampal neuronal and non-neuronal functions were evaluated *in vitro*. Cultured microglia challenged with *P.g* supernatant and cultured neuron challenged with microglia medium to investigate the effects of *P.g* on microglial functions and neuron structure *in vivo*.

Results: Oral *P.g* infection in mice resulted in brain colonization and increased production of hippocampal Aβ_{1-42} and p-Tau level. NOX4^{-/-} mice by oral *P.g* administration alleviates cognitive and memory dysfunction and restores hippocampal synaptic function and neuronal activity *in vitro*. After NOX4 lentivirus transfection, the structure and function of microglial mitochondrial were saved, reduced neuroinflammation in vivo. These data suggest that NOX4^{-/-} could be valuable for treating *P.g* brain colonization and neurodegeneration in AD.

Conclusions: Our study uncovers *P.g* can generate AD by increasing microglial overactivation and shows that the dysfunction of the NOX4 signal in mitochondria from microglia, suggests that managing periodontitis may

S2-201

Helicobacter pylori: Analysis of Oral and Gactric Microbiome in Non-Disease, Gastritis, and Gastric Cancer

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Objectives: *Helicobacter pylori* (*H. pylori*) is associated with periodontitis, and the oral cavity has been considered as reservoir for *H. pylori* gastric infection. This study aimed to investigate the oral and gastric microbiome in non-disease, gastritis, and gastric cancer patients.

Methods: Samples (saliva, plaques, and gastric tissues) were collected from 15 non disease, 11 gastritis and 15 gastric cancer patients. Bacterial genomic DNA was extracted and examined by sequencing and amplification of the 16S rDNA V3-V4 hypervariable regions followed by bioinformatics analysis.

Results: Alpha diversity analysis based on the ACE, Chaol, Observaved OUT and Shannon indexes between oral samples and gastric tissues was significant different. The oral microbiome composition clearly differed from gastric microbiome. At phyla level, *Fusobacteriota* and *Actinobacteriota* were predominant in oral samples, while *Campilobacteriota* and *Proteobacteria* were found in gastric tissues. At genus level, *Fusobacterium* and *Porphyromonas* were detected in oral samples, while *Helicobacter* and *Pseudomonas* were found in gastric tissues. Alpha diversity analysis of microbiome of gastric cancer was significantly different from non-disease and gastritis patients. *Helicobacter* was significantly found more in gastritis and gastric cancer than in non-disease patients.

Conclusions: Results indicated that *H. pylori* was found specific to gastric tissues, however, it was also detachable in oral samples. It is endeavored to understand the relation of *H. pylori* in oral and gastric microbiome. The information may help to prevent the transmission of *H. pylori* from oral cavity to gastric infection.
be a promising therapeutic approach in managing AD patients.

S2-202

Interrelationship among the Four Clinical Parameters of the Gingival Biotype in the Esthetic Zone

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Objectives: To explore the interrelationship among the four clinical parameters of gingival biotype (GB) in the esthetic zone.

Methods: Twenty-five periodontally healthy volunteers were assessed for GB measurements on 296 maxillary and mandibular anterior teeth. The recorded parameters included gingival thickness (GT), keratinized gingival width (KGW), crown width (CW), crown length (CL), and papilla height (PH). The GT was measured at 2 mm apical from the gingival margin using 15-MHz B-mode ultrasound. A periodontal probe was used for the KGW measurement. A vernier caliper was used to measure the CW, CL, and PH on a plaster model. Subsequently, the CW/CL ratio was calculated. The interrelationship among the four parameters (GT, KGW, CW/CL, and PH) was assessed for each tooth type using Pearson's correlation coefficient.

Results: GT was positively correlated to KGW (r=0.13, $p<0.05$); however, GT showed no correlation with CW/CL and PH ($p>0.05$). KGW was significantly positively correlated to CW/CL (r=0.50, $p<0.01$) and significantly negatively correlated to PH (r=-0.28, $p<0.01$). CW/CL was significantly negatively correlated to PH (r=-0.18, $p<0.01$).

Conclusions: As evident from the findings, GT was related to KGW, but not CW/CL and PH. KGW exhibited a significant relationship with CW/CL and PH; on the other hand, CW/CL showed a significant relationship with PH. The findings presented in this study add to our understanding of GB.

S2-203

Antibody Levels against *Porphyromonas gingivalis* and Isolated Systolic Hypertension in Japanese Older Adults

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Objectives: To examine the association between plasma antibody levels against *Porphyromonas gingivalis* (*PG*) and isolated systolic hypertension (ISH) among community-dwelling older adults in Japan.

Methods: A cross-sectional study was conducted on 1,942 participants aged 60–79 years using the baseline data of the Uonuma cohort study. Data on systolic and diastolic blood pressure were collected through medical examinations and plasma immunoglobulin G anti-*PG* antibody levels were measured. The other data were collected through medical examinations or a self-administered questionnaire. ISH was defined as a systolic blood pressure of ≥140 mmHg with a diastolic counterpart of <90 mmHg. Participants were divided into quartiles according to their anti-*PG* antibody levels (quartile 1, lowest; quartile 4, highest). The Cochran−Armitage test was used to look for the trend toward a higher prevalence of ISH with higher anti-*PG* antibody levels. A multivariable logistic regression analysis was performed to assess their association.

Results: The prevalence of ISH was 24.0%, and it increased with higher anti-*PG* antibody levels (19.3%, 24.5%, 26.1%, and 26.0% for quartiles 1, 2, 3, and 4, respectively; p for trend = 0.013). After adjusting for previously reported ISH risk factors, participants with the highest quartile of anti-*PG* antibody levels were more likely to have ISH (adjusted odds ratio = 1.43; 95% confidence interval = 1.05–1.96) than those with the lowest quartile.

Conclusions: A positive association was found between plasma anti-*PG* antibody levels and ISH among community-dwelling older adults in Japan.

S2-204

Fabrication of Implant Overdenture by Computer-guided Surgery using Existing Denture in Elderly Patient

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Objectives: Well-adapted dentures play an essential and indispensable role for older adults/older people and can become objects of attachment. In this case, we aim to achieve excellent functional and aesthetic outcomes by creating new implant-supported dentures using existing denture components.

Methods: A surgical stent was fabricated by replicating the existing complete mandibular denture, and this was integrated with computed tomography (CT) data to plan the placement of two implants. This stent was then integrated with CT data to plan the placement of two implants. The computer-guided implant surgery was performed, resulting in the successful placement of the two implants. Utilizing the model obtained from the existing denture, an individual tray was fabricated, allowing for the acquisition of implant and denture impressions. These impressions were crucial in the fabrication of the final implant-supported dentures.

Results: Due to the adaptation of the patient's facial features, temporomandibular joint, and oral tissues to the existing complete mandibular denture, the adaptation period for the newly created implant-supported dentures was minimal. Not only was the required adaptation time short, but the patient's satisfaction was also remarkably high.

Conclusions: Utilizing the patient's existing denture for implant surgery and fabrication of implant-supported dentures yielded highly effective results in terms of functionality and aesthetics.

S2-205

Reduction of Extrinsic Tooth Stain by A Sonic Electric Toothbrush: An 8-week Randomized Clinical Trial

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Objectives: This study was aimed to evaluate the effects of a sonic electric toothbrush on removing extrinsic tooth stain in comparison with a manual toothbrush.

Methods: The study design used a single-blind, parallel-controlled clinical study method. A total of 86 adults who met with the inclusion and exclusion criteria were invited to participate in the study. They were randomized into two groups. Test group was Oclean Sonic Electric Toothbrush, and the control group was a manual toothbrush: Oral-B Classic 40 Soft Regular. Tooth stains were assessed using the Lobene Stain Index at baseline, 4 weeks and 8 weeks. Oral soft and hard tissues were also evaluated. Adverse events were monitored throughout the study.

Results: When the study was completed, comparisons between subjects in test group and the control group yielded statistically significant differences in Lobene stain mean area [0.74 ± 0.42 vs. 0.94 ± 0.45], intensity [0.71 ± 0.4 vs. 1.01 ± 0.52] and composite [1.27 ± 0.84 vs. 1.88 ± 1.21] scores ($P=0.023$, $P=0.003$ and $P=0.005$). Subjects in the test group exhibited reductions of 21.3%, 29.7% and 32.4%, respectively in Lobene stain area, intensity and composite scores, relative to subjects in the control group. Comparisons within groups showed that all three Lobene scores at 8 weeks in both groups were lower than those at baseline (All, $P<0.001$). No adverse events were observed in the subjects.

Conclusions: This study demonstrates that the sonic electric toothbrush can effectively reduce extrinsic tooth stains after 8 weeks of usage.

S2-206

Inhibitory Effects of Saliva on SARS-CoV-2 and Influenza Viral Infections by Improving Oral Hygiene

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Objectives: Although there are a few reports of clinical studies suggesting that toothpastes and mouthwashes inhibit SARS-CoV-2 and Influenza viral infections, it is not clear whether brushing with toothpaste contributes to the suppression of these viral infections. This study aimed to investigate the effects of improved oral hygiene through brushing with toothpaste on salivary inhibitory effects against SARS-CoV-2 and Influenza viral infections.

Methods: The participants, including 16 healthy individuals, refrained from oral care between 11:00 p.m. and 9:00 a.m. of the following day. Saliva and mouth-rinsed water (MW) were collected at 9:00 a.m. and then again after brushing their teeth with toothpaste for 5 min. Ammonia, which is an indicator of oral cleanliness, was measured with the Salivary Multi Test (LION Dental Products Co. Ltd.) using the MW. Furthermore, the inhibitory effects of saliva on cellular infection by influenza viruses were assessed using the $TCID_{50}$ method. Additionally, salivary inhibitory effects on SARS-CoV-2 infection were measured by ELISA, which evaluates the interaction between SARS-CoV-2 spike protein S1 subunit and ACE2 receptors.

Results: The amount of ammonia significantly decreased after tooth brushing. Additionally, the salivary inhibitory effects on influenza virus cell infection increased significantly, from 60.2% before tooth brushing to 90.4% after tooth brushing. Moreover, the salivary inhibitory effects of the interaction between the SARS-CoV-2 spike protein and ACE2 receptors increased from 62.2% before tooth brushing to 85.6% after tooth brushing.

Conclusions: These results suggest that improved oral hygiene through tooth brushing with   toothpaste enhances the salivary inhibitory effects against viral infections.

S2-207

Effect of Toothbrush Designed with 'Thin Head' and 'Super-tapered Bristles' on Plaque Removal and Gingivitis

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Objectives: To evaluate a toothbrush designed with a thin head and super-tapered bristles to target hard-to-reach areas in the oral cavity in terms of reducing dental plaque and gingivitis.

Methods: This cross-over study included 58 adults aged 20 and older. All participants were randomly assigned test and control toothbrushes (normal head and round filament) for two 4-week phases. Participants brushed their teeth twice daily in a habitual manner. At the start and end of each phase, we assessed the Silness-Löe Plaque Index (PI), Löe & Silness Gingival index (GI), and Bleeding on probing index (BOP) and performed plaque fluorescence tests using quantitative light-induced fluorescence.

Results: After using the test toothbrush, PI, GI, and BOP decreased by 25%, 30%, and 48%, respectively($p<0.05$). In the case of the rearmost molars, PI, GI, and BOP decreased by 18%, 26%, and 47%, respectively ($p<0.05$). In the case of implants, GI and BOP decreased by 31% and 57%, respectively ($p<0.05$). Furthermore, based on the plaque fluorescence tests, after using the test toothbrush, both the plaque area in the anterior teeth and the plaque score on the rear most molars decreased by 25% ($p<0.05$) and 14% ($p=0.527$), respectively.

Conclusions: The test toothbrush excelled at reducing plaque and gingivitis than the control toothbrush. In particular, the test toothbrush showed an excellent reduction in dental plaque and gingivitis in the rearmost molars and implants.

S2-208

MDSC-derived Extracellular Vesicles Decorated to Fibronectin-anchoring Platelets Promote Tissue Retention and Ameliorate Periodontitis Progression

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Objectives: Overactive immune activation accounts for the development and progression of immuo-inflammatory disorders, such as chronic periodontitis. Currently, anti-inflammatory and immunosuppressive drugs generally subject to rapid clearance from target sites, critically contribute to severe side effects. Therefore, we aimed to develop long-lived immunotherapeutics for the safe and efficacious resolution of inflammation.

Methods: A5/PLT-MDEV was prepared by decorating extracellular vesicles derived from MDSCs (MDEVs) to fibronectin-anchoring platelets with integrin α5 overexpression through matrix metalloproteinase (MMP)-cleavable peptide linkers. The tissue retention and anti-uptake activity of A5/PLT-MDEV were examined. The immunosuppressive function of A5/PLT-MDEV was investigated *in vitro* and *in vivo*, followed by evaluation of therapeutic efficacy in a mouse model with periodontitis.

Results: A5/PLT-MDEV dually anchored to fibronectin and collagen in the inflamed periodontal tissue to markedly prolong the local retention of MDEVs to at least 10 days while assisting to reduce the unintended uptake of MDEVs by macrophages. A5/PLT-MDEV conferred on-demand release of MDEVs in response to MMPs to elicit multifaceted immunosuppressive effects. A5/PLT-MDEV extended the bioavailability of MDEVs to enable a single dosage to markedly reprogram the hyperactive periodontal immune responses, thus attenuating periodontal inflammation and rescuing alveolar bone resorption to ameliorate periodontitis progression.

Conclusions: A5/PLT-MDEV distinctly prolonged and localized the tissue retention of MDEVs via fibronectin anchoring mediated by engineered platelets, thus exerting multiple immunosuppressive impacts to treat periodontitis. A5/PLT-MDEV platform highlights a generalized strategy to develop drug delivery system to enhance tissue retention of therapeutics and provides new insights into the safe and effective immunotherapy of inflammatory disorders.

S2-209

The Relation of Learning Strategies and Student's Online Tutorial Performance

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Objectives: This study aimed to determine the relationship between learning strategies and student performance towards online learning implementation.

Methods: A cross-sectional design was used in this quantitative study. Respondents were students from Faculty of Medicine, Universitas Mulawarman, Indonesia. Data was collected using Motivated Strategy for Learning Questionnaire (MSLQ) instruments as a part of learning strategies and tutorial assessment sheet from the faculty. Fisher statistical test was used to analyze the relationship.

Results: We found that learning strategies applied by majority of students were in the moderate category (66%) with "good" tutorial performances (50.3%). Most students had moderate learning strategies and good tutorial performance (33.1%), with p- value of 0.959.

Conclusions: There was no significant relationship between learning strategies and student performance towards online learning implementation. Further research is needed to identify the determinants that influence student performance in learning.

S2-210

Perspectives of Caregivers on the Use of Online Platforms for the Elderly Oral Healthcare

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Objectives: This study aimed to collect the opinions of caregivers on the use of online platforms (e.g. mobile applications) for oral healthcare for the elderly in long-term care facilities, and seek the direction of the platform development.

Methods: Structured written interviews and online focus group interviews were conducted with 11 caregivers in long-term care facilities. The interview contents were explored thematically, and strengths, weaknesses, opportunities, and treats analysis on the platform utilization was performed.

Results: Participants had qualifications as care workers or social workers, their average work experience was 7.4 years. 1) Caregivers had little experience using online oral healthcare platforms when caring for elders but recognized the need for the platform. 2) As essential elements of the platform, they picked up functions such as assessment for oral health status/problem, education on oral hygiene care methods, and management, including planning and communication. They also valued convenience and interoperability with existing systems in terms of UX/UI. 3) As obstacles to using the platform, they were worried about low ICT acceptance and utilization skills, increased workload, and work environment, etc. 4) However, they expected systematic healthcare, and easy information access and record management through the platform. Also, they predicted the increase in work efficiency and time-saving, and improvement of individual job competency would act as rewards promoting platform utilization.

Conclusions: In order for caregivers to utilize the online oral healthcare platform for the elderly, it is necessary to develop the platform with a user/environment-friendly operating system and comprehensive functionality, to promote work efficiency and competency.

S2-211

Efficacy of Orthodontic Treatment versus Adenotonsillectomy in Children with Obstructive Sleep Apnoea and Mandibular Retrognathia

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Objectives: Pediatric obstructive sleep apne (OSA) is a multifactorial syndrome caused by many risk factors. This study aimed to analyse the characteristics of the upper airway (UA) by computational fluid dynamics (CFD) and compare the efficacy of orthodontic treatment versus adenotonsillectomy (AT) in children with OSA accompanied by adenotonsillar hypertrophy and mandibular retrognathia.

Methods: 42 pediatric patients (average age 9.11 ± 1.30, 22 males, 20 females) who were diagnosed with OSA accompanied by adenotonsillar hypertrophy and mandibular retrognathia were enrolled in this retrospective study. The study design incorporated two cohorts: an orthodontic group consisting of subjects who experienced orthodontic treatment (Twin-block appliance combined with RME), and an AT group who underwent AT surgery. The data of overnight PSG before and after treatment were used to evaluate the efficacy. The 3D UA model from CBCT scanning was reconstructed and CFD simulation were completed sequentially by Mimics, Geomagic Wrap, Ansys Workbench and CFD-POST R1 softwares.

Results: The orthodontic group exhibited a more pronounced reduction in OAHI than AT group. Significant improvement was observed both in the volume and aerodynamic parameters (WSS, maximum velocity, airway resistance) of the UA in both groups. The orthodontic group primarily exhibited increased airway volumes in the palatopharynx and hypopharyn, while the AT group primarily in the glossopharynx region. The AT group exhibited a slighter reduction in WSSmax than orthodontic group. The maximum airflow velocity decreased more sharply in orthodontic group in glossopharynx, while no differences in other aerodynamic characteristics were detected between the two groups.

Conclusions: Objective effect of orthodontic treatment is superior to AT in children with OSA and mandibular retrognathia, which could be explained by anatomical and aerodynamic the improvement of the UA.

S2-301

A Community Service-based Preventive Dental Care for Preschool Children

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Objectives: Early childhood caries (ECC) remains children's most common chronic disease, and more than 90% of 5-year-old children in Indonesia suffer from dental caries. Therefore, this project set out to develop a preventive dental care strategy for preschool children in Pasar Rebo, East Jakarta.

Methods: The innovative programs included oral health and need assessment, determined community oral health diagnosis by modified caries risk assessment, developed dental preventive care programs based on evidence, and performed monitoring and evaluation. Based on the WHO oral health survey, clinical and subjective data were collected from 196 pairs of 3- to 5-year-old children and their parents.

Results: The prevalence of dental caries was 93.7%, with a mean dmft of 7.56. Almost all the respondents (93%) were included in a high risk of dental caries. Several strategies of preventive dental care were completed, such as giving an oral health report of the children to the parents, supervised toothbrushing at home and school, application of fluoride varnish, pit fissure sealant, digital oral health education to parents on the risk of dental caries through social media platform, and Training for Trainer (TOT) for teachers in delivering regular oral health education at kindergarten. Twelve community health workers were also trained as dental volunteers regarding the early detection of dental caries in the Primary Health Centre. An evaluation and follow-up program were undertaken to maintain sustainability.

Conclusions: This project provided substantial oral health care at extramural sites and gained additional experience caring for a diverse population of patients.

S2-302

Investigation on Caries Status and Influencing Factors in Adults in Fuqing City

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Objectives: To study the association between caries and hypertension, hyperglycemia and obesity in adult in Fuqing and to provide evidence for scientific prevention and control of caries.

Methods: Permanent residents living in Gaoshan Town, Fuqing City, Fujian Province were recruited from August 2020 to June 2021. The basic demographic characteristics, living habits, general health and caries incidence were collected. T-test, Chi-square test and multivariate regression statistics were used to analyze the data.

Results: A total of 5404 cases were investigated in this study, of which 5396 cases (99.9%) were included in the analysis of valid data, including 2227 cases (41.3%) of hypertension, 659 cases (12.2%) of hyperglycemia, and 629 cases (11.7%) of BMI≥28. The total caries prevalence was 92.7% and the average caries was 7.11 ± 5.46. The caries prevalence was 91.0% in males and 93.5% in females ($p<0.05$). The prevalence of caries in the hypertensive group (93.5%) was higher than that in normal group (92.1%) ($p<0.05$). Multivariate regression analysis showed that hypertension was significantly associated with caries prevalence (OR=1.394, 95%CI: 1.116-1.741). There was no significant difference in the caries prevalence between hyperglycemia group and normal group ($p=0.154$). There was no significant difference of caries prevalence between the BMI≥28 group and the BMI < 28 group ($p=0.816$).

Conclusions: The results of this study suggest that there is a significant association between hypertension and caries prevalence. Effective caries preventive measures should be taken for the people who suffering from hypertension.

S2-303

Evaluation of Anticaries Effect of Fluoride Toothpaste by ICDAS in Children with Different Cariostat Values

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Objectives: To evaluate the anticaries effect of fluoride toothpaste in children with different Cariostat values by ICDAS.

Methods: Children aged 3-4 years old in the 7 kindergartens in Miyun District, Beijing where were recruited to the study. The children were selected on the basis of inclusion and exclusion criteria. According to the results of Cariostat caries activity test at baseline, all recruited children were stratified and randomly divided into 2 groups (fluoride toothpaste group and control group). The children should brush their teeth three times a day under the supervision of kindergarten teachers and parents. All children needed to brush their teeth for 120 seconds each time. 12 months later, the 2 groups of children were given a final oral health examination. Independent sample t-test, and chi-square test were used to compare the differences between the groups.

Results: Due to the influence of COVID-19, the final inspection was postponed for two months, and the final research period was 14 months. In the children with low Cariostat value, the mean increment $d_{1-6}mft$ and $d_{1-2}s$ scores were lower than that in the control group ($p<0.05$). Among the children with moderate and high Cariostat values, there was no significant difference between the two groups after 14 months ($p>0.05$).

Conclusions: For children with low Cariostat value, 1100 ppm fluoride toothpaste has good preventive effect on incipient caries. However, there is no significant anticaries effect of 1100 ppm fluoride toothpaste on cavitated caries in children aged 3-4 years.

S2-304

Application of Modified Caries-risk Assessment Tool in Caries Prevention among Preschool Children

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Objectives: To evaluate the effectiveness of the Modified Caries-risk Assessment Tool (MCAT) for prevention of caries among preschool children in Yulin, Guangxi.

Methods: MCAT was designed based on Caries-Risk Assessment Tool (CAT) and the caries related factors of the primary school children in Guangxi. In the test group, topical fluoride use was applicated for preschool children based on their different risks assessed by MCAT. Meanwhile, a conventional intervention group was set up, and the children received topical fluoride application every 6 months. Follow-up oral examination will be performed biannually for one year to evaluate caries incidence. The economics of different intervention methods were compared through cost-effectiveness analysis method.

Results: The caries incidence and caries increment at teeth level in the test group were 50.6% and 1.78±2.27, respectively, which were lower than that of the conventional intervention group (67.1%, 2.86±2.83) ($p<0.001$).

The test group has a lower prevention cost and better cost-effectiveness, and when the WTP was 626.32 RMB, the probability of the experimental group achieving economic efficiency was 99.8%.s no significant difference of caries prevalence between the BMI≥28 group and the BMI < 28 group ($p=0.816$).

Conclusions: The use of MCAT for caries risk assessment and grading management in preschool children can effectively reduce the increment of new caries in children through precise topical fluoride application The MCAT-preschool edition provides guidance on fluorinated intervention for early children caries, which has a lower unit prevention cost and good economic benefits.

S2-305

Detection of Caries Severity in Primary and Permanent Teeth Children Age 6-12 Years for Planning in Caries Prevention Management Program

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Objectives: To assess the severity of dental caries in the deciduous and permanent teeth of children using P∕p: Pulpal Involvement, U∕u: Ulceration, F∕f: Fistula, A∕a: Abscess (pufa) and PUFA index for for developing caries prevention programs.

Methods: A cross-sectional study was conducted among children who lived in Puteran village in Pager Ageung district, Tasikmalaya Regent, West Java, Indonesia. Untreated dental caries was assessed using the pufa and PUFA indices for deciduous and permanent teeth, respectively. Total sampling was used and children who met the inclusion and exclusion criteria were invited to participate in the study. Data were analysed using formulas for pufa and PUFA indices.

Results: A total of 206 children participated in the study. The pufa assessment showed the severity of caries was high in the deciduous dentition with mean pufa of 3.49. The PUFA assessment showed a relatively lower severity of caries in permanent teeth with mean PUFA of 0.48. The severity of caries was higher in the maxillary than the mandibular teeth in deciduous teeth. On the other hand, the severity of caries was higher in the mandibular than maxillary teeth in the permanent teeth.

Conclusions: Each child aged 6 to 12 years in Puteran village had severe caries in 3 to 4 of deciduous teeth and severe caries in one permanent tooth. The findings of the study will be used to develop caries prevention television programs using virtual reality for mothers with small children suffering from caries.

S2-306

Predicting Early Childhood Caries in Age 2-3 Year Based on Conceptual Multilevel Models

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Objectives: To analyze risk factors at the child's and family level on early childhood caries occurance in age 2-3 year.

Methods: This research design uses a cross-sectional study. The study was conducted to obtain socio-determinants based on a multilevel conceptual model by extracting information from mothers of children aged 2-3 years using a questionnaire, then conducting def-s and OHI-S examinations on children aged 2-3 years, then taking plaque on the surface of the anterior teeth of children aged 2-3 years to obtain the number of Streptococcus mutans cultured on TYS20B agar media and counted using an automatic scan colony counter. This study was conducted in 25 community health posts located in Sukajadi District, Bandung City.

Results: Children aged 3 years in cases of decay> 0, visible plaque> 0 and *Streptococcus mutans* (CFU / ml)$> 10^5$ have a greater proportion than children aged 2 years. The results of comparative analysis between age and decay> 0 (p value $= 0.000$) show a p value <0.050. Gender, socio-economic factors, maternal oral health knowledge, practices of maintaining oral health with ECC, visible plaque and Streptococcus mutans (CFU/ml) showed comparative analysis results with $p> 0.050$. The final results of logistic regression analysis with the dependent variable ECC and independent variables as predictors that entered into the final model consisted of age and oral hygiene (OHI-S) with a significance value of 0.000 ($p < 0.050$). The logistic regression test obtained an AUC value of 0.752 (CI95% 0.701-0.804) and the Hosmer and Lemeshow test $p=0.725$ ($p>0.050$).

Conclusions: A significant relationship between age and early childhood caries (ECC). No significant relationship between gender, socio-economic factors, maternal oral health knowledge, practices of maintaining oral health with ECC, visible plaque and *Streptococcus mutans* (CFU/ml). Age and debris index variables are significant predictors of ECC.

S2-307

Effectiveness of Dental Innovation Foundation's Fluoride Varnish in Preventing Root Caries in the Elderly

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Objectives: To assess the efficacy of fluoride varnish developed by The Dental Innovation Foundation (FLV-DIF) in preventing root caries in Thai seniors.

Methods: Participants aged 60-74 years with root caries or exposed root surfaces were divided into four groups (n=143 teeth). Duraphat® fluoride varnish was applied every 3 or 6 months in Groups I and II, while FLV-DIF fluoride varnish was applied every 3 or 6 months in Groups III and IV. Root caries activity scores were collected at baseline, 6 months, and 12 months. The changes in root caries activity scores between follow-up periods were categorized as preventing, inhibiting, or fail. Chi-square and 2 Proportions Z-test, were used for analyzing root caries development frequencies. Multiple comparisons were conducted to control Type-I error.

Results: The p-values for comparing the efficacy of Duraphat® and FLV-DIF fluoride varnishes every 3 and 6 months were 0.0876 and 0.0198, respectively. The overall comparison yielded a p-value of 0.2907, indicating no significant difference in efficacy. No significant difference was found in the efficacy of Duraphat® fluoride varnish between the groups receiving applications every 3 and 6 months (p=0.0507). However, a significant difference was observed in the efficacy of FLV-DIF fluoride varnish between these groups (p=0.0396).

Conclusions: No significant difference in efficacy was found between Duraphat® and FLV-DIF when applied every three months. However, a difference was observed when comparing applications every six months. Overall, both varnishes are equally effective in preventing tooth decay. Therefore, FLV-DIF every three months is recommended.

S2-308

Association of Candida Colonization with Dental Caries in 1-year-old Children

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Objectives: Since Candida colonization has been found to associate with early childhood caries but limited data exist for children as young as one year old, we aimed to investigate the prevalence and levels of Candida colonization and dental caries in one-year-old children.

Methods: This study was conducted among 568 one-year-old children in Khon Kaen, Thailand. We used a structured questionnaire to collect information on possible confounders. Dental examination was conducted by one calibrated dentist using modified WHO criteria. Saliva samples were collected and the presence of Candida in the samples was evaluated by culturing on Yeast-Peptone-Dextrose agar supplemented with penicillin G and streptomycin. The association between prevalence and magnitude of colonization and dental caries was analyzed using Chi-square and Wilcoxon rank sum tests, respectively.

Results: Our results showed that children who have oral Candida colonization at 1-year-old have higher prevalence of dental caries than those without Candida (55.7% vs. 39.5%, p=0.007). The average level of colonization (Colony forming units, CFU/ml) was also significantly higher in children with caries compared to caries-free children. (p=0.007) However, when comparing only among those with Candida colonization, there was no statistically significant difference in the levels of Candida colonization between children who had dental caries and caries-free children (p=0.70).

Conclusions: The prevalence of Candida colonization was associated with dental caries in 1-year-old children.

Assessment of Carious Lesions with Quantitative Light-induced Fluorescence: A Systematic Review and Meta-Analysis

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Objectives: To identify the validity of quantitative light-induced fluorescence (QLF) technology in diagnosing caries lesions.

Methods: A systematic search (Ovid-Medline and Ovid-Embase) was carried out up to May 2023 for studies meeting the eligibility criteria: (1) assessed the accuracy of QLF technology of detecting caries, in both primary and permanent human teeth, in the laboratory or clinical setting; (2) used a reference standard; (3) reported sufficient data relating to sample size and accuracy of methods. Pooled sensitivity, specificity, and area under curve were calculated and a risk-of-bias was assessed using the QUADAS-II tool.

Results: Of the initially 481 search results, 17 articles were included. For detecting initial versus advanced enamel occlusal lesions in clinical settings (6 studies), range sensitivity was 0.84-0.94, range specificity 0.74-0.88 and range AUC 0.57-0.97. Detecting sound teeth versus enamel and dentinal occlusal primary or secondary lesions in laboratory setting (12 studies), range sensitivity was 0.57-0.96, range specificity 0.38-0.92 and range AUC 0.59-0.97. According to the results of meta-analysis, the cumulative sensitivity and specificity was 0.86 and 0.82 in diagnosis of occlusal caries and 0.74 and 0.82 for diagnosing proximal caries in the clinical setting. *In vitro* setting had cumulative sensitivity and specificity of 0.83 and 0.74 in diagnosis of occlusal caries. QLF method tends to have similar accuracy for primary (4 studies) and permanent teeth (13 studies). Most of the articles were of good quality and moderate heterogeneity was observed.

Conclusions: QLF is a valid detection method offering moderate to high diagnostic effectiveness for caries lesions.

Accreditation Instrument for Dental Hospital (A Literature Review)

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Objectives: This study explored the trends of literature to design hospital instruments suitable for dental hospital conditions.

Methods: In this literature review, articles were searched in Web of Science, Pub- Med, Scopus, Google Scholar obtained from 2014-2023. We conducted a literature review using the main search terms: "instrument or tools", "accreditation" and "dental hospital". Search criteria included English-language literature.

Results: After appraisal of the 72 citations initially retrieved, 34 studies were included in this review; there were 7 references indicating that the accreditation agency assessed the accreditation of dental services. 85.71% discuss leadership and management; 71.43% have the same elements, namely facility management and safety, infection prevention and control, facility management and safety; 57.14% have the same element access, assessment and continuity of care, patient and family rights, quality improvement, human resource management and information management.

Conclusions: Due to the different types of services provided in dental and general hospitals, a special instrument is needed to assess the accreditation of dental hospitals.

S2-311
The Effect of Oral Intervention on Cognition: A Meta-analysis and Systemic Review

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Objectives: This meta-analysis and systemic review was conducted to analyze the effectiveness of oral interventions on cognition.

Methods: Four databases including Medline, Embase, Web of science and Cochran databases were searched on 16th, April, 2023. Two investigators independently screened the full-text articles according to the inclusion and exclusion criteria and conducted the risk of bias assessment of eligible studies as well. Review Manager 5.2 was used to visualized the results.

Results: Four randomized controlled trials were included in this meta-analysis. Three studies analyzed the effect of oral hygiene intervention on cognition, one study elaborated the evaluation of oral exercises intervention on cognition. The Mini-Mental State Examination was used to assess the effect of oral intervention on cognition in these included studies. Three studies were assessed as "high risk" and one study were in "some concerns" when assessing the quality by using the Revised Cochrane risk-of-bias tool 2. The random-effect model was selected to combine data. The value of I^2 test and Chi^2 test was 0% and 0.77 respectively, which suggested that there was not a statistical heterogeneity among the four studies. The weighted mean deviation of this meta-analysis was 1.04, and the *P* value was 0.001, suggesting that oral intervention was effective to cognition.

Conclusions: Oral intervention was effective to cognition on mild dementia in this meta-analysis, which need a lot of high-quality studies to support. Moreover, dentists should pay attention to restore the masticatory efficiency and maintain good oral health in old adult to decrease the decline of cognition.

S2-401
Exploring the Role of Wnt Ligands in Osteogenic Differentiation of Periodontal Ligament Stem Cells

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Objectives: The present study aimed to investigate the impact of Wnt ligands on the osteogenic differentiation of human periodontal ligament stem cells (hPDLSCs), with particular focus on the molecular mechanisms underlying the notable upregulation of WNT3A and WNT4.

Methods: Real-time quantitative Polymerase Chain Reaction (qPCR) was employed to assess the expression levels of Wnt ligands during hPDLSCs osteogenic differentiation at 7, 10, and 14 days. Adenovirus vectors were used to knockdown the expression of WNT3A and WNT4, and conditional medium derived from WNT3A and WNT4 overexpression cells was further used to detect the role of WNT3A and WNT4 in the osteogenic process of hPDLSCs. Osteogenic-specific genes were subsequently examined by qPCR. Alkaline phosphatase and alizarin red S activities and staining were utilized to analyze the osteogenic differentiation ability of hPDLSCs.

Results: The expression levels of Wnt ligands varied during the hPDLSCs osteogenic differentiation process. The expression of WNT5A and WNT7B decreased to some extent, while WNT3A and WNT4 demonstrated a significant increase. Inhibition of WNT3A and WNT4 expression substantially hindered the osteogenic capacity of hPDLSCs. Additionally, WNT3A facilitates early osteogenic differentiation of hPDLSCs, whereas WNT4 exhibits minimal impact on their osteogenesis or proliferation.

Conclusions: The findings highlight the importance of Wnt ligands in the osteogenic differentiation of hPDLSCs, with WNT3A and WNT4 playing a promotive role in osteogenesis.

S2-402

Effect of Procyanidin B2 on Anti-oxidative Stress Injury in Human Gingival Epithelial Cells

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Objectives: Emerging evidence highlights the association between periodontitis and oxidative stress (OS), with Human Gingival Epithelial Cells (HGECs) playing a crucial role in the defence against periodontal pathogen invasion. Procyanidin B2 (PB2), a natural antioxidant with high bioavailability and multiple pharmacological activities, holds promise as a potential therapeutic agent. However, its impact on oxidative damage in HGECs remains unexplored. This study aims to evaluate the effects of PB2 on oxidative damage in HGECs and the underlying mechanisms.

Methods: Initially, a cell counting kit 8 (CCK-8) assay was employed to determine optimal concentrations of hydrogen peroxide(H_2O_2) and PB2. Subsequently, a 2,7-dichlorodihydrofluorescein diacetate (DCFH-DA) probe and other methods were used to assess the effects of PB2 on OS in HGECs. Finally, Western blotting and immunofluorescence were performed to explore the underlying mechanisms.

Results: PB2 at 12.5μg/ml significantly inhibited H_2O_2-induced reactive oxygen species (ROS), malondialdehyde (MDA), and nitric oxide (NO) overproduction, while markedly increasing the activities of superoxide dismutase (SOD) and catalase (CAT) induced by H_2O_2. Additionally, PB2 up-regulated the relative protein expression levels of the ERK1/2/Nrf2 signalling pathway and promoted the nuclear translocation of the nuclear factor erythroid 2-related factor 2 (Nrf2) in HGECs.

Conclusions: Our findings demonstrate that Procyanidin B2 exerts a protective effect on HGECs against oxidative stress induced by H_2O_2. This anti-oxidative stress effect of PB2 may be mediated through the regulation of the ERK1/2/Nrf2 signalling pathway and Nrf2 nuclear translocation.

S2-403

Effects of A New Mouthwash on *In Vitro* Dental Biofilm Model

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Objectives: To clarify the effect of a new mouthwash on plaque biofilm removal *in vitro*.

Methods: *In vitro* multispecies biofilms containing *Actinomyces viscosus, Veillonella parvula, Fusobacterium nucleatum and Porphyromonas gingivalis* were formed on 24-well plates. After treatment with mouthwash for 3 minutes, harvested biofilms were measured by turbidity, followed by counting the colony-forming unit with the aid of colony morphology and colony colour on selective agars. Also, plates were incubated for 8 days with or without mouthwash in a medium containing calcium and phosphate solution. Calcium concentration in biofilms was measured by atomic absorption spectrometry. The visualization of extracellular polymeric substances was observed by confocal laser scanning microscopy after staining.

Results: Treatment of dental biofilms with the new mouthwash resulted in a reduction in both turbidity and viable bacterial counts. Furthermore, treatment with the mouthwash during biofilm formation in the presence of calcium and phosphate led to a decrease in calcium concentration and biofilm thickness.

Conclusions: The results suggest that the new mouthwash may contribute to the maintenance of oral health by effectively removing dental biofilm and inhibiting dental calculus formation.

Potential of Kalimantan Plants *Myrmecodia Tuberosa Jack* versus *Myrmecodia Pendens* as Periodontal Disease Prevention

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Objectives: To analyze the comparison of antibacterial activity of Sarang Semut plants *Myrmecodia tuberosa Jack* and *Myrmecodia pendens* against the growth of *Aggregatibacter actinomycetemcomitans* bacteria.

Methods: True experimental and post-test only control group study types are used. This study employed two distinct groups of each Sarang Semut plant with 12 test groups specifically treatment with concentrations of 125 mg/mL, 62.5 mg/mL, 31.25 mg/mL, 15.62 mg/mL, 7.81 mg/mL and 3.90 mg/mL,1.95mg/mL, 0.97 mg/mL, 0.48 mg/mL, 0.24 mg/mL, 0.12 mg/mL, 0.06 mg/mL, chlorhexidine gluconate 0.2% as positive control group and DMSO 10% as negative control group. The microdilution methods were used to determine the minimum inhibition value indicated by the color seen in the wells. Data were analyzed using Mc Nemar test.

Results: The results showed the presence of antibacterial activity in both *Myrmecodia tuberosa Jack* and *Myrmecodia pendens* which was indicated by the presence of wells that remained clear at several concentrations. Minimum Inhibitory Concentration of *Myrmecodia tuberosa Jack* or the smallest concentration that can inhibit the growth of *Aggregatibacter actinomycetemcomitans* bacteria is 7.81 mg/mL, while in *Myrmecodia pendens* MIC obtained is 1.95 mg/mL. Statistic result was not a significant difference between the effectiveness levels of *Myrmecodia tuberosa Jack* and *Myrmecodia pendens* with p value>0.05. Its showed clinical result with proportion value *Myrmecodia pendens* 58.30% and *Myrmecodia tuberosa Jack* 41.70%.

Conclusions: From the results of the study, it was concluded that *Myrmecodia tuberosa jack* and *Myrmecodia pendens* have antibacterial effectiveness. However, *Myrmecodia pendens* has greater antibacterial effectiveness than *Myrmecodia tuberosa Jack*.

Ascorbic Acid Compensates Barrier Function of Gingival Epithelial Cells Exposed by Cigarette Smoke Extract

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Objectives: Smoking is a major risk factor of periodontal disease. We have reported that cigarette smoke extract (CSE) disrupts junctional adhesion molecule 1 (JAM1), a tight junction-related protein, in human gingival epithelial barrier. Since there have been reports showing the low blood levels of ascorbic acid (AA) in smokers, this study aims to evaluate the effects of AA supplementation on gingival epithelial barrier function when exposed by CSE.

Methods: This study was approved by the ethics committee of Osaka University Graduate School of Dentistry (R2-E8-1). Immortalized human gingival epithelial cells were cultured with or without AA. Three cigarettes (Seven Stars: JT; Kent: British American Tobacco Japan; Marlboro: Phillip Morris) were bubbled into culture media for CSE preparation. Experiments such as generation of three-dimensional gingival epithelial tissues, construction of plasmids encoding short hairpin RNA (shRNA), and quantitative real-time PCR were performed, as previously described (Takeuchi et al., 2019, PLoS Pathogens).

Results: CSE administration markedly increased permeability of gingival epithelial tissues to lipopolysaccharide and peptidoglycan. In contrast, AA supplementation significantly induced JAM1 expression in gingival epithelial cells and restored the permeability, resulting in restoration of barrier function. This AA compensation was abolished in tissues expressing shRNA against *JAM1*.

Conclusions: These data suggest that AA supplementation increases JAM1 expression, which compensates barrier function of gingival epithelium disrupted by CSE.

The Effect of Snakehead Fish (Channa Striata) Fiber Toward Hardness of Flowable Resin Composite

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Objectives: Flowable Resin Composite could be used for fissure sealant treatment as preventive restoration. Fiber Reinforced Composite (FRC) is a combination material between polymer matrix and fiber and it is used as an alternative material to improve physical properties. The aim of this study was to explore the effect of Channa striata fiber toward hardness of flowable resin composite.

Methods: This research was conducted using a post-test only control group design. Specimen disc size with diameter 7 mm and height 4 mm was made using flowable resin composite, which the control group was not added with fiber and two treatment groups were added with fiber. Treatment group 1 were added channa striata fiber 5% and treatment group 2 were added channa striata fiber 10%. Hardness measurements were taken with a Rockwell Hardness Tester.

Results: The hardness test results revealed that the hardness value of composite resin in the control group was 26.556 ± 1.295 HR15N, 30.022 ± 1.405 HR15N in the 5% fiber added group, and 30.322 ± 1.652 HR15N in the 10% fiber added group. The Shapiro Wilk test revealed that the data was normally distributed ($p>0.05$). Data were analyzed with one-way ANOVA and it shows that the surface hardness value was significantly affected by the adding of Channa striata fiber ($p<0.05$).

Conclusions: There are significant differences in the surface hardness value of flowable resin composite after added with Channa striata fiber in this study.

Session 3

S3-101
Selected *Lactiplantibacillus plantarum* as Potential Probiotics for Prevention of Oral Diseases
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Objectives: The study aimed to evaluate the probiotic properties of *Lactiplantibacillus plantarum* strains to be potential probiotics for oral health.

Methods: Four selected strains of *Lactiplantibacillus plantarum* (*L. plantarum*) were used in this study, which strains were collected from the Oral Microbiology Laboratory, Faculty of Dentistry, Prince of Songkla University. *Streptococcus mutans* ATCC25175 and *Aggregatibacter actinomycetemcomitans* (*A. actinomycetemcomitans*) ATCC33384 were used to represent the oral pathogens. All *Lactiplantibacillus* strains were cultured in MRS broth for 24 hours at 37°C, and both bacterial cells and their cell-free supernatant (CFS) were examined for the inhibition of the growth of tested strains using the agar-diffusion method. Tolerance to low pH, bile salt and pancreatic enzymes using the plate count method and the adhesion ability of *Lactiplantibacillus* strains to the keratinocyte H357 cells was examined.

Results: All *L. plantarum* strains could inhibit the growth of pathogens, and *L. plantarum* SD-KMP 205 gave the strongest activity to inhibit the growth of *S. mutans* ATCC 25175 and *A. actinomycetemcomitans* ATCC 33384 with the inhibition zone of 30.00±0.00 and 24.50±0.58 mm, respectively. All *L. plantarum* strains resisted to acid (pH3) at 40-57%, bile salt at 40-58%, α-amylase at 83-88%, proteinase K at 85-90%, and lipase at 85-87%. *L. plantarum* SD-KMP 205 showed the highest adhesion ability to keratinocyte H357 cells at 86%.

Conclusions: This preliminary study indicates that *L. plantarum* SD-KMP 205 may be a good candidate for a potential probiotic supporting oral health. Further study is required to confirm these findings.

S3-102
Psychological Intervention in Improving Adolescents' Oral Health-Related Quality of Life: A Systematic Review and Meta-Analysis
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Objectives: This systematic review aimed to explore the effectiveness of psychological interventions in improving adolescents' oral health-related quality of life (OHRQoL).

Methods: Six electronic databases (PubMed, Ovid Medline, Ovid Embase, Cochrane Library, APA PsyINFO (ProQuest), and Web of Science) were searched up to July 2023. Studies which investigated the impacts of various psychological approaches and interventions on adolescents' OHRQoL were included in this review. The primary outcome was OHRQoL while the secondary outcome was self-efficacy of oral health behaviors.

Results: Seven articles were finally included in the review and four randomized control trials were included in the meta-analysis. The interventions were based on Health Belief Model, Social Cognitive Theory, Health Action Process Approach, loss-and gain-framed theory, and planning intervention. Psychological intervention was effective in improving adolescents' overall well-being and OHRQoL in the short-term (within 6 months, overall SMD=1.04 (0.34, 1.73)), with a low level of evidence. All the included studies did not report the impacts of psychological intervention on physical function, psychological function, social function, and oral health perceptions. For the outcome of self-efficacy, no meta-analysis was carried out due to the high heterogeneity on the oral health behaviors focused, follow-up duration, and outcome measures.

Conclusions: Psychological intervention was effective in improving adolescents' overall well-being and OHRQoL in the short term. However, further research is needed to explore the potential benefits of psychological intervention in enhancing adolescents' self-reported function and other psychological outcomes.

S3-103

Association of Hepatitis B Virus Infection with Head and Neck Cancer: A Propensity-matched Study

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Objectives: This work focused on investigating the relation between hepatitis B virus (HBV) infection with head and neck cancer (HNC), identifying the associated risk factors and providing a reference for preventing and treating HNC.

Methods: Retrospective analysis was conducted on 1,572 HNC cases who were hospitalized between January 2009 and December 2020. Meanwhile, 58,409 individuals with non-oncological illnesses from the departments of oral and maxillofacial surgery, psychiatry, neurology and cardiology were recruited as controls. R software was utilized for data processing. Clinical data were processed using SPSS 22.0, while baseline radiotherapy data were balanced with 1:4 propensity score matching (PSM).

Results: In this study, 1:4 PSM was completed in 1,572 HNC patients and 6,288 controls. In comparison with controls, HNC cases had a markedly increased HBsAg positivity rate (5.9% vs 3.5%, $p<0.001$). Additionally, the HBsAb positivity rate of HNC cases remarkably decreased relative to controls (52.9% vs 58.7%, $p<0.001$).

Conclusions: HBV infection was positively related to HNC, while HBsAb was negatively correlated with HNC.

S3-104

Oral Health Awareness Evaluation among Public Primary School Children: Cross-sectional Study

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Objectives: To evaluate the level of oral health knowledge awareness among primary school children in Shantou City.

Methods: A survey was conducted between 2019 to 2022 applying stratified random sampling to 20 classes from 12 primary school in Shantou City by questionnaire. The 12-item questionnaire offered by project included two sections: oral health knowledge (item 1 to item 10) and oral health behavior (item 11 to item 12). Completely answered questionnaire was collected and analyzed.

Results: A total of 841 valid questionnaires were included. The annual awareness rate (AAR) was 78.84%, 87.63%, 68.03% and 74.55% from 2019 to 2022, respectively. The difference of 4 years AAR has statistically significant ($\chi^2 = 24.8905$, $p<0.0001$). It was observed the children was well aware of item 2 (Brush Teeth Daily) and item 10 (Worst Foods for Tooth). The AAR of two items maintain more than 85% over 4 years. The AAR of item 11 maintain more than 70% over 4 years. The other items about oral health knowledge and behavior not met the require. The score of oral health knowledge has relationship with oral health behavior (item 11: $r = 0.1792$, $p<0.0001$; item 12: $r = 0.5102$, $p<0.0001$).

Conclusions: The findings of the present study reveal good knowledge oral health produce good practices. School-based educational should be established with oral self-care and oral health education. Special in caries and Teeth Care Day field need strengthened.

S3-105

Inflamed Exosomes Facilitated Dental Pulp Regeneration Through Cell Homing: A New Strategy for Regenerative Endodontics

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Objectives: Exosomes are predicted to be utilized in pulp regeneration as they play a significant role in tissue regeneration. Our goal was to develop a new strategy for cell homing-based regenerative endodontics for immature teeth damaged by caries and injuries.

Methods: Normal exosomes (NEXO) and inflamed exosomes (IEXO) were isolated from dental pulp stem cells (DPSCs) and LPS-induced DPSCs. The effects of exosomes on stem cells from apical papilla (SCAP) and human umbilical vein endothelial cells (HUVECs) were detected by CCK8, transwell, angiogenesis, and odontogenic differentiation assays. IEXO were investigated in an *in vivo* "cell homing" model using human tooth slices to compare their roles in pulp regeneration. We placed SCAP-containing collagen gel at the root tip and filled the treated dentin matrix (TDM) with IEXO and NEXO-laden scaffolds, which would be expected to recruit SCAP to the pulp cavity. The complex was implanted subcutaneously into immunodeficient nude mice. After eight weeks, tissues were taken and analyzed histologically to determine whether IEXO contributes to pulp regeneration through cell homing.

Results: Exosomes were successfully extracted and confirmed. *In vitro* experiments, IEXO performed better than NEXO in promoting cell proliferation, migration, and differentiation of SCAP. Additionally, IEXO recruited SCAP to regenerate pulp-like connective tissue containing blood vessels, odontoblasts, and predentin-like tissue *in vivo*.

Conclusions: This study demonstrated the possibility of IEXO to induce SCAP to regenerate pulp-like tissue through cell homing, providing a new strategy for regenerative endodontics for immature teeth.

S3-106

Oral Health Status of 3-5-Year-Old Autistic Children in Jilin Province

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Objectives: The aim of this study was to investigate the oral health status and influencing factors of 3-5 years old autistic children in Jilin Province.

Methods: From June 2022 to present, the parents of children with autism aged 3 to 5 years old were investigated by questionnaire, and the children were examined orally. SPSS 26.0 statistical software was used to analyze the correlation of oral health care behavior data.

Results: A total of 347 children with autism in Jilin Province were invited to participate in this study, of which 308 children aged 3-5 years (58% were boys) participated (response rate: 88.8%). It showed that the prevalence of caries was 39.3% and that of severe early childhood caries was 33%. 21.4% of the children had motor retardation (46.97% of them had caries, $p=0.683$), 87.7% of them had delayed language development (43.7% had caries, $p=0.042$), 83.1% of them did not have continue vitamin D supplementation (45.7% had caries, $p=0.001$), 41.6% of the fathers received only compulsory education (50% of the children had caries, $p=0.011$), 30.1% of mothers had only compulsory education level (55% of the children had caries, $p=0.001$), 30.2% of the children brushed their teeth less than 2 times a day (of which 52.7% had caries, $p=0.039$). The above results were statistically significant except for motor development.

Conclusions: In Jilin Province, the oral health status of 3-5-year-old autistic children is poor, and the oral health education of their parents needs to be strengthened.

S3-107

Nomograms to Predict the Risk of Early Childhood Caries among Kindergarten Children

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Objectives: To investigate the risk factors of caries in kindergarten children (aged 3-5 years) and establish simple-to-use nomogram models for predicting their risk of early childhood caries (ECC) and severe early childhood caries (SECC).

Methods: 2746 children, selected using the multi-stage stratified sampling method were divided into a training data and a validation dataset. All participants received a questionnaire and an oral examination. Univariate and multivariate binary logistic regression analyses were used to select variables for the nomogram. Nomograms were evaluated using area under receiver operating characteristic curve (AUC), and calibration plots.

Results: The prevalence of ECC was 63% and SECC was 26%. Four variables were selected to establish the nomogram for ECC and another four variables for SECC (P<0.05). The AUC of nomogram models of ECC and SECC were 0.707 and 0.780, and their good prediction performance was proved by the reserved 10% validation dataset. The calibration plots showed favorable consistency between the prediction of the nomogram and actual observations in both the training and validation cohorts.

Conclusions: The nomograms can be simple and easy-to-use for predicting ECC and SECC in kindergarten children aged 3-5 years. The models should be well utilized in risk assessment and early warning for childhood caries without complex oral examinations, aiming to better allocate and utilize social resources and protect children's oral health.

S3-108

Global Prevalence of Early Childhood Dental Fear and Anxiety: A Systematic Review and Meta-analysis

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Objectives: This systematic review and meta-analysis aimed to determine the global prevalence of dental fear and anxiety (DFA) among preschool children and its relation to the assessment tools used.

Methods: A systematic search was performed in three databases (PubMed, EMBASE and Web of Science). Observational studies on DFA prevalence in preschool children aged 2 to 6, published in English between 2000 to 2023, were included. Two independent reviewers screened the papers. Methodological quality assessment was performed using The Joanna Briggs Institute Critical Appraisal Checklist for Studies Reporting Prevalence Data checklist. The random-effects model was used to calculate the pooled prevalence rate with a 95% confidential interval (CI). A subgroup analysis was conducted.

Results: Out of 2,895 papers identified, 25 were included in the analysis. Most articles (80%, 20/25) demonstrated moderate or high methodological quality. The pooled prevalence of DFA among preschool children was 30% (95% CI 25, 36). The most commonly used DFA assessment tools were the Frankl Behaviour Rating Scale (FBRS, n=8), followed by the Children's Dental Fear Survey Schedule Dental Subscale (CFSS-DS, n=5) and the Dental Anxiety Question (DAQ, n=5). No statistically significant difference was found between the pooled prevalence using different assessment tools ($p>0.05$).

Conclusions: DFA among preschool children is prevalent globally, with approximately one-third experiencing DFA. The most commonly used DFA scale was FBRS. The assessment tools do not influence their DFA prevalence in preschool children.

The Application Research of Quantitative Light-induced Fluorescence in Resin Infiltration Treatment

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Objectives: Our research aimed to assess the ability of quantitative light-induced fluorescence (QLF) technology in detecting artificial early caries at different demineralization depths; and to investigate the effectiveness of QLF for evaluating the efficacy of resin infiltration treatment for enamel caries.

Methods: In our study, we established enamel demineralization models with different depths, ranging from $40 \sim 200 \mu m$. The lesion depth and the mineral loss of demineralized enamel were analyzed by transverse microradiography (TMR), and the loss of fluorescence was analyzed by QLF (ΔF). Then performed the correlation analysis. The effectiveness of QLF for evaluating the efficacy of resin infiltration treatment was compared with spectrophotometer (ΔE) and TMR.

Results: We found that there was a strong negative relationship between the detection parameters of QLF and TMR (r =-0.9943, $p<0.005$). After resin infiltration treatment, ΔE showed a regression toward the baseline levels (normal enamel). The ΔF values were the same as the normal enamel by analyzing the fluorescence images of the infiltrated specimens ($\Delta F=0$). Therefore, in the early stages of caries, QLF can be used as an evaluation tool to monitor the therapeutic effect of osmotic resins.

Conclusions: Our findings show that QLF technology is a more efficient method to detect the degree of demineralization on early caries and evaluate the effectiveness of resin infiltration treatment. Our study provides a reference for the resin infiltration to select a treatment plan and confirm the treatment efficacy.

A Novel Tongue Biofilm Index Based on Bacterial Autofluorescence

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Objectives: This study aimed to confirm the reliability and validity of Tongue Biofilm Fluorescence Index (TBFI) using bacterial autofluorescence in tongue biofilm.

Methods: Data were collected twice from 81 participants at a one-week interval (N=162). To assess the tongue biofilm, white light and fluorescence images of the tongue dorsum were obtained using Qraycam. The concentrations of hydrogen sulfide (H_2S) and methyl mercaptan (CH_3SH) were measured as indicators of the pathogenicity of tongue bacterial biofilm. Two independent evaluators determined the TBFI based on the fluorescence images. TBFI was determined as the product of three-point (0-2 points) scale scores for the red fluorescence (RF) intensity and area. The quantitative values of RF were obtained from the fluorescence images and compared according to the TBFI scores. Two existing tongue coating indices (Winkel's tongue coating index and Oho's index) were also determined based on the white light images.

Results: TBFI showed the highest level of inter-rater agreement (TBFI, $\kappa=0.725$; WTCI, $\kappa=0.342$; Oho, $\kappa=0.598$). The concentrations of H_2S and CH_3SH were significantly correlated with all three indices, especially TBFI had the strongest correlation (TBFI; $r=0.391$, $p<0.01$).

Conclusions: The TBFI demonstrated higher reliability and validity than existing indices for evaluating tongue biofilm. It was also significantly correlated with indicators of oral malodor (H_2S, CH_3SH). As the TBFI score increased, the RF values also significantly increased ($p<0.001$). This suggests that objective and real-time assessment of the pathogenicity of tongue biofilm may be useful in clinical practice.

S3-201

A Novel 3D Printed Tooth Model for Ledge Management Practice in Preventive Dentistry

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Objectives: Ledge management is crucial in preventing lateral perforation during endodontic treatment. However, tooth models for preclinical hands-on practice are lacking. Therefore, this study aimed to fabricate a 3D printed tooth model used for ledge management practice.

Methods: A tooth featuring curved roots was acquired for research purposes following ethical committee approval. After the preliminary root canal preparation, the tooth underwent a micro-CT scan and was then 3D reconstructed. A K-file was created by computer-aided design (CAD) using a scripting language. Afterward, the K-file was partially inserted into the outer wall of the 3D-reconstructed tooth's root canal. By subtractive boolean operation, a tooth model with a root canal ledge was generated. This model was subsequently 3D printed for an interactive training course. To evaluate the effectiveness and quality of the model, a questionnaire consisting of seven items on a Likert scale was presented to 30 participants, which included 20 postgraduate students and 10 endodontic experts.

Results: The tooth created using additive manufacturing proves effective for endodontic training. The ledge present on the root canal wall can be identified through the tactile sensation of the endodontic tools. Furthermore, one can bypass this ledge by pre-curving the instruments. Responses from both students and endodontists were favorable, with no noticeable statistical variations observed between the two categories ($p > 0.05$).

Conclusions: The present study created a tooth model used for ledge management practice. The novel tooth model is expected to provide dental practitioners with better preclinical training, thus preventing serious iatrogenic accidents.

S3-202

Changes in Red Autofluorescence and Bacterial Composition of Cariogenic Microcosm Biofilm

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Objectives: This study aimed to assess the change in red autofluorescence (RF) intensity and the bacterial composition of the cariogenic microcosm biofilm according to maturation.

Methods: Stimulated saliva of healthy donors was inoculated on hydroxyapatite disc and the biofilm was matured for 7 days. Basal medium mucin growth media containing 0.2% sucrose was replaced daily and cultured under anaerobic conditions. Fluorescence images were acquired using QLF-D for 7 days. To quantify the RF intensity of the biofilm, the mean red values of the biofilm were calculated. 16S rRNA sequencing was performed on inoculum and biofilms (days 3, 5, 7).

Results: The RF intensity of the biofilm began to manifest on day 3 and increased from day 3 (46.6) to day 7 (114.9). 16S rRNA sequencing showed that the biofilm bacterial diversity was lower than that of the inoculum. In 3-day-matured biofilm, *Streptococcus* (65%)-*Veillonella* (19%)-*Lactobacillus* (13%), which are aciduric and acid-resistant bacteria, predominated. As a result of the log fold change, the relative abundance (RA) of *Lactobacillus*, *Streptococcus*, and *Veillonella* increased rapidly in 3-day-matured biofilm, and *Atopobium* and *Veillonella* on day 7 as compared to day 3. The RF intensity was significantly correlated with the RA of *Atopobium* (r=0.88, *p*=0.02) and Rothia (r=-0.92, *p*=0.01).

Conclusions: The biofilm RF and the RA of anaerobic bacteria gradually increased with the maturation period. Particularly, the *Atopobium* and *Rothia* changes were significantly correlated with the changes in RF. Therefore, the changes in the bacterial composition of cariogenic microcosm biofilm can be effectively detected with RF.

S3-203
A Bibliometric Analysis of the Diagnostic Approaches for Dental Caries
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Objectives: This bibliometric study aims to provide an overview of the global research on the diagnostic approaches for dental caries published from 2003 to 2022.

Methods: A literature search was conducted using Scopus Database to retrieve studies on the diagnostic approaches for dental caries published from January 2003 to December 2022. The diagnostic approaches in the retrieved studies were then categorized. Bibliometric data including citations, journals, authors, affiliations and countries of the publications were summarized. The publications' co-authorship and keyword co-occurrence were analyzed using VOSviewer.

Results: This bibliometric analysis included 1638 publications. These publications were broadly categorized based on 7 caries diagnostic approaches. Visual and/or tactile (n=401; 24%), radiation-based (n=587; 36%), light-based (n=694; 42%), ultrasound-based (n=25; 2%), electric-based (n=48; 3%), and molecular-based (n=148; 9%) diagnostic approaches as well as AI-based diagnostic interpretation aids (n=158; 10%) were investigated in these publications. In recent years, the incorporation of artificial intelligence has demonstrated to enhance caries detection. This bibliometric analysis also revealed an increase in the annual number of publications on caries diagnostic approaches throughout the past 20 years, with most of them being published in dental journals by various research teams all over the world. Among them, the majority of the publications were on light-based diagnostic approaches. The most frequently occurring keywords were 'Radiography' and 'Fluorescence'.

Conclusions: This bibliometric analysis highlighted an emerging research trend in the diagnostic approaches for dental caries from 2003 to 2022. Insights gained from this bibliometric analysis will guide the future progression of caries detection in dentistry.

S3-204
Assessment of Dentin Remineralization by 1.1% NaF Gel Containing Sr/F Bioactive Glass Nanoparticles
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Objectives: This study formulated 1.1% NaF gel containing 0,1,2,4 wt% of Sr/F bioactive glass nanoparticles (Sr/F-BGNPs). The remineralizing action of the materials on demineralized dentin was examined.

Methods: Dentin disc specimens were demineralized in 17% EDTA. They were cut into five pieces (n=9 per group). The specimens were treated with commercial 1.1% NaF toothpaste (Prevident, PV) or experimental 1.1 % NaF gel containing 0 wt%, 1 wt%, 2 wt%, and 4 wt% of Sr/F-BGNPs. The specimens were applied with toothpaste/gel daily and placed in 5 mL of simulated body fluid. The surface was examined using FTIR-ATR at 1, 7, and 14 days. The ratio of FTIR peak height representing the phosphate peak of hydroxyapatite (1024 cm^{-1}) versus the peak representing amide I of collagen (1636 cm^{-1}) was obtained.

Results: PV showed a significant increase in the median peak ratio of 1024 cm^{-1}/1636 cm^{-1} on Day7 (1.65) and Day14 (1.84) ($p<0.05$). No significant change in the ratio at each time point was detected from the experimental NaF gel ($p>0.05$). The ratio of PV on Day1, Day7, and Day14 was significantly higher than that of all experimental materials within the same time point ($p<0.05$). The ratio among experimental groups containing 0-4 wt% was comparable at all time points ($p>0.05$).

Conclusions: The increase in remineralizing action of the experimental 1.1% NaF gel upon rising concentrations of Sr/F-BGNPs from 0 to 4 wt% was not detected. The experimental materials also showed lower remineralizing potential than the commercial 1.1% NaF toothpaste.

Natural Desensitizer for Super-Fast and Long-Term Stable Dentin Hypersensitivity Treatment

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Objectives: Dentin hypersensitivity (DH) causes transient pain from exposed dentin tubules (DTs). Current treatments, including remineralization methods, have limitations in achieving long-term occlusion and rapid symptomatic relief. To address this challenge, we developed an innovative approach using a novel protein-based desensitizer for rapid and deep occlusion of exposed DTs.

Methods and Results: We introduced a functional silk fibroin-based desensitizer to exposed dentin to achieve in situ fast and deep occlusion within DTs, reaching a depth exceeding 250 μm with excellent long-term resilience to the dynamic oral environment through *in vitro* and *in vivo* experiments. Moreover, we designed a modified Transwell dentin disk (m-TDD) model for evaluating the biocompatibility of the desensitizer in a stimulated oral environment, and the desensitizer showed outstanding cytocompatibility and cytoprotective effects, reducing the risk of human dental pulp stem cells (hDPSCs) stimulation.

Conclusions: We present a novel and effective approach to occluding DTs rapidly and deeply through a novel desensitizer providing a groundbreaking alternative to existing treatments. Its exceptional performance opens new possibilities for treating dentin hypersensitivity, ensuring long-term stability and relief for patients. Our study contributes to the understanding of the underlying mechanisms and offers insights for future research in this area.

Application of Zeolites in Dentistry

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Objectives: To provide an overview of the application of zeolites in dentistry.

Methods: We performed a systematic search in five databases, PubMed, Cochrane Library, EMBASE, Scopus and Web of Science. The search keywords were (zeolite) AND ((dentistry) OR (dental material)). The included 55 studies were limited to articles published in English on or before 1 May 2023. We excluded studies on zeolites in fields other than dentistry, microbial studies irrelevant to dentistry or oral health, abstracts, conference papers, literature reviews and systematic reviews.

Results: The common zeolite compounds for dental application include silver zeolite, zinc zeolite, calcium zeolite and strontium zeolite. Zeolites have been employed in various areas of dentistry. In restorative dentistry, zeolites are used as antimicrobial additives in dental adhesives, temporary filling materials and restorative materials. In endodontics, they are used in root-end fillings, root canal irritants, root canal sealers and bone matrix scaffolds for peri-apical diseases. In prosthodontics, zeolite can be incorporated into denture bases, tissue conditioners, soft denture liners and dental prostheses. In implantology, zeolites are applied in dental implants, bone graft materials, bone adhesive hydrogels, drug delivery systems and electrospinning. In periodontics, they can be applied as antibacterial agents for deep periodontal pockets, guided tissue regeneration membranes and guided bone regeneration membranes. Zeolites are also used in orthodontic appliances and in oral cancer diagnostic marker membranes, maxillofacial prosthesis silicone elastomer, osteogenic glue and tooth extraction medicines for oral surgery.

Conclusions: Zeolites have a broad application in dentistry and are receiving more attention from clinicians and researchers.

S3-208

Characteristics of Early-life Salivary Microbiome and Its Potentiality for Predicting Early Childhood Caries

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Objectives: To investigate variations in salivary microbiome along with dynamic changes of Early Childhood Caries (ECC) and to explore salivary microbiomic biomarkers for surveillance of this disease.

Methods: 103 children aged 3~4 years in a kindergarten were recruited for an 18-month follow-up, during which period oral health examination and collection of stimulated whole saliva samples were performed every three months. According to their caries status, saliva samples corresponding to time points of characteristic changes of caries were extracted and put into 3 groups: full-course ECC-free (EF) group, ECC-occurrence (EO) group, and ECC-recurrence (ER, i.e. post-treatment occurrence of new caries lesions) group. Full-length 16S rRNA high-throughput sequencing technique was employed to screen salivary microbiomic biomarkers which specifically differed with dynamic changes of individual caries status and to construct a prediction model for those changes.

Results: After screening for changes of caries status, saliva samples collected during the follow-up period from 20 children in the EF group, 13 in the EO group, and 17 in the ER group were finally selected as the study samples. From analysis of the composition spectrum, some characteristic changes in the composition of species and abundance were found in the occurrence and recurrence of ECC. Comparative analyses at the species level found a lower abundance of *Porphyromonas catoniae* in the EO group and a higher abundance of *Rothia aeria,* and *Eikenella corrodens* in the ER group. A prediction model for ECC recurrence based on five typical differential species was built, in which area under curve (AUC) value was close to 1.00, exhibiting excellent predictive capability.

Conclusions: Salivary microbiome showed certain characteristic changes during dynamic changes of ECC. These characteristics could be used for predicting the dynamic trend of ECC, which facilitated screening and surveillance of this disease and should be helpful for further explorations in mechanisms of occurrence and development of dental caries.

S3-209

Study on the Characteristics of Spatial Distribution of Dental Medical Resources and Its Influencing Factors in Guangxi

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Objectives: The Geographic Information System (GIS) was used to analyze the spatial distribution of dental health care resource allocation and to explore the relevant factors affecting the allocation of health care resources in Guangxi province.

Methods: Based on the dental medical resource data of Guangxi in 2020, the spatial autocorrelation, Ordinary Least Squares (OLS), Geographically Weighted Regression (GWR), and Multi-scale Geographically Weighted Regression (MGWR) of GIS were used to explore the spatial allocation pattern of medical resources and its influencing factors.

Results: The Gini coefficient of dental medical resources in Guangxi based on economic allocation is around 0.3, and based on geographical area is >0.6. The spatial autocorrelation analysis shows that the dental medical resources show a significant positive correlation, and the dental medical resources are mainly concentrated in Nanning, Liuzhou, Guilin and other cities with more developed economic development, and the radiation decreases in all directions with these regions. The results of OLS regression show that GDP per capita, population density, and years of education are significant variables affecting the distribution of dental medical institutions, and there is a positive propulsive effect on the allocation of dental medical resources. The results of GWR and MGWR show that there is significant spatial heterogeneity in dental medical resources, and GDP per capita, population density, and years of education are important factors influencing spatial heterogeneity.

Conclusions: There is uneven allocation of dental medical resources in Guangxi, showing a form of dense distribution around the center of economically developed areas and gradually sparse outward, with obvious spatial heterogeneity.

S3-210

Exploration of Salivary Metabolomic and Proteomic Biomarkers Associated with Occurrence of Early Childhood Caries

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Objectives: To explore salivary biomarkers for occurrence of early childhood caries using metabolomic and proteomic techniques.

Methods: Twenty-two initially caries-free children aged 3-5 years old were recruited in this longitudinal study. Oral health examination and collection of stimulated salivary samples were performed every three months during the 18-month check-up period. For those who developed new caries lesions, salivary samples at three continuous time points, namely the time point of clinically diagnosed caries (marked as 'occurrence of caries (OC)'), as well as 3 and 6 months before this point (marked as 'pre-caries (PC)' and 'caries-free (CF)', respectively), were selected for further detections.

Results: Compared with the healthy control, a total of 25 and 173 differentially expressed metabolites were identified in the PC and OC groups, respectively. In the OC group, KEGG enrichment analyses of these metabolites revealed functional clusters associated with carbohydrate metabolism and amino acid metabolism, such as glyoxylate and dicarboxylate metabolism and cysteine and methionine metabolism, while differentially expressed metabolites were enriched in selenocompound metabolism in the PC group. The proteomics profile revealed 85 and 93 significantly different proteins in the PC and OC groups compared with healthy control. Annotation by bioinformatics analysis revealed that these differentially express proteins were commonly associated with immune system, complement and coagulation cascades.

Conclusions: This study revealed dynamic changes of specific metabolites and proteins in saliva during the occurrence of early childhood caries, which was undoubtedly helpful for early detection, screening and surveillance of this disease, laying the basis for exploring the pathogenesis of dental caries in further studies.

Parental Valuation of Preventive Interventions on Dental Caries among Preschool Children: A Literature Review

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Objectives: To identify factors of dental care valued by parents on caries preventive treatments for preschool children.

Methods: A comprehensive literature search was conducted with search keywords in electronic databases. The search encompassed qualitative research, including interviews, focus group discussions, questionnaires, and surveys; exploring public and parental attitudes, opinions, and experiences concerning Early Childhood Caries (ECC) and child dental care. All the relevant titles were screened dually and independently to identify studies requiring full-text retrieval and subsequent evaluation.

Results: The initial search yielded 241 titles, with 23 articles scrutinized for full-text screening, ultimately resulting in the inclusion of 12 articles. The included studies explored the common attributes associated with different caries preventive interventions, including fluoride varnish, fissure sealant, dietary analysis, professional advice, and regular check-ups. Positive attributes mostly valued by parents include treatment effectiveness, aesthetics, service accessibility, and the professionalism of the service provider. Negative attributes, such as care-providers' acculturation, the anticipatory dental anxiety or pain of their children could also impact on the treatments perceived. Their treatment valuation could also be influenced by treatment cost, time requirement, and child-specific factors such as their level of cooperation, past caries experience, and age. However, the parental preference of these dental health outcomes and their willingness to pay for these preventive interventions on ECC were still understudied.

Conclusions: This review offers insight into attributes considered significant by parents. Further research utilizing discrete choice experiments is necessary to explore how different attributes interplay and influence parental preference.

Physical Activity as a Modifiable Risk Factor for Periodontal Disease

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Objectives: Non-communicable diseases (NCDs), which contribute significantly to global morbidity, are largely preventable through behavioural changes. As with other NCDs, periodontitis is associated with modifiable risk factors such as smoking and stress, and is linked to multiple adverse health outcomes through a shared pathway of chronic systemic inflammation. While the health benefits of physical activity have been widely promoted in public health and extensively studied for other systemic conditions, its impact on periodontal health has only recently started to gain attention.

Methods: This review critically evaluates the current literature on the relationship between physical activity and periodontitis.

Results: While cross-sectional studies have shown an inverse association between physical activity levels and periodontitis risk in the general population, periodontal problems have nonetheless been identified in elite athletes with high levels of physical activity. Although causality has not been determined, physical activity could positively impact periodontitis directly, by reducing inflammatory biomarkers, and indirectly, through its modulatory effects on insulin sensitivity, body mass, and mental wellbeing. However, confounding factors, differences in measurements and non-standardized variables to quantify activity levels present challenges in comparing studies.

Conclusions: Given importance of risk factor control during initial periodontal therapy, understanding the role of physical activity as a potential behavioural risk modifier is paramount. The findings of this review provide an evidence-based overview of how physical activity could influence periodontitis. There is a need for longitudinal cohort studies to verify the temporality of the reported associations and exclude confounders, while interventions are needed to assess the efficacy of physical activity on periodontal treatment outcomes.

S3-303

Photobiomodulation Therapy in Preventing Osteoradionecrosis of the Jaws: A Case Report

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Objectives: To apply photobiomodulation therapy (PBMT) for prevention of osteoradionecrosis of the jaws (ORNJ).

Methods: The PBMT regimen was 635nm-diode laser at $100mW/4J/cm^2/CW/20$ sec per point of irradiation with 8-mm laser probe. 4 episodes of pre extraction-PBMT and 2 episodes of post extraction-PBMT were performed in 51-year old Thai male who received head and neck radiotherapy due to laryngeal cancer. Clinical and radiographic finding were examined. At each episode of pre and post PBMT, Laser Dropper Flowmetry (LDF) was also conducted to evaluate the mucosal microcirculation at 4 sites of buccal mucosa in all quadrants.

Results: 8 unrestorable teeth were extracted involving 5 episodes of dental extractions over a 2-year period. There were no clinical and radiographic presentation of exposed mucosa and bone after extraction. From LDF of the first PBMT episode, the percentage of increase in mucosal microcirculation appeared more noticeable in the maxilla (51.01% in Q1 and 25% in Q2) than in the mandible (14.32% in Q3 and 11.37% in Q4). The second PBMT episode was done in the following week. The microcirculation of Q1 to Q4 increased 47.16%, 18.78%, 37.03% and 20.01%, respectively. Completion of epithelialization over extraction sockets was observed within 3 to 4 weeks without clinical complications. There was no incidence of ORNJ in this patient during 2-year follow-up period.

Conclusions: This PBMT regimen could prevent ORNJ after extraction by increasing mucosal microcirculation immediate after therapy and promoting epithelization. These were repeated with favorable results in the patient undertaken 5 episodes of 8-tooth extractions.

S3-304

Fostering Dentist-patient Communication for Quality Clinical Care

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Objectives: The objective of this study is to discuss the essence and strategies of effective dentist-patient communication.

Methods: This study highlights the importance of these "soft skills" in clinical dental practice.

Results: Dentist-patient communication is a bidirectional process involving the exchange of ideas that should be clear (easy to understand), concise (to the point), correct (accurate), complete (with essential information) and cohesive (well-organised). The goal of effective communication is to empower patients with the knowledge required to make an informed decision about their own oral health. Dentist and patient can discuss clinical care objectives and professional opinions together to determine the best treatment option for the patient's oral health. Effective dentist-patient communication not only improves dentist's efficiency and boosts self-confidence, but also alleviates patient's dental anxiety and fear, addresses patients' needs and preferences, increases patients' adherence and enhances patient satisfaction. Dentists should take the patient-centered approach as premise and acquire skills in verbal and non-verbal communication to overcome communication barriers. The patient-centered approach comprises understanding patients' illness, shared decision making and mindful intervention at the patient's own pace. Verbal communication should involve simple, succinct, and jargon-free language. Proper body posture, gesture, facial expressions and eye contact are fundamental for showing positive attitudes towards patients.

Conclusions: Effective dentist-patient communication is vital for the success of dental practice. Dentists who prioritize communication and build positive relationships with their patients are more likely to achieve positive outcomes and foster the expansion of their dental practice.

S3-305
Dental Outreach Service to Hong Kong Students with Visual Impairment
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Objectives: The outreach service aimed to provide preventive dental care service and promote oral health care for the visually impaired students in Hong Kong.

Methods: Invitations were sent to all students and their parents of the Ebenezer School and Home for the Visually Impaired. Written consent was obtained from the parents before the activity. A simple oral examination was carried out to assess dental caries and oral hygiene status. Customized oral hygiene instructions (OHI) were given. Topical fluoride varnish and/or silver diamine fluoride (SDF) treatment was provided according to their need. After the treatment, written reports, which outlined the caries teeth, treatment provided, and recommended follow-up treatments were given to parents. An oral health education (OHE) talk, focusing on oral health homecare for the visually impaired was delivered to parents, caretakers, and staff. A post-service questionnaire was sent to all participants/staff to evaluate their satisfaction with the activity.

Results: Among 103 students invited, 73 (70.9%) participated in the outreach service and receive dental screening. Their mean (SD) age was 12.9 (4.7) years and 42.5% were female. One-third of them (31.5%) were unable to see at all. Sixty-two participants (85%) received topical fluoride varnish and/or SDF treatment. All of them (100%) received individualized OHI. Thirty-three staff/parents attended the OHE talk. After the outreach, most (>90%) of the staff and students reported that they were satisfied with the project.

Conclusions: Outreach dental care services have been successfully delivered to visually impaired students in Hong Kong. It received positive comments from all stakeholders.

S3-306
Attitude, Knowledge and Practice of Dentists in Providing Dental Treatments to HIV/AIDS Patients
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Objectives: The aim of this research is to evaluate the attitude, knowledge, and practice of dentists in Ho Chi Minh City towards providing dental care to The Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) patients.

Methods: A cross-sectional descriptive study design was employed to collect data from a group of dentists in the city.

Results: A total of 414 dentists participated in an online survey by responding to a questionnaire. Results indicated that 35.75% of dentists were willing to treat HIV/AIDS patients, 41.30% expressed a neutral opinion, and 22.95% were unwilling. Up to 90% of dentists regularly obtained medical and dental histories of their patients. Moreover, 77.29% of dentists were knowledgeable about Antiretroviral Therapy (ART) for treating HIV patients.

Conclusions: The results revealed a generally positive attitude among Ho Chi Minh City dentists towards providing oral health care services for HIV/AIDS patients. Most dentists paid attention to collecting patients' medical and dental histories and possessed knowledge of ART.

S3-307

Exploratory Study on Oral Health Care Difficulties among Elderly Residents in Long-term Care Facilities

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Objectives: To identify the challenges related to oral health care that elderly residents face in long-term care facilities, aiming to collect fundamental data for developing an effective oral health promotion program.

Methods: An exploratory study was conducted by interviewing seven elderly capable of communication and residing in long-term care facilities in South Korea. The data on the participants' cognition, activities of daily living, and overall health were collected through a structured questionnaire completed by their caregivers. Trained interviewers conducted interviews with the participants to gather responses on their oral health care experiences and also utilized direct observation of oral care practices to complete the data collection process.

Results: Elderly residents were not effectively resolved due to practical difficulties, such as the absence of dental professionals and challenges in accessing dental care. Some participants forwent self-care due to physical limitations. Despite their desire for oral care assistance, doubts about caregivers' capabilities, and considering it less vital compared to other caregiving tasks, many elderly residents in long-term care facilities restrain themselves from asking for help.

Conclusions: Elderly residents in long-term care facilities face difficulties maintaining proper oral hygiene due to systemic illnesses, cognitive impairments, and physical limitations. An oral health promotion program addressing these issues is essential. The program should ensure that caregivers provide suitable oral care that fulfils the residents' oral health conditions. Furthermore, it should ensure a seamless connection to dental specialists for appropriate treatment when residents experience oral pain or issues.

S3-308

Real-Time Fluorescence-based Oral Hygiene Assessment for Oral Care of Inpatients with Pneumonia

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Objectives: Geriatric inpatients with oral hypofunction exhibit poor oral clearance and develop an environment where biofilms can accumulate in the oral mucosa. Consequently, mucosal biofilms, which are rarely observed in healthy individuals, easily deposit and may cause pneumonia through aspiration. Herein, we propose a real-time method for detecting mucosal biofilms in elderly hospitalized patients with pneumonia and effectively removing pathological mucosal biofilms using Quantitative Light-induced Fluorescence (QLF) technology.

Results: A 78-year-old female patient with multiple severe comorbidities was hospitalized for pneumonia. Oral hygiene status was assessed using the QLF technology, which revealed severe oral malodor and poor oral hygiene. The accumulated biofilm on the oral mucosa was challenging to differentiate visually from normal mucosa owing to slight color differences. However, with QLF application, the pathogenic mucosal biofilm was easily observed as red fluorescence, allowing unambiguous differentiation from normal mucosa. Quantifying this color difference as $\triangle E$, the fluorescence evaluation using QLF ($\triangle E=19.78\pm9.55$) showed approximately five times higher values than the visual evaluation ($\triangle E=4.44\pm1.38$, $p<0.001$). After professional oral care, no red fluorescence was observed in the mucosal biofilm, indicating successful removal of the pathological oral biofilm.

Conclusions: QLF technology applied in oral care of geriatric inpatients enables easy detection and removal of mucosal biofilms, which are challenging to identify with the naked eye. This approach allows real-time oral hygiene assessment in frail patients and reduces unnecessary repetitive actions, thereby providing efficient oral care.

S3-309

Associations between Oral Hygiene and Possible Sarcopenia in Low-income Region

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Objectives: To investigate the associations between oral hygiene and possible sarcopenia in a low-income region, and to explore the role of potential mediators in their associations.

Methods: A cross-sectional study was performed among older persons in Mao County, China. Questionnaire, oral examination, and physical fitness test were performed. Univariable and multivariable logistic regression analyses were conducted to evaluate the relationships between oral hygiene and possible sarcopenia. Bootstrap method was used to evaluate the mediation effects.

Results: A total of 532 participants aged ≥60 years were included in the study. After adjusting for confounding factors (including gender, household type, health insurance, pension, education, and living alone or not), participants with decayed-filled root (DFRoot) had an increased risk (OR 1.444, 95%CI 1.019-2.046) of possible sarcopenia, compared with participants without DFRoot, where 13.7% of the total association was mediated by reducing chewing ability. And the participants with number of remaining teeth (NRT) ≥20 had a lower risk (0.493, 0.325-0.748) of possible sarcopenia, compared with participants with NRT <20. Of the total association between NRT ≥20 and possible sarcopenia, 6.8% was suppressed by reducing chewing ability.

Conclusions: DFRoot and NRT ≥20 were associated with possible sarcopenia. Their associations were partly explained by reducing chewing ability. Thus, it may be effective on preventing possible sarcopenia among the older persons by oral health management and chewing ability improvement. Our findings highlight the urgent need for oral hygiene measures in the management of sarcopenia.

S3-310

A Nomogram Model for Predicting the Risk of Root Caries in Individuals Aged 65-74 Years

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Objectives: Root caries is one of the most common oral diseases in elder people and impairs their oral health. However, no effective tool was developed to predict the risk of root caries in elder people. The study aimed to identify risk factors related to root caries in older people and to develop and evaluate a straightforward nomogram for estimating the risk of root caries in older adults.

Methods: A cross-sectional survey of 744 people aged 65 to 74 was carried out in Sichuan Province between October 2015 and June 2016. The univariate and multivariate analyses were used to identify suitable factors in the model. The five-fold cross-validation method was conducted to create and validate the nomogram model.

Results: After final regression analysis, 'chewing difficulty' (OR 2.01, 95%CI 1.33-3.05), 'dissatisfied with the appearance of teeth or dentures' (2.41, 1.70-3.42), 'medication to relieve oral pain' (1.66, 1.20-2.29), 'tooth sensitivity' (1.70, 1.21-2.41), and 'per capita household income'(0.85, 0.73-0.99) were identified and included into the nomogram model. The nomogram model demonstrated satisfactory predictability in disease recognition capabilities (AUC 0.716) by five-fold cross-validation.

Conclusions: Without oral examination, the nomogram model seems to be an effective tool for risk assessment of root caries in older people, even non-professional individuals, which shows good clinical value in early warning and graded treatment in geriatric dentistry.

S3-311

Interaction between SPP1 and Dental Pulp Cells in the Inflammatory Pulp Microenvironment

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Objectives: To prove that secreted phosphoprotein (SPP1) is an effective diagnostic marker in pulpitis and to determine the immunoregulatory and interactive effects of recombinant SPP1 on dental pulp cells (DPCs) and alterations of its odontogenic potential under an LPS-induced inflammatory microenvironment.

Methods: We integrated two microarray datasets GSE77459 and GSE92681, and identified differential expression genes. Immune infiltration in the inflamed pulp was studied using CIBERSORT. The relationship between SPP1 and immune cells were investigated and validated in clinical samples. Functions of SPP1 and its protein complexes were predicted. We stimulated DPCs with/-out lipopolysaccharides plus recombinant SPP1, and determined the expression of pro-inflammatory cytokines, Integrin Subunit Alpha 5 (ITGA5) and dentin matrix protein 1 (DMP1).

Results: SPP1 was a diagnostic marker in inflamed pulp associated with dendritic cells and macrophages. QRT-PCR and immunostaining showed an increased expression of SPP1 in the inflamed pulp ($p<0.05$). GSEA analysis indicated SPP1 had a function in extracellular matrix (ECM) interaction and PPI network plus CORUM Protein Complexes predicted a protein complex of ITGA5-ITGB1-SPP1. Recombinant SPP1 protein regulated ITGA5 expression, and enhanced mRNA expression of IL6 and IL8 but decreased odontogenic marker DMP1 in DPCs under LPS stimulation ($p<0.05$).

Conclusions: SPP1 is an immuno-related diagnostic marker for pulpitis. SPP1 is significantly elevated in the inflamed pulp, which plays a crucial role in extracellular matrix regulation and interacts with ITGA5. Recombinant SPP1 impairs odontogenic differentiation and promotes inflammation of DPCs under an LPS-induced inflammatory microenvironment.

S3-401

Integrated Analysis of the Periodontal Microbiome and Metabolome in Patients with Type 2 Diabetes Mellitus

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Objectives: There is growing evidence of a bidirectional link between periodontitis and type 2 diabetes mellitus (T2DM). But few studies have focused on the specific effects of glycaemic status on periodontitis-related microbes and metabolism. This study evaluated if periodontal microbiome and metabolome of T2DM patients is affected by glycaemic status.

Methods: Saliva and gingival crevicular fluid (GCF) samples were collected from T2DM patients with periodontitis. The patients were allocated into three groups according to systemic glycaemic status: good control (GC, HbA1c<6.5%, n=13), medium control (MC, 6.5%≤HbA1c≤7.0%, n=15), poor control (PC, HbA1c>7.0%, n=14). MC group and PC group can be refered to as IC (inadequete control) group. The microbiome was evaluated using full-length 16S rRNA gene sequencing, and the metabolome was accessed using gas chromatography-mass spectrometry.

Results: There were characteristic microorganisms and metabolites in each group under different glycaemic status. The structure and function of the flora in saliva and GCF showed similarity in GC group. In IC group, the flora in GCF showed higher α-diversity, and a more pronounced trend toward separation with the flora in saliva by β-diversity. There are also significant differences in metabolic pathways including biosynthesis and metabolism of some sugars and fatty acids between salivary and GCF in IC group.

Conclusions: Glycaemic status in T2DM patients seems to have an impact on periodontal microbiome and metabolome. When blood glucose control is inadequate, different niches such as saliva and GCF show different changing trends.

S3-402

Isobavachin Inhibits Osteoclastogenesis via Inhibiting Iron Accumulation and Mitochondrial Biogenesis and Counteracts Periodontitis in Mice

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Objectives: Periodontitis is highly prevalent bone disorders that pose major challenges to public health. Although pharmacological treatment of periodontitis has been extensively developed, safer and more effective therapeutics are still needed. Isobavachin (IBA) is a novel flavonoid compound proved to be efficacious in the treatment of osteoporosis. The aim of this study was to explore whether IBA is able to inhibit osteoclastogenesis and suppress periodontitis-associated bone loss, and investigate the underlying mechanisms.

Methods: The effect and underlying mechanism of IBA on osteoclast differentiation were illustrated *in vitro* and *in vivo* with RANKL-induced bone marrow–derived macrophages (BMMs) osteoclastogenesis and ligature-induced experimental periodontitis mice model. Healthy (age, 7–8 weeks) C57/BL6 mice were randomly divided into three groups (n=7 per group): control, periodontitis, and IBA.

Results: IBA inhibited RANKL-induced osteoclastogenesis and bone resorptive capacity *in vitro* and suppressed bone loss in experimental periodontitis *in vivo*. We found that IBA suppressed iron accumulation in osteoclast formation by elevating ferroportin (*Fpn1*) expression. Mechanistically, *Fpn1* silencing abrogated the inhibitory effect of IBA on osteoclastogenesis, while *Fpn1* overexpression aggravated osteoclastogenesis inhibition by IBA. In addition, activation of mitogen-activated protein kinase (MAPK) signaling pathway reduced IBA-induced Fpn1 expression, implicating that MAPK signaling pathway was involved in IBA-mediated Fpn1 expression in RANKL induced osteoclastogenesis. Further, IBA impaired RANKL-induced mitochondrial biogenesis, as evidenced by decreased mitochondria mass and mitochondrial DNA copy numbers. Meanwhile, IBA also reduced functional mitochondrial activities, as determined by measuring ATP production, mitochondrial superoxide and membrane potential.

Conclusions: These findings suggest IBA is a promising agent to combat periodontitis and other bone loss diseases.

S3-403

Anti-Inflammation of Mouthwash Containing Poly L-Lysine and Glycerol Monolaurate Stimulated with Oral *Helicobacter Pylori*

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Objectives: To investigate the efficiency of mouthwash containing poly L-Lysine and glycerol monolaurate in suppressing pro- inflammatory cytokines induced by oral *Helicobacter pylori* (*H. pylori*).

Methods: Ten strains of oral *H. pylori* isolated from patients with pocket depth ≥ 5 mm and Clinical attachment loss ≥ 5mm were used in this study. Mouthwash containing poly L-Lysine and glycerol monolaurate were tested for cytotoxicity to human periodontal ligament cells (PDL) using an MTT assay. The efficiency of mouthwash containing poly L-Lysine and glycerol monolaurate in suppressing pro-inflammatory cytokines induced by oral *H. pylori* in PDL cells was measured using real-time polymerase chain reaction (real-time PCR).

Results: The cytotoxicity of the mouthwash to PDL cells showed 4.8 % after incubating for 60 mins. *H. pylori* strains could give different levels of all pro-inflammatory cytokines (IL-1 β, IL-6, IL-8, TNF-α), which the interleukin (IL)-8 showed the highest cytokines (17.6-22.4 folds for PDL cells). After mixing with mouthwash, all pro-inflammatory cytokines were significantly decreased compared to the *H. pylori* strain alone. The IL-8 reduction showed 20.2±2.4 to 18.3±2.3 folds in PDL cells.

Conclusions: Mouthwash containing poly L-Lysine and glycerol monolaurate showed low cytotoxicity to oral cells and could reduce pro-inflammatory cytokines induced by oral *H. pylori* strains. Thus, mouthwash may give the benefit to prevent anti- inflammation stimulated by oral *H. pylori* in oral tissues.

S3-404

Anti-adhesion Ability of Oral Helicobacter Pylori by Mouthwash Containing Poly L-Lysine and Glycerol Monolaurate

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Objectives: The oral cavity served as a reservoir of *Helicobacter pylori* (*H. pylori*) in periodontitis patient with pocket depths (PD) more than 5 mm. *H. pylori* with cagA showed high virulence especially adhesion ability. Thus, this study aimed to examine the anti- adhesion ability of poly L-Lysine and glycerol monolaurate containing mouthwash against *H. pylori* strains to human oral keratinocyte epithelial cells (H357).

Methods: The five strains of *H. Pylori* with cagA and another 5 strains without cagA, isolated from periodontitis patients with PD≥5 mm and clinical attachment loss (CAL)≥5mm, were used in this study. All *H. pylori* strains were observed the anti- adhesion ability by mouthwash containing poly L-Lysine and glycerol monolaurate in H357.

Results: Oral *H. pylori* with cagA showed a significantly greater adhesion to H357 cells (71.7±5.3%) to strains without cagA (50.2±4.4%). The adhesion of *H. pylori* after adding the mouthwash was 0.5 - 0.9 folds lesser than *H. pylori* alone while the anti-adhesion property was observed greater in strains without cagA compared to the strains with cagA.

Conclusions: Poly L-Lysine and glycerol monolaurate containing mouthwash showed anti-adhesion to H357 cells of *H. pylori* strains. Therefore, this mouthwash could use to against the colonization of *H. pylori* in oral tissues and reduce the risk to be oral diseases.

S3-405

The Use of Platelet-Rich Plasma (PRP) and Growth Factors for Accelerating Healing and Preventing Complications

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Objectives: Platelet-rich plasma (PRP) and growth factors have attracted considerable interest in the field of oral surgery as potential therapeutic substances to promote wound healing and reduce postoperative issues. This review aims to thoroughly examine existing literature concerning the application of PRP and growth factors in oral surgery, with a particular emphasis on their effectiveness in expediting tissue healing and mitigating complications.

Methods: A thorough research was undertaken, utilizing electronic databases: PubMed, MEDLINE, and Cochrane Library to identify pertinent articles. The search incorporated keywords such as "platelet-rich plasma," "growth factors," "oral surgery," "wound healing," and "complications." The inclusion criteria encompassed clinical trials, randomized controlled trials, and observational studies that assessed the use of PRP and growth factors in oral surgery.

Results: The review successfully identified 12 articles that met the inclusion criteria. These studies consistently reported favorable outcomes of PRP and growth factors in facilitating wound healing across different oral surgical procedures, such as dental extractions, implant placements, and periodontal surgeries. Patients who received PRP and growth factor treatments experienced accelerated regeneration of soft tissues and bone, along with decreased postoperative pain and reduced occurrence of complications.

Conclusions: The application of PRP and growth factors in oral surgery exhibits great potential in enhancing wound healing and reducing complications. These biological agents have consistently shown their ability to expedite the regeneration of soft tissues and bone, resulting in better postoperative results and increased patient comfort. Nevertheless, further research is needed to standardize preparation protocols, dosage, and application methods, ensuring consistent and optimized therapeutic benefits.

S3-406

The Physical Assessment of Nano Chitosan in Inhibiting Release of Calcium Ion in Root Canals

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Objectives: To review the effect of using 2% nano-chitosan in inhibiting the release of calcium ions and the formation of the smear layer.

Methods: 32 premolars underwent endodontic extraction, irrigated with 2.5% NaOCl and 17% EDTA. Then given, 15% EDTA gel and chitosan gel. Atom absorption spectroscopy (AAS) analyzed the release of calcium ions, and changes in the dentinal tubules' morphology and the smear layer's formation was observed using SEM.

Results: The inhibition of calcium ion release by the Chitosan Nano group was better than that of the 15% EDTA group. The 5-minute treatment time in Nano chitosan had the best inhibition value (0.0012 (mg/L) $\pm$ 0.003) compared to the 10-minute, 15-minute, and 20-minute groups. There was a significant difference between groups ($p<0.005$; 0.003). Meanwhile, there was no significant difference in the 15% EDTA group ($p>0.05$; 0.825). Based on the morphology of the dentinal tubules, the nano-chitosan group showed more regular cleaning of the dentinal tubules (cleaning). In contrast, the 15% EDTA group was coarser and less structurally sound.

Conclusions: Nano chitosan better prevents calcium release on the root canal walls compared to 15% EDTA.

Session 4

S4-101

Caries Risk Factors in Indonesian Adult Based on National Survey

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Objectives: Although caries is a preventable disease, it is still a health burden in all countries in all age categories. This study aimed to identify the determinants of the risk factors for caries in Indonesian adults.

Methods: This secondary analysis used the 2018 National Health Survey data, which included 37,057 respondents ages ≥15 years old. The sampling design used census blocks with the probability proportional to size (PPS) linear systematic sampling. The survey included an interview to collect data on sociodemography, oral health practice, and health behavior. An oral examination was conducted to measure DMF-T (decay, missing, filling-tooth). Multivariate models were generated to estimate the odds ratio (OR) and confidence intervals (95% CI).

Results: The highest average DMF-T index was seen at the age of over 45 years, respondents who lived in rural, had low formal education, drank sweets once a day or more, did not brush their teeth regularly, and smoked. Multivariate analysis shows the potential risk of caries, namely some older adults have a risk of 16.99 times, men at 72%, live in rural areas at 95%, lower formal education 1.51 times, wear dentures 2.06 times, have no dental visits 1.36 times, drinking sweets often 1.28 times, not brushing teeth regularly 1.56 times, taking medicine regularly 1.15 times, smoking 1.3 times and chew betel 79%.

Conclusions: Middle and older adults have the highest number and risk factors for caries among other age categories. Sociodemography factors, health practice, and behavior contribute to the occurrence of caries in Indonesian adults.

S4-102

Oral Health Services for the Orang Asli Population in Perak: Addressing Disparities and Improving Access

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Objectives: This community-based project in Perak, Malaysia, aims to enhance public oral health services for the Orang Asli population. Objectives include assessing oral health needs and raising awareness for sustainable improvements.

Methods: The project adopts a participatory approach involving local communities, healthcare professionals, and stakeholders. Activities encompass clinical examinations and oral health education, conducted in schools, transit centers, and outreach programs. Data was collected from January to December 2022, analyzing clinical records of Orang Asli attending oral health services and outreach programs in Perak.

Results: Among the 60,565 Orang Asli, 22.7% received oral health services, with 46.9% requiring dental treatment. Children aged 6 to 12 had dental caries prevalence of 20.9% and mean DMFT of 0.22. Only 19.4% of adults aged 15 and above had a healthy periodontium. 43.9% of adults were screened for oral cancer, with 15.5% exhibiting high-risk habits. The project provided dental health education to 6,640 and tooth brushing drills for 4,693 participants. Case completion for comprehensive dental treatment was 72.4%. Barriers to accessing dental services were identified, such as language, transportation, and culturally sensitive care limitations. Nevertheless, the project revealed strong community engagement and willingness to improve oral health outcomes.

Conclusions: Addressing oral health disparities for the indigenous population requires a multi-faceted approach, including culturally sensitive programs, mobile dental teams, training community health workers, and collaboration with indigenous leaders and authorities.

S4-103

Public-Private-Partnership: Way to Enhance Oral Health Service Utilization among Children under Universal Coverage Health Scheme

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5. Bang Krathum Hospital, Thailand
6. Samut Prakan Provincial Public Health Office, Thailand

Objectives: To develop a public-private partnership (PPP) model for oral health services in Bang Pu Subdistrict Municipality and Phraek Sa Town Municipality, with the primary goal of increasing oral health service utilization among children age 3-6 years.

Methods: The research team was coordinating local government budgets from the health promotion fund to procure preventive dental services from private dental clinics in Bang Pu Subdistrict Municipality and Phraek Sa Town Municipality. An information system, a web-based application called "ThaiDER", was also developed to facilitate data collection, auditing, and evaluation of the intervention.

Results: Children aged 3-6 years (428 in total) received dental services, with 318 from Bang Pu Subdistrict Municipality and 110 from Phraek Sa Town Municipality. These numbers represent 16.32% and 8.6% of the target children in both municipalities, respectively. The services rendered to the children covered dental examinations, dental X-rays, and fluoride varnish application (restricted to Phraek Sa Town Municipality). Furthermore, 223 children underwent caries control procedures.

Conclusions: The project's outcomes highlight the potential of utilizing local health resources to enhance oral healthcare for the population in the study area. The success achieved through the PPP model emphasizes the importance of coordination between central government policies, local government bodies and private facilities in establishing effective oral health interventions.

S4-104

Barriers to Oral Health Care Among People Living with HIV/AIDS in Ho Chi Minh City

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Objectives: This study aimed to investigate obstacles hindering the availability of oral health care services and to look for factors influencing these hindrances among people living with HIV/AIDS (PLWHA) residing in Ho Chi Minh City, Vietnam.

Methods: A comprehensive 27-item scale assessing barriers to oral health care among PLWHA was developed and validated. The research included two phases. Initially, a cross-sectional study was conducted, involving 1000 PLWHA (aged 18 and above) from Ho Chi Minh City. These participants anonymously responded to an online questionnaire containing the oral health care barrier scale. Subsequently, in the second phase, 30 individuals with elevated barrier scores were selected for in-depth interviews. Trained interviewers engaged with these participants to discuss factors contributing to the identified barriers.

Results: Within the PLWHA community in Ho Chi Minh City, several categories of barriers to oral health care access were identified, including financial difficulties (73.1%), administrative complexities (54.4%), fear (49.4%), consciousness (44.8%), awareness (33.7%), and physical accessibility (32.3%). Four primary factors were ascertained as contributors to these barriers: societal stigma and discrimination, self-stigmatization, financial burdens associated with dental treatment, and complicated administrative processes.

Conclusions: This research underscores various challenges confronted by PLWHA in accessing oral health care services in Ho Chi Minh City. Effective resolution of these barriers necessitates a strategic emphasis on developing policies that prioritize oral health care for this patient group within the community.

S4-105

Managing Dentine Hypersensitivity in Older Adults with Silver Diamine Fluoride: A double-blind Randomized Clinical Trial

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Objectives: This study aimed to investigate the desensitizing effect of topical application of 38% silver diamine fluoride (SDF) solution on hypersensitive teeth due to exposed root surface in older adults.

Methods: This trial recruited healthy older adults with dentine hypersensitivity. A trained examiner assessed all hypersensitive tooth-root surfaces with a blast of compressed cold air from a three-in-one syringe and participants gave a self-reported sensitivity score (SS) from 0 (no pain) to 10 (maximum pain). Participants received 38% SDF or 5% potassium nitrate (control) solution as intervention on the most hypersensitive tooth-root surface (with the highest pre-intervention SS) before being tested at the second time and giving a second SS at the baseline visit. The same examiner assessed the most hypersensitive tooth-root surface with compressed cold air at 4-week and 8-week follow-up visits before intervention. The primary outcome was the change in SS in response to air stimulus at 8-week follow-up visit. Shapiro-Wilk and Mann-Whitney U tests were conducted for data analysis after normality test of SS.

Results: This trial recruited 148 older adults with 139 (94%) completed the study and being assessed at 8-week follow-up visit. The median percentage reduction in SS in the SDF and potassium nitrate groups were 60% and 50%, respectively ($p<0.001$).

Conclusions: According to this clinical trial, 38% SDF solution reduces dentine hypersensitivity on exposed root surface of older adults. Moreover, 38% SDF solution is more effective than 5% potassium nitrate solution in reducing dentine hypersensitivity on exposed root surface of older adults.

S4-106

Early Childhood Caries Prevalence and Associated Factors among Children in Huizhou, China

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Objectives: This cross-sectional study examined the prevalence of early childhood caries (ECC) and its associated factors among 3- to 5-year-old children in Huizhou, China.

Methods: Children were recruited from 21 kindergartens using a multistage sampling method. Two examiners performed oral examinations of the children. Children's dental caries experience was assessed following the World Health Organization criteria. Children's caries activity, malocclusion, tonsil size, and pH value of saliva were also assessed. Parental questionnaires collected information about the child's demographics, snacking habits, feeding habits, oral-health-related behaviors, and dental visit experiences.

Results: This study invited 1,485 children and eventually recruited 1,348 (53.1% boys) (response rate: 90.8%). The ECC prevalence rate was 74%, 58% for 3-, 71% for 4- and 81% for 5-year-old. The mean dmft score was 5.15. The results of the regression model indicated the prevalence of ECC was associated with age ($p<0.001$), Cariostat score ($p<0.001$), spacing ($p<0.001$), tonsil grading score ($p=0.013$), singleton or non-singleton ($p=0.002$), sugary snacking habit before bed ($p<0.001$) and breastfeeding duration ($p=0.050$).

Conclusions: ECC was prevalent among 3-to 5-year-old preschool children in Huizhou, China. Childre's age, caries activity, tonsil, malocclusion, family background sugary snacking and breastfeeding habits were related to ECC's prevalence.

S4-107
Alcohol Consumption and 10-year Mortality in Oral and Pharyngeal Cancer

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Objectives: Previous studies on the association of alcohol drinking with the prognosis of patients with oral and pharyngeal cancer are scarce and conflicting. Most previous studies are surveys from Europe, and examined up to 5 years of overall survival. We therefore evaluated the association between alcohol consumption and 10-year mortality among oral and pharyngeal cancer patients in Japan.

Methods: 3,053 eligible cancer patients diagnosed between 1975 and 2010, identified through a hospital-based cancer registry in Japan, were followed up for up to 10 years. Alcohol consumption was used to divide subjects into five categories: non-drinker, ex-drinker, light ($\leq$23 g/day of ethanol), moderate (23 < to $\leq$ 46 g/day of ethanol), and heavy drinker (> 46 g/day of ethanol), respectively. A Cox proportion hazards regression model was conducted to evaluate the association of alcohol consumption with 10-year all-cause mortality adjusting for sex, age, primary site, cancer stage, number of multiple cancers, radiotherapy treatment, smoking status and diagnosis year.

Results: Ex-drinker and heavy drinker cases had a significantly higher risk of death than non-drinkers (ex-drinker; HR=1.44; 95% CI,1.18-1.75, heavy drinker; HR=1.28; 95% CI,1.09-1.51). Heavy drinkers had a significantly higher risk of death than non-drinkers in both men and women (men; HR=1.25; 95% CI,1.05-1.50, women; HR=2.49; 95% CI,1.44-4.30).

Conclusions: Among oral and pharyngeal cancer patients, an elevated risk of death was observed for heavy drinkers who consumed more than 46 g/day of ethanol compared with non-drinkers. In addition, this relationship was observed in both men and women.

S4-108
Radiographic Periodontal Findings are Associated with Declined Intrinsic Capacity Among Older People in Mao County

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Objectives: To explore whether severe periodontitis diagnosed by panoramic radiography is associated with declined intrinsic capacity (IC) among people $\geq$50 years in Mao County.

Methods: 230 individuals who participated in the 2021-2022 West China Health and Aging Trend study (WCHAT) and voluntarily underwent an oral panoramic radiography examination were included in this study. Diagnosis of severe periodontitis was based on the measure of radiographic periodontal bone loss (R-PBL). Considering tooth loss as the adverse endpoint of periodontitis, the number of missing and remaining teeth was also recorded and analyzed. The status of IC decline was determined by the grades of the locomotion (Short Physical Performance Battery), cognitive (Short Portable Mental Status Questionnaire), psychology (15-item Geriatric Depression Scale), vitality (Mini Nutritional Assessment-short form), and sensory (self-reported visual and hearing problems) domains.

Results: 48 of 230 participants were detected with declined intrinsic capacity in this study. People with severe periodontitis (OR 2.19, 95% CI 1.01-4.88), more missing teeth (1.07, 1.00-1.14), and incomplete functional dentition (0.41, 0.17-0.99) were more likely to experience IC recession at the same time after adjusting for confounders, such as age, gender, education level, socio-economic status, consumption of cigarettes, alcohol, and tea, and systemic chronic diseases ($p<0.05$).

Conclusions: Severe periodontitis, tooth loss, and the loss of functional dentition detected by panoramic can predict the decline of intrinsic capacity. This provided evidence for the association of periodontitis with functional deterioration in older adults.

S4-109
New Measure of Functional Tooth Loss for Successful Oral Aging

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Objectives: To evaluate the impacts of functional tooth loss on oral health-related quality of life (OHRQoL) in older people, compared to other common indicators. The cutoff of functional tooth loss required for a better OHRQoL was investigated to establish a new measure for successful oral aging.

Methods: The training data of people aged 65-74 years were extracted from the Fourth National Oral Health Survey in Sichuan. The validation dataset was from a two-year prospective cohort in Mao Country. Functional tooth loss was defined as both natural tooth loss and nonfunctional teeth such as third molars, residual roots, and removable dentures. The cutoffs of functional tooth loss were identified as 12, based on the definition of functional dentition, and 14/16/18 for further investigation. OHRQoL was evaluated by the standardized GOHAI (sGOHAI) score. Logistic regression were performed to estimate the impacts on OHRQoL.

Results: Older people who lost ≤12 functional teeth had greater odds of reporting a higher sGOHAI score than those who lost more functional teeth in both training dataset (OR1.49, 95%CI1.05-2.11) and validation data (3.41,1.17-9.94). However, no association was found between OHRQoL and number of missing natural teeth, number of occluding pairs or functional dentition after adjustment. Additionally, no significant difference of sGOHAI was detected between people who lost 13-16 functional teeth and those who lost ≤12 functional teeth.

Conclusions: Functional tooth loss can be a better indicator of OHRQoL, compared to other indicators. Sixteen remaining functional teeth seem to be sufficient to maintain good OHRQoL and successful oral aging.

S4-110
The Effectiveness and Economics Evaluation of Topical Fluoride Application for Preventing Caries in Preschool Children

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Objectives: To evaluate the effect of fluoride varnish on caries prevention in preschool children for one year in Nanning, Guangxi. And evaluate the health economics effect by cost-effectiveness analysis and cost-benefit analysis.

Methods: A total of 639 preschool children aged 3～4 years old from 6 kindergartens were randomly selected in Nanning, Guangxi. The subjects were also randomly divided into the intervention and control groups. Oral health education and oral examination twice a year were conducted in the control group. Topical fluoride varnish interventions twice a year were also done in the intervention group A decision tree model was established by using TreeAge pro2019, and health economics was evaluated through cost-effectiveness analysis and cost-benefit analysis.

Results: The results of the baseline showed that no statistically significant differences were observed between the intervention group (prevalence of caries was 60.4%, mean dmft was 3.55±4.41) and the control group (60.1%, 3.27±3.98). After intervention for one year, the caries situation in the intervention group (66.8%, 4.12±4.60) was lower than the control group (75.0%, 5.11±4.86), and the differences were statistically significant. The results from cost-effectiveness analysis and cost-benefit analysis showed that it costs ¥430.52 per child to prevent caries, with a cost-benefit ratio of 1.24. And it cost ¥28.70 per child to prevent one decayed deciduous tooth, with a cost-benefit ratio of 0.12.

Conclusions: The topical fluoride application is effective in preventing deciduous tooth caries and has good economic benefits, and it is recommended to promote large-scale promotion and application.

S4-111

Immediate Laser-Induced Coagulation after Tooth Extraction to Prevent Complications in Compromised Bleeding Tendency Patients

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Objectives: Diode lasers were proposed to prevent complications and promote wound healing after tooth extraction in patients with underlying condition-induced bleeding tendencies.

Methods: Two cases of bleeding tendency diagnosed as liver transplantation and factor VIII deficiency needed tooth extraction under local anaesthesia. The diode laser-initiated blood coagulation and rapidly induced blood clots to prevent delayed or post-extraction bleeding. This also promoted wound healing. Accordingly, the 980 nm diode laser at 3W continuous wave with a 350-micron optical fiber was performed for tissue loosening via sulcus. Then, the 635 nm diode laser at 200 mW 4J/cm2 continuous wave was irradiated for 10 seconds via an 8 mm photobiomodulation probe to the extraction socket for initiating blood clots. This procedure was repeated for 4 sessions. A 10-minute of pressure was used to reassure hemostasis.

Results: Diode lasers as described in both bleeding tendency cases allowed us to enhance hemostasis during operation and reach excellent control of postoperative bleeding after tooth extraction. Post-extraction of pain and edema of soft tissues was less compared with the previous similar treatment without using laser therapy. Both patients and their caregivers were satisfied during and after the patient had undertaken oral surgery.

Conclusions: The application of photocoagulation and photobiomodulation using 980nm and 635nm diode lasers is considered a practical innovation that can be successfully used in surgical treatment in patients with bleeding tendencies for preventing postoperative complications and promoting soft tissue coverage after tooth extraction.

S4-201

Effects of Sugar Substitute Consumption on Cariogenic Bacteria in Dental Plaque: A Systematic Review

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Objectives: The use of sugar substitutes in food products has recently increased. The study aims to investigate the effects of sugar substitute consumption on reducing cariogenic bacteria in dental plaque.

Methods: A systematic search was performed in three databases (PubMed, EMBASE and Web of Science). The search keywords included 'dental caries', 'sugar substitutes', 'dental plaque', 'microbiome' and 'mutans streptococci (MS)'. The outcome of the studies included cariogenic microflora changes in dental plaque. Prospective controlled trials published in English during 1963-2023 were included in the review. Two independent reviewers screened the papers, and the risk of bias for the included articles was assessed using the Cochrane risk-of-bias tools.

Results: Among the 880 studies identified, 16 prospective controlled trials were included. Half of studies were considered as high risk of bias (50%, 8/16). All studies investigated sugar alcohols (low-intensity sweeteners); xylitol was the most commonly investigated (100%), followed by sorbitol (56.3%) and maltitol (12.5%), whereas there were no trial investigating high-intensity sweeteners such as sucralose, saccharin, aspartame or stevia. All studies (100%) investigated the effect of xylitol on the amount of cariogenic bacteria. Out of 16, 15 xylitol studies (93.8%) showed a significant reduction of cariogenic microflora in dental plaque.

Conclusions: The consumption of xylitol as a sugar substitute has a positive effect on reducing cariogenic bacteria in dental plaque. There is no clinical evidence regarding the role of high-intensity sweeteners on cariogenic bacteria in dental plaque.

S4-202

Construction of Injectable Hydrogel Based on ROS and Fluoride-releasing for Caries Management

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Objectives: This study was aimed to construct an injectable alginate hydrogel loaded with Cu-Mn nanozymes and sodium fluoride to inhibit caries pathogenic bacteria and induce enamel remineralization without disturbing the oral homeostasis and surrounding mucosal tissue.

Methods: Cu@Mn nanozymes were prepared by gas-assisted soft template solvothermal process and high-temperature calcination. Scanning electron microscopy (SEM), transmission electron microscopy (TEM), X-ray diffraction (XRD), X-ray photoelectron spectroscopy (XPS), and high-resolution transmission electron microscopy (HRTEM), dynamic light scattering (DLS), and nitrogen adsorption-desorption were used to characterize the morphologies. Then, a certain amounts of Cu@Mn nanozymes and sodium fluoride (NaF) were loaded into the injectable sodium alginate (SA) hydrogel (SA-Cu@Mn-F hydrogel), which was composed of two pre-gels A and B. Component A consisted of a homogeneous colloid mixture of calcium carbonate, sodium alginate, Cu@Mn nanozymes, and NaF. Component B consisted of a homogeneous colloid mixture of sodium alginate and D-(+) -glucose-δ-lactone.

Results: Results showed that SA-Cu@Mn-F hydrogel had good oxidase-like activity (OXD), peroxidase-like activity (POD), and the ability to produce reactive oxygen species (ROS). excellent photothermal performance and photostability under the irradiation of near-infrared light (NIr). SA-Cu@Mn-F hydrogel was able to kill planktonic bacteria, and inhibit or destroy plaque biofilms under NIRL, and also induce enamel remineralization *in vitro* and *in vivo* rat model.

Conclusions: This novel strategy provides a promising and non-invasive treatment for dental caries and protects oral health.

S4-203

Effect of Dual-species Biofilm between *Streptococcus mutans* and Non-*albicans Candida* on Biofilm Mass and pH

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Objectives: *Candida albicans* (*C. albicans*, Ca) enhances *Streptococcus mutans* (*S. mutans*, Sm) biofilm formation, but little is known about the effect of other common Non-*albicans Candida* species (NACs), such as *Candida tropicalis* (*C. tropicalis*, Ct). We aimed to determine the impact of interactions between *S. mutans* and *C. tropicalis* in comparison to co-culturing with *C. albicans* in terms of biofilm formation and biofilm pH.

Methods: Single-species and dual-species biofilms of *S. mutans* and *C. albicans* or *S. mutans* and *C. tropicalis* were cultured for 36 h. Biofilm mass was measured using the crystal violet assay at 36 h, while biofilm pH was measured at 0 min, 15 min, 30 min, 45 min, 1 h, 2 h, 3 h, 4 h, 8 h, 12 h, 24 h and 36 h. The dual-species biofilm mass was calculated relatively to the sum of single-species biofilms. The biofilm mass data was analyzed using a t-test with a significant level of 0.05. The pH values were compared to the critical pH of enamel (pH=5.5).

Results: Dual-species biofilms of Sm-Ca and Sm-Ct showed significantly higher biofilm mass compared to the sum of respective single-species biofilms ($p<0.01$). There was no significant difference between the dual-species biofilms of Sm-Ca and Sm-Ct. The pH levels of both types of dual-species biofilms were similar to those of *S. mutans* throughout 36-h, falling below the critical pH of enamel within approximately 2 h.

Conclusions: Co-culturing *S. mutans* with *C. albicans* or with *C. tropicalis* enhances biofilm mass and exhibits similar pH changes to that of *S. mutans* single-species biofilm.

S4-204

Physichemical Characterization of Extrinsic Black Tooth Stain on the Deciduous Tooth

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Objectives: To study the physical and chemical properties of extrinsic black tooth stain (EBS) on the deciduous tooth.

Methods: A trained dentist collected the supragingival plaque samples from labial or buccal surfaces of the teeth with EBS and without dental caries or restorations. The collected samples were cleaned and purified by alkali-soluble acid precipitation method. The scanning electron microscopy (SEM) was used to study the physical structure of the stain. Energy dispersive spectroscopy (EDS) was used to analyze the elemental constitution. The functional group was studied by pyrolysis gas chromatography-mass spectrometry (PY- GC-MS).

Results: In total, 107 samples were collected and purified. The SEM showed that the stain was nano flake particles with irregular shapes, which were intensively interlaced and adhered to each other. Their surface was smooth and with no impurities. The dominant elements of the stain were carbon (82%) and oxygen (14%). Less than 1% iron and sulphur also can be found. The degradation products of the stain included 55 chemical compounds, and they mainly belonged to hydrocarbon chain groups. No typical melanin degradation products, such as benzene ring and indole, were obtained.

Conclusions: Extrinsic black tooth stain on primary teeth was hydrocarbon chain groups in forms of nano particles, which deposited on tooth surfaces. More studies are still warranted to further elaborate its molecular skeleton and chemical structure.

S4-205

My Child's Oral Health Program

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Objectives: The study aimed to assess the oral health status and the oral health-related behaviors of children who participated in the "My Child's Oral Health Program" in Kuwait.

Methods: Starting in September 2017, children receiving their vaccines at the Primary Health Care Centers underwent an oral examination and fluoride varnish application. Their parents completed caries risk assessment questions and participated in an oral health promotion program for 5 visits. These procedures were done after a consent form was obtained by their parents/guardians. Fourteen dentists attended a training course both theoretical and hands-on before joining the program. Six newly created forms were used such as consent form, oral screening, questionnaire, and caries risk assessment. Children with caries were referred to a pediatric dentist.

Results: In 2020, the total number of recruited children was 3,049. Their mean age was 2.04 years. Gender distribution was 51% females and 49% males. Their mean dmft score was 0.67. On the first visit, 87% of parents/guardians mentioned that the primary teeth are important, whereas 95% on the last visit reported the importance of primary teeth. There was a reduction in bottle feeding from the first visit (66%) on the first visit to 48% on the fifth visit. The habit of daily toothbrushing increased from 40% and 86% in the first and fifty visits, respectively.

Conclusions: Out of 10, x Infants and toddlers have developed dental caries. Their parents reported that they have improved their oral health-related habits after participating in the program. The implementation of "My Child's Oral Health Program" from infancy is the infrastructure of optimal oral and overall health for life.

Descriptive Study of Traumatic Dental Injuries of Young Permanent Teeth

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Objectives: To investigate the status of traumatic dental injuries (TDI) of young permanent teeth.

Methods: All 7-11-year-old children with TDI of young permanent teeth of first visit as emergency in Department of Stomatology of the Affiliated Hospital of Qingdao University during 2017-2022 were collected. Age, gender, visit time after dental injury, scene, tooth number, tooth position, type of dental injuries and correlative soft tissue injuries were analyzed.

Results: 111 children were collected and boys were more than girls (boy=78, girl=33). 213 young permanent teeth were involved. There was no significant difference of age between boys and girls via independent-samples T-test (mean age: boy=9.04±1.23, girl=9.37±1.48). 8-year-old children were most susceptible to TDI. 53% children visited hospital for treatment during 6 h-24 h after TDI occurred. School became the most place where TDI occurred. Upper central incisors were exposed most to TDI. Tooth fracture was the most important reason for hospital visit. 31% of TDI occurred with gingival laceration.

Conclusions: Boys suffer TDI more than girls. TDI of upper central incisors and tooth fractures are paid more attention to by parents according to the hospital visit records.

***In Vitro* Remineralization of ClinproTM XT Varnish, A Resin-modified Glass Ionomer, on Enamel Caries**

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Objectives: To evaluate the remineralization ability of Clinpro[TM] XT varnish compared to Fuji VII and Duraphat® on enamel caries in a proximal model.

Methods: Artificial enamel carious lesions were created on 48 human tooth specimens. The specimens were then randomly divided into four groups (n=12/group): (1) Clinpro[TM] XT varnish, (2) Fuji VII, (3) Duraphat®, and (4) control Before applying the materials to the demineralized surface, the baseline lesion depth was measured using micro-computed tomography. Subsequently, the specimens were attached to a proximal model and subjected to seven days of thermocycling and pH cycling. The lesion depth of all specimens was re-evaluated. Additionally, four specimens from each group were coated and immersed in artificial saliva at 37°C for one and four weeks, and the amount of fluoride, phosphate, and calcium ion was measured. ANOVA with multiple comparison tests was used to evaluate the differences between groups ($p<0.05$).

Results: The use of Clinpro[TM] XT varnish and Fuji VII has significantly reduced the depth of enamel carious lesions compared to a control group ($p<0.05$). During the first week, Clinpro[TM] XT varnish had a significantly lower fluoride ion release than Fuji VII and Duraphat®. However, after four weeks of incubation, there was no significant difference in the release of fluoride, phosphate, and calcium ions among the three groups.

Conclusions: Clinpro[TM] XT varnish has the potential to be a material of choice to promote remineralization of enamel caries.

S4-208

EDTA-Functionalized Silica Nanoparticles as a Conditioning Agent for Dentin Bonding Using Etch-and-Rinse Technique

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Objectives: To investigate the possibility of using Ethylenediaminetetraacetic acid functionalized silica nanoparticles (EDTA-SiO$_2$) as a dentin-conditioning agent using etch-and-rinse technique to promote the durability of dentin bonding.

Methods: SiO$_2$-EDTA were synthesized and characterized by flourier transform infrared spectroscopy (FTIR), thermogravimetric analysis (TGA), and X-ray photoelectron spectroscopy (XPS). The capacity of SiO$_2$-EDTA to chelate calcium ions from dentin was examined by inductively coupled plasma-atomic emission spectrometry (ICP-AES). The dentin surfaces conditioned with SiO$_2$-EDTA were detected by Field emission scanning electron microscopy (SEM), Transmission electron microscopy (TEM) and microhardness testing. For dentin bonding, dentin surfaces were adopted wet- or dry-bonding technique after conditioned with EDTA or SiO$_2$-EDTA and rinsed, then the surfaces were bonded with adhesive and applied composite resin on them. The durability of dentin bonding was evaluated by microtensile bond strength test, SEM, in-situ zymography and nanoleakage testing.

Results: FTIR, TGA and XPS results indicated that EDTA has been connected to the surface of silica nanoparticle. SEM, TEM and microhardness results indicated that the dentin surface conditioned with EDTA-SiO$_2$ created extrafibrillar demineralization and retained more intrafibrillar minerals. SiO$_2$-EDTA group achieved acceptable bond strength, and reduced the activity of matrix metalloproteinase and nanoleakage along bonding interface.

Conclusions: Dentin extrafibrillar demineralization could be achieved by SiO$_2$-EDTA to improve dentin bond stability, which may have the potential to be used in clinic to promote the life of restoration bonding.

S4-209

Challenge-Based Learning in Dental Education

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Objectives: This presentation describes the concept of inclusion, principles and design, implementation, and supervision of Challenge- based learning (CBL) in dental courses for the adaptation of this learning framework to dental education.

Methods: CBL concepts are derived from a variety of educational theories and approaches, such as problem-based learning and inquiry- based learning. However, unlike problem-based learning and other approaches, in CBL students generate and find solutions to the challenges they face. CBL comprises three phases: 'Engage'-through a process of essential questioning, learners (students) move from a big idea to a concrete and effective challenge, 'Investigate'- all students plan and participate in a journey that forms the basis of solutions and addresses academic requirements, and 'Act'- evidence-based solutions are designed for application to an authentic audience.

Results: CBL is a collaborative and multifaceted learning experience that allows students, teachers, stakeholders, researchers, families, and society to work together to identify and solve real-world challenges. CBL considers the social impact of an idea rather than just corporate benefits. It helps students develop an in-depth knowledge of the subjects of their study by collecting knowledge from a variety of sources and forming a team to plan solutions with cognizance of quality and ethics in decision- making and addressing real-world challenges.

Conclusions: CBL has been implemented in science, engineering, and medicine, but not in dentistry. It can be applied to dental education so that students can create and face challenging questions and solve them based on practical perspectives.

S4-210

Activity, Distribution, and Colocalization of Cathepsin K and Matrix Metalloproteases in Intact and Eroded Dentin

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Objectives: This study aimed to investigate the activity, distribution, and colocalization of cathepsin K (catK) and matrix metalloproteases (MMPs) in intact and eroded dentin *in vitro*.

Methods: Eroded dentin was obtained through consecutive treatment with 5% citric acid (pH=2.3) for 7 d, while intact dentin was left untreated. The activity of catK and MMPs was measured spectrofluorometrically after extracting aliquots of pulverized dentin powder from both intact and eroded dentin. Double-labeling immunefluorescence was performed on dentin slices to evaluate the distribution and colocalization of catK and MMPs (MMP-2 and MMP-9). The distribution and colocalization of enzymes were analyzed by using inverted confocal laser scanning microscopy (CLSM), and the colocalization rate was quantified by Leica application suite advanced fluorescent (LAS AF) software. One-way analysis of variance (ANOVA) showed that the activity of catK and MMPs significantly increased in eroded dentin compared with intact dentin.

Results: After erosive attacks, catK, MMP-2 and MMP-9 were intensely localized in the eroded regions. Furthermore, the colocalization rates of catK and MMP-2 and catK and MMP-9 were 13- and 26-fold higher in eroded dentin than in intact dentin, respectively.

Conclusions: Based on the current findings, catK, MMP-2, and MMP-9 may function synergistically to play pathophysiological roles in dentin erosion.

S4-211

More Plain Water, Less Dental Caries? A Study of Preschool Children in Shanghai, China

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Objectives: To investigate the association between the consumption of plain water and dental caries in children at the age of five.

Methods: In the year 2018, a total of 1992 5-year-old children from 16 districts in Shanghai were enlisted using Stratified cluster random sampling. Oral examinations were conducted by calibrated dentists following the World Health Organization's method and criteria. The frequency and amount of plain water consumption among the children was assessed through a questionnaire administered by their parents.

Results: Children who consumed plain water three times per day or less had a higher caries prevalence of 53.3% compared to those who consumed it 4-5 times per day (45.6%) and those who consumed it more than 5 times per day (44.1%) ($P = 0.002$, chi-square tests). The decayed, missed, and filled teeth (dmft) scores of the three groups were 2.37 ± 3.30, 1.88 ± 2.96 and 1.73 ± 2.76, respectively ($P < 0.001$, Kruskal-Wallis test). Compared to the children who consumed three times per day, those who consumed between 4-5 times per day had an odds ratio (OR) of 0.75 ($P=0.007$), while those who consumed water more than five times per day had an OR of 0.72 ($P=0.006$), after adjusting for potential confounder using logistic regression. Likewise, inverse associations linking water volume intake and dental caries were identified.

Conclusions: The present study suggests that consuming plain water may serve as a potential protective measure against dental caries in five-year-old children. Promoting increased water intake may holds a role in preventing caries among children.

S4-301
Construct an Oral Health Education Strategy for Adolescents: A Qualitative Study

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Objectives: This qualitative study aimed to develop an effective oral health education (OHE) strategy for adolescents by exploring their perspectives of adolescents on OHE and identifying factors that may influence their engagement.

Methods: Semi-structured interviews were conducted with 20 adolescents aged 13 to 15 years, and thematic analysis was used to analyze the data. The topic guide included questions on attitudes towards OHE, perceived benefits and barriers, and preferences for delivery format.

Results: The findings revealed adolescents desired practical education on oral health, with a focus on what constitutes a healthy or unhealthy oral condition, causes of tooth decay and gum bleeding, and proper toothbrushing techniques. They addressed questions related to orthodontic treatment and bad breath, whereas they lacked knowledge of sugar consumption and dental flossing. Participants emphasized the benefits of good oral health for appearance rather than overall well-being. Barriers to engagement with OHE included no personal relevance (perceiving oral health as no/little relevant to their lives and personal health goals); social stigma (perceiving oral health problems as embarrassing or stigmatizing); diverse socioeconomic and cultural backgrounds; and no parental involvement (no support or reinforce on their children's oral health behaviors). Interactive and engaging formats like videos and Q&A sessions were preferred over traditional lectures.

Conclusions: An OHE strategy was developed that caters to the needs and preferences of adolescents. The delivery format is mobile messaging, which includes videos and Q&A addressing topics that adolescents are concerned about. Culturally sensitive and linguistically appropriate education, emphasizing personal relevance, and parental involvement may increase OHE engagement and effectiveness.

S4-302
Dietary Fiber Related to Sleep Bruxism: An Exploratory Study

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Objectives: Nutrients are related with sleep conditions. However, it remains unclear whether sleep bruxism (SB) is related with nutrients. The objective of the present research was to identify nutrients related to SB and to establish a hypothesis regarding the relationship between SB and nutrients.

Methods: We recruited 143 Japanese university students in 2021 and assigned them to SB (n=58) and non-SB groups (n=85) using an identical single-channel wearable electromyography device. To investigate nutrient intakes, participants answered the Food Frequency Questionnaire Based on Food Groups. We assessed differences in nutrient intakes between the SB and non-SB groups.

Results: Sex, age, height, weight, alcohol, dietary fiber, folic acid, vitamin C, sodium, and chromium tended to be related to SB ($p<0.2$). Logistic regression modelling showed that SB occurrence was associated with lower dietary intake of fiber (odds ratio; 0.91, 95% confidence interval; 0.83–1.00, $p=0.059$). In addition, subgroup analysis in selecting students in the top and bottom quartiles of dietary fiber intake showed that students with SB had significantly lower dietary fiber intake (10.4 ± 4.6 g) than those without SB (13.4 ± 6.1 g) ($p=0.022$).

Conclusions: The present exploratory research showed that dietary fiber intake may be related to SB. We hypothesized that more intake of dietary fiber would suppress SB in young adults.

S4-303

Psychosocial Impact on Oral Health-related Quality of Life in Myanmar

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Objectives: This study aims to evaluate the effects of socioeconomic, behavioral, and psychological factors on oral health- related quality of life (OHRQoL) in Myanmar adults.

Methods: Data were from a convenience sample of Myanmar adults who are from a township health center in Yangon city. Face-to-face interviews using a paper-based questionnaire in the Myanmar language was performed at the health center. Socioeconomic and behavioral information, and validated Myanmar version of instrument tools such as Depression Anxiety, and Stress Scale-21 items (DASS-21), and Oral Health Impact Profile-14 items (OHIP-14) were incorporated into the questionnaire. Mann-Whitney U test, Kruskal Wallis test, and linear regressions were used.

Results: The sample consisted of 132 participants who completed written consent forms, of which mean age was 54.3 ± 12.9 years and 47.7% were men. Total mean number of OHIP-14 was 8.5 ± 7.6. In socioeconomic variables, OHIP-14 was significantly associated with individual income, but not related with behavioral factors. Significant associations were observed in all three subscales of DASS-21 with OHIP-14. After controlling for socioeconomic and behavioral factors, the unstandardized beta coefficients showed that there were positive linear relationships in OHIP-14 with depression subscale (B: 7.16, 95% CI: 3.45 – 10.86) and stress subscale (B: 3.85, 95% CI: 0.31 – 8.02).

Conclusions: The experience of OHRQoL in Myanmar adults was unfavorable, and individual income affected OHRQoL. Psychological distress indicates a higher risk for poor OHRQoL, and thus our study suggests that proper psychological support should be urgently provided to Myanmar people facing worse challenges.

S4-304

Trajectory Patterns of Gestational Weight Gain Link to Maternal Periodontitis

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Objectives: To investigate the potential association of gestational weight gain (GWG) trajectory with periodontitis in women of child-bearing age.

Methods: 160 pregnant women (aged 24-35 years) at 34-36 gestational weeks were recruited at the Shenzhen Maternity & Child Healthcare Hospital (SMCHH) from August 2020 to February 2021, and their parity histories and gestational weight were collected via questionnaires and electronic health record system. Periodontal status was assessed via full-mouth examination and GWG trajectory models with groups and shapes were identified and determined via the latent class growth modeling. Binary logistic regression was performed to examine the association of periodontal status with GWG trajectory.

Results: Three distinct GWG trajectory groups were identified, based on seven time points (pre-pregnancy, 12, 20, 30, 32, 34, and 36 gestational weeks). Notably, 75 participants with an average ppBMI of 18.9 ± 1.24 were classified into Traj1 group with initially slow rising followed by a fast GWG and cubic shape of trajectory, and 62 subjects (mean ppBMI: 21.8 ± 1.42) were allocated to Traj2 group with a stable initial pattern followed by a fast GWG and cubic shape. The 23 subjects from the Traj3 group (mean ppBMI: 24.4 ± 1.84) exhibited initial dropping with a subsequent fast GWG and quadratic shape. Multi-variable logistic analysis revealed that periodontal status was positively correlated with the GWG trajectory (OR: 3,86, 95% CI: 1.51-12.9, $p=0.02$).

Conclusions: High pre-pregnancy BMI links to increasing GWG trajectories that are associated with higher risk of periodontitis, highlighting the great importance of promoting maternal healthcare.

S4-305

Development of Evidence-Based Instructional Guidelines for Practice of Siwak as an Oral Hygiene Care Method

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Objectives: To consolidate the perceptions of Islamic scholars and siwak users on the method of siwak practice and its effects, incorporating scientific findings, and ultimately formulate a comprehensive guideline for an integrated approach to siwak practice.

Methods: A mixed method approach was used to explore the perceptions of contemporary Islamic scholars and siwak users through individual interviews and focus group discussions (FGD). Concurrently, scientific evidence on method of siwak practice and its effects on periodontal health as established through systematic reviews and meta-analysis was incorporated. The framework and content for the guideline were designed based on a triangulation of these data sources, with a modified Delphi technique being employed to validate the content among experts.

Results: Three themes emerged from data analysis of interview and FGD, and steer the triangulation. The guideline on integrated method of siwak practice was developed using triangulated data, and it consisted of fifty-two statements organised under the themes of "preparation of siwak", "method of toothbrushing" and "siwak practice" and fifteen subthemes. Through a two round of Delphi process consensus was achieved for a total of 48 statements.

Conclusions: The list of statements serving as a comprehensive guideline for siwak use was approved for the first time by the contemporary Islamic scholars, dental specialists, and experienced siwak users. The guideline serves as a tool for dental professionals, aiding them in delivering effective oral hygiene guidance to siwak users. Its implementation can enhance communication between patients and dentists while also acknowledging and honoring the patient's health beliefs.

S4-306

Periodontitis Aaggravates the Renal Fibrosis and Inflammation in a Mouse Model of Renal Fibrosis

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Objectives: To assess the effects of periodontitis on renal fibrosis and inflammatory response in a mouse model, and to explore for periodontal pathogens colonized in the kidney.

Methods: Twenty-four C57BL/6 male mice were randomly divided into control, periodontitis (PD), unilateral ureteral ligation (UUO), and PD + UUO groups. In PD and PD + UUO groups, 5-0 silk sutures coated with human dental plaque were used to establish the model of periodontitis. Unilateral ureteric ligation was performed in UUO and PD + UUO groups two weeks after dental plaque application. After ligation for 6 days, all mice were sacrificed. Histological staining and flow cytometry were performed to observe the renal fibrosis and immunocyte infiltration in kidneys. The expression of inflammatory genes was determined using qRT-PCR. Periodontal pathogens colonized in periodontal and renal tissues were screened using 16S rRNA sequencing.

Results: Compared with the UUO group, the area of renal interstitial fibrosis significantly increased in the PD+UUO group. The percentage of macrophages in kidneys of PD+UUO group was markedly higher than that in UUO group, as well as the expression of inflammatory genes IL-1β and TNF-α. Results of 16S rRNA sequencing showed that *Fusobacterium nucleatum* (*F.nucleatum*) is the most abundant bacterium colonizing the kidney among the periodontal pathogens on the sutures. *In vitro* co-culture of *F.nucleatum* with macrophages significantly promoted the expression of inflammatory genes such as IL-1β and TNF-α in macrophages.

Conclusions: Periodontitis aggravates renal fibrosis and inflammation in UUO mice, and *F.nucleatum* was the periodontal pathogens that colonized in kidneys.

Application of Antibody-Liposome-Rh2 in Periodontitis via Intracellular Antibiosis and Immunomodulation

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Objectives: *Porphyromonas gingivalis* (*P. gingivalis*) can enter host cells and subvert the immune system to evade phagocytosis by macrophages. Periodontitis is more intractable than infectious disorders caused by typical species. Here, we developed intracellular-factor interventions: Antibody-Liposome-Rh2 (A-L-R).

Methods: The drug toxicity was evaluated using CCK-8. Subsequently, the CFU counting method was used to evaluate the intracellular bactericidal effect. The bactericidal effect of A-L-R on intracellular bacteria and its targeting of *P. gingivalis* were observed using IF staining and I-TEM. In addition, qRT-PCR and ELISA were used to evaluate the anti-inflammatory effect, and its anti-inflammatory mechanism was further studied. Rats with periodontitis were administered, and the total amount of *P. gingivalis* and bacteria in gingival tissues were measured. The periodontal tissue was IF stained to observe the changes in periodontal inflammatory factors.

Results: Over time, the effects of A-L-R on cells remained relatively stable and non-toxic. A-L-R co-targeted and killed *P. gingivalis* in RAW264.7 cells more effectively than Rh2. Both A-L-R and L-R could significantly decrease the levels of proinflammatory cytokine in LPS-induced RAW264.7 cells and HGF cells, related to TLR-4 and AKT. In the experimental periodontitis model, bacteria in gingival tissues were much less in the A-L-R group. The expressions of inflammatory factors in the Rh2 and L-R groups were significantly lower than those in the control group but significantly higher than those in the A-L-R group.

Conclusions: A-L-R could facilitate intracellular release to inhibit the intracellular survival of bacteria. Moreover, A-L-R can attenuate inflammatory responses by suppressing the expression of inflammatory cytokines.

Procyanidin B2 Alleviates the Lipopolysaccharide-induced Inflammatory Response of RAW264.7 Cells by Inhibiting PI3K/Akt/NFκB Pathway

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Objectives: This study aims to elucidate the therapeutic potential of procyanidin B2 (PB2) for periodontitis treatment. Despite its natural origin and versatile applications, limited research has explored its effectiveness against periodontitis. Thus, we established a mouse monocyte RAW264.7 cell inflammation model using *Porphyromonas gingivalis* lipopolysaccharide (*Pg*.LPS) to investigate PB2's role and underlying mechanism in periodontitis treatment.

Methods: Cytotoxicity of PB2 at various concentrations was assessed using the CCK8 assay. RT-qPCR and ELISA assays were employed to quantify the IL-1β, IL-6, TNF-α and IL-10 expression levels. Western blot analysis was performed to detect the expression levels of p-PI3K/PI3K, p-Akt/Akt, and p-p65/p65 proteins.

Results: Within the 0-200 μg/mL concentration range, PB2 demonstrated no significant effects on cell viability. RT-qPCR and ELISA assays revealed that Pg.LPS stimulation upregulated the expression of IL-1β, IL-6 and TNF-α, while downregulating IL-10 expression. However, pretreatment with PB2 significantly attenuated the elevated levels of these pro-inflammatory factors and upregulated IL-10 expression in a concentration-dependent manner. Furthermore, western blot analysis demonstrated that PB2 effectively suppressed *Pg*.LPS-induced NFκB activation and inhibited PI3K and Akt phosphorylation in RAW264.7 cells. Notably, the addition of PI3K agonist 740Y-P partially reversed the effects of PB2 on *Pg*.LPS-induced RAW264.7 cells.

Conclusions: This study highlights the significant anti-inflammatory effect of PB2 in RAW264.7 cells induced by *Pg*.LPS and this effect are closely associated with the inhibition of the PI3K/Akt/NFκB pathway activation.

Inhibition of the Oral Pathogen Growth by Mouthwash Containing Poly L-lysine and Glycerol Monolaurate

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Objectives: To study the effect of a mouthwash containing poly L-lysine and glycerol monolaurate on inhibiting the growth of oral pathogens.

Methods: Nineteen strains of oral *Helicobacter pylori*, *Streptococcus mutans* ATCC25175, and *Porphyromonas gingivalis* ATCC33277 were used in this study. Poly L-lysine and glycerol monolaurate were used for testing of anti-microbial activity. MIC and MBC values were examined using broth dilution assay and dot plate method, respectively. The synergist effect of poly L-lysine and glycerol monolaurate was explored using a checkerboard assay.

Results: All *H. pylori* strains were sensitive to poly-L-lysine and glycerol monolaurate. Means of inhibition zone of poly L-lysine and glycerol monolaurate were 25.5±0.6 and 28.5±1.4 mm, respectively. Both MIC and MBC values were 0.3 mg/ml for poly-L-lysine and 0.2 mg/ml for glycerol monolaurate. The combination assay found synergism between poly L-lysine and glycerol monolaurate with the FIC index of 0.20. Then, the mouthwash containing poly-L-lysine (0.03 mg/ml) and glycerol monolaurate (0.02 mg/ml) was prepared and observed for anti-bacterial against oral *H. pylori*, *S. mutans* ATCC25175, and *P. gingivalis* ATCC33277. The inhibition zones of mouthwash were 21.0±0.0 mm for *H. pylori*, 15.4±0.5 mm for *S. mutans* ATCC25175, and 28.7±0.2 mm for *P. gingivalis* ATCC33277.

Conclusions: Mouthwash containing poly-L-lysine and glycerol monolaurate could inhibit the growth of oral pathogen, which may help to prevent oral diseases including dental caries and periodontal diseases.

Mental Foramen: Anatomical Risks? Retrospective Radiological Study

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Objectives: The study aimed to determine the position, shape, appearance, diameter, path, and symmetry of mental foramen between the two mental foramen.

Methods: It is a retrospective descriptive and analytical study, conducted on 150 cases of cone beam volume tomography from 2019 to 2021. JAMOVI software was used to analyzed X-rays. Chi^2 test was used to evaluate the qualitative variables, while STUDENT'S test or WELCH'S test for quantitative variables.

Results: The most frequent horizontal position of the mental foramen was found under the second premolar on both the right and left sides, with a frequency of 57.30%. The position between the two mandibular premolars on both sides and sexes followed this result. The correlation between gender and horizontal position did not show a statistically significant difference ($P>0.05$). Regarding the vertical position, the most dominant location was apical to the apex of the tooth on both the right (74%) and left sides (68.70%). The position at the apex also showed considerable frequency for both sexes on both sides. The correlation between gender and vertical position did not show a statistically significant difference ($P>0.05$). The study found that the vertical symmetry of the right and left mental foramens was 76.70%, while the horizontal symmetry was 72.70%, and sagittal symmetry was 46%. No statistically significant difference was found between gender and the symmetry of the two mental foramens ($P>0.05$).

Conclusions: Our study showed the diversity of position of the mental foramen. A complete preoperative radiological assessment should be performed before any surgical procedure, in order to prevent intraoperative and postoperative complications.

S4-401

Effects of 17β-estradiol on the Morphology, Viability, Osteogenic Differentiation of Stem Cell Spheroids

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Objectives: The objective of this study is to evaluate the effects of 17β-estradiol on morphology, viability, osteogenic differentiation and mineralization of human mesenchymal stem cells.

Methods: Spheroids composed of human gingiva-derived stem cells were cultured in the presence of 17β-estradiol at concentrations of 0, 0.01, 0.1, 1, and 10 nM. The morphological evaluation was done on Day 1, 3, 5, 7. Determination of qualitative cellular viability was performed with Live/Dead Kit assay on Days 1, 7. Quantitative cellular viability was evaluated with Cell Counting Kit-8 on Day 1, 3, 5, 7. To analyze the osteogenic differentiation of cell spheroids, alkaline phosphatase activity assays were done with a commercially available kit on Days 7 and 14. Real-time polymerase chain reaction was used to determine the expression levels of Runx2, and Col1 on Day 7.

Results: The stem cells produced well-formed spheroids, and addition of 17β-estradiol did not show any noticeable changes in the shape. The addition of 17β-estradiol did not significantly change the diameter of the spheroids at 0, 0.01, 0.1, 1, and 10 nM. Concentrations. The addition of 17β-estradiol at 1 nM enhanced cellular viability. The use of 17β-estradiol made effect on the osteogenic differentiation.

Conclusions: Based on these findings, we concluded that 17β-estradiol could be applied for the differentiation of stem cell spheroids.

S4-402

The *in vitro* Antibacterial Efficacy of Sonic-assisted MB-aPDT Against *Enterococcus faecalis*

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Objectives: The *in vitro* study aimed to evaluate the antibacterial efficacy of sonic-assisted methylene blue mediated antimicrobial photodynamic therapy (MB-aPDT) against *Enterococcus faecalis* (*E. faecalis*) in infected lateral canals.

Methods: Fifty-five premolars with a single canal were selected to establish the *E. faecalis* lateral root canal infection models. All samples were randomly divided into five groups (n = 11): 1) Positive controls were treated with 5.25% NaClO; 2) Negative controls were treated with saline; 3) Sonic-assisted MB-aPDT group; 4) 3% NaClO + MB-aPDT group; 5) 3% NaClO + sonic-assisted MB-aPDT group. Then, their antibacterial efficacy was evaluated using the technology of counting colony-forming units and scanning electronic microscope (SEM).

Results: The positive control group (92.15%) and 3% NaClO + sonic-assisted MB-aPDT group (91.86%) had the best antibacterial effect in this study, with no statistical difference among these two groups (p>0.05); the antibacterial effect of 3% NaClO + MB-aPDT group (86.06%) was significantly better than that of sonic-assisted MB-aPDT group (80.32%) (p<0.05). The negative control group had the lowest antibacterial rate of 39.86%. In addition, the SEM results showed that changes in the number and morphology of *E. faecalis* were observed in all experimental groups except the negative control group.

Conclusions: The concentration of NaClO can be reduced to 3% while maintaining its antibacterial efficiency through the synergistic effect of NaClO irrigation with sonic-assisted MB-aPDT.

S4-403
Metabolic Profile of Children with Different Levels of Early Childhood Caries

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Objectives: The present study aimed to compare metabolic differences between children with different levels of dental caries, and to identify the "advantages metabolites" enriching in healthy children.

Methods: Preschool children were recruited and assigned to the caries-free (CF) group, early childhood caries (ECC) group, and severe early childhood caries (SECC) group. The plaque biofilms were collected from the erupted teeth and analyzed by ultra-high performance liquid chromatography-tandem mass spectrometry. Orthogonal partial least-squares-discriminant analysis was used to assess the total differences in metabolites between groups. Student's t-test, one-way ANOVA, and Bonferroni multiple comparisons were performed to identify the key differential metabolites. The ROC curve was used to predict the diagnostic efficiency of the "advantages metabolites".

Results: A total of 102 children were enrolled and classified into CF, ECC, and SECC groups (n=34 per group). The metabolic profile of the SECC vs CF group presented the largest discrepancy. 18, 29, and 40 metabolites were screened as the significant differential metabolites with VIP (Variable Importance in Projection)>1 and $p<0.017$ through three groups comparisons. 4-Amino-2-methylenebutanoic acid, N, N-dimethyldecan-1-amine oxide, Ala-Val-His-Ser, Lansiumarin C, and a new-discovered Metabolite1 were "advantage metabolites" in CF group. The "advantage metabolites" combination predictions showed high sensitivity and specificity for the clinical diagnostic reference.

Conclusions: Metabolic profile of children is significantly different among those with different levels of early childhood caries. The present findings suggest the combination of multiple protective metabolites can be used as a novel predictive/preventive tool for dental caries of preschool children.

S4-404
Study on Enamel Strengthening of Whitening Toothpaste Containing Sodium Hexametaphsphate (SHMP)

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Objectives: In this study, we tried to explore the possibility of enamel strengthening effect of various remineralizing agent for SHMP containing whitening toothpaste.

Methods: In this study leson bovine teeth were classified into 5 study group (n=8); (1) Placebo, (2) 0.22% sodium fluoride (NaF), (3) 0.22% NaF/ 7.5% SHMP/0.4% trisodium phosphate, (4) 0.22% NaF/ 7.5% SHMP/0.5% potassium phosphate (PP) /0.8% tripotassium phosphate (TPP), (5) 0.22% NaF, / 7.5% SHMP/0.5% PP/0.8% TPP /1.55% zinc stearate. Remineralization was performed using a modified pH-cycling method. Microhardness analyses were conducted after caries formation (T1), and after the remineralizing treatment (T2). The data were analyzed by the one-way Anova and paired t-test ($p<0.05$).

Results: After pH cycling average changes of micro hardness of experimental groups from 1 to 6 were 3.83(16.77), 20.49(6.56), 19.82(8.40), 33.86(11.42), 41.76(15.82), respectively. All test group microhardnesses were increased statistically significant compared with placebo group ($p<0.05$). Groups 4 and 5 increased tooth hardness by 1.7 and 2.1 times, respectively, compared to group 3, and it was confirmed that there was statistical significance.

Conclusions: Potassium phosphates and zinc stearate could be strengthening teeth enamel combined with SHMP in the whitening toothpaste.

A Bioactive Resin Composite Enhances Surface Hardness of Adjacent Artificial Proximal Enamel Caries

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Objectives: This study aimed to investigate the impact of a bioactive resin composite on the surface hardness of artificial proximal enamel caries.

Methods: Enamel slabs were obtained from human primary molars (n=30) and randomly allocated into three groups: bioactive resin composite group (Predicta®), glass ionomer cement group (EQUIA Forte®), and a control group (composite resin; Filtek™ Z350). Artificial enamel carious lesions were created in the enamel slabs, and the samples with artificial caries were exposed to the respective restorative materials. Subsequently, pH-cycling was conducted for 14 days to simulate the oral environment. Surface microhardness testing was performed to evaluate the recovery of surface hardness. The percentage of surface microhardness recovery (%SMHR) was calculated and compared among the groups using appropriate statistical analysis.

Results: The bioactive resin composite group (Predicta®) exhibited a significantly higher increase in %SMHR compared to the control group (Filtek™ Z350) ($p>0.05$). However, no significant difference in %SMHR was observed between the bioactive resin composite group (Predicta®) and the glass ionomer cement group (EQUIA Forte®) ($p>0.05$).

Conclusions: The bioactive resin composite (Predicta®) demonstrates superior performance in terms of surface microhardness recovery compared to the control composite resin (Filtek™ Z350). Moreover, the bioactive resin composite (Predicta®) shows comparable results to the glass ionomer cement (EQUIA Forte®) regarding surface hardness improvement. These results suggest that the bioactive resin composite (Predicta®) holds promise for application in restorative dentistry to improve the surface hardness of enamel caries.

Effect of PRG Barrier Coating Material on Remineralization of Initial Proximal Carious Lesion

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Objectives: To evaluate the effect of pre-reacted glass-ionomer (PRG) barrier coating on remineralization of initial proximal carious lesion measured by using Quantitative Light-induced Fluorescence (QLF).

Methods: Sixty-eight windows ($2*2$ mm^2) of polished proximal surface of premolar teeth were immersed in demineralizing solution for 48 hours to create an artificial enamel carious lesion, and then were randomly assigned into 4 groups: Group 1 fluoridated toothpaste (1000 ppm F ion), Group 2, 3 and 4 were treated with fluoridated toothpaste and adding application of sodium fluoride mouthwash (226 ppm F ion), PRG barrier coating material and sodium fluoride varnish (22,600 ppm F ion), respectively. All specimens were paired with sound premolar tooth to create proximal contact, after that were subjected for 17 days of pH cycling. The fluorescence loss (ΔF) and lesion area were determined at baseline and after 17 days.

Results: All groups showed a significant decrease in fluorescence loss and lesion area compared to their baseline ($p<0.01$). The average percent change in fluorescence loss of group 1, 2, 3 and 4 were 24.57%, 25.56%, 40.18% and 54.01% respectively. Group 4 demonstrated statistically significant decrease in percent change in fluorescence loss greater than Group 1 and 2 ($p<0.001$).

Conclusions: The application of PRG barrier coating material might promote remineralization of proximal initial enamel carious lesion. However, the lesion improvement was not superior to the application of sodium fluoride varnish.

Session 5

S5-01

Streptococcus mutans **GcrR Affects Exopolysaccharides Production and Biofilm Homeostasis**

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Objectives: This study aimed to investigate the effect of *Streptococcus mutans* (*S. mutans*) GcrR on exopolysaccharides production and cariogenicity of multispecies biofilms.

Methods: A multispecies biofilm model consisting of *S. mutans* and its *gcrR* mutants, *Streptococcus gordonii* (*S. gordonii*) and *Streptococcus sanguinis* (*S. sanguinis*) was constructed. Scanning electron microscopy (SEM) and confocal laser scanning microscopy (CLSM) were used to detect the multispecies biofilm architecture and distribution of exopolysaccharides. Crystal violet (CV) assay was used to detect the volume of the multispecies biofilms. The yield of glucans was analyzed by anthranone method and the lactic acid was analyzed by lactate dehydrogenase (LDH). RT-qPCR was used to analyze the expression level of genes associated with exopolysaccharides metabolism. Three independent experiments were performed and the results were obtained in triplicate.

Results: Clusters of bacterial cells surrounded with enriched exopolysaccharide in SmugcrR mutant group. While in SmugcrR+ group, the thickness of the biofilm was obviously decreased and the architecture of the biofilms was sparser and more porous. The amount of multispecies biofilms was significantly decreased in SmugcrR+ group. The composition of WIG and WSG and lactic acid decreased in SmugcrR+ group. The expression of *gtfB/C, ftf, gbpB/C, comD/E* increased in SmugcrR group and the *gtfB/C/D, gbpC, comE* decreased in SmugcrR+ group.

Conclusions: GcrR plays a negative role in modulating the metabolism of exopolysaccharide and carigenicity of mutispecies biofilms. GcrR may be a potential target for exploring new anti-caries measures.

S5-02

Sugar Substitutes on Caries Prevention in Permanent Teeth among Children and Adolescents: A Systematic Review

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Objectives: Sugar substitutes have recently gained popularity. This study aimed to systematically review the effect of sugar substitute consumption on caries prevention in permanent teeth among children and adolescents.

Methods: Two independent reviewers systematically searched English publications with keywords (child OR adolescent) AND (sugar substitutes) AND (dental caries) in three databases (PubMed, Web of Science and EMBASE). Randomized controlled trials (RCTs) and controlled clinical trials (CCTs) reporting the effect of sugar substitutes (both high- and low-intensity sweeteners) in preventing caries in permanent teeth among children and adolescents aged 6-19 were included. The Cochrane risk-of-bias assessment tools were used for quality assessment.

Results: The initial search found 1,858 and 15 studies (11 RCTs and 4 CCTs) were included. Most (80%, 12/15) were graded as having a 'moderate' or 'high' risk of bias. All trials investigated sugar alcohol which is a low-intensity sweetener; xylitol was the most commonly investigated (73.3%, 11/15), followed by sorbitol (46.7%, 7/15) and erythritol (13.3%, 2/15). More than half (54.5%, 6/11) of xylitol studies and nearly all (85.7%, 6/7) sorbitol studies showed a caries-preventive effect compared to placebo control. No clinical trial on high-intensity sweeteners such as aspartame and saccharin was found.

Conclusions: The use of xylitol or sorbitol as a sugar substitute is potentially effective in preventing caries in permanent teeth among children and adolescents. No clinical evidence is available regarding the role of high-intensity sweeteners in caries prevention.

S5-03

Analysis of the Prevalence and Associated Factors of Malocclusion in 7-8-year-old Zhuang Children

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Objectives: The aim of this study was to investigate the prevalence of mixed dentition stage malocclusion and associated factors in Chinese Zhuang children aged 7-8 years old.

Methods: A stratified whole-cluster sampling method was used to randomly select 2,281 7- to 8-year-old Zhuang children from schools in cities and counties in northwestern Guangxi, China. The children were examined on-site for malocclusion and caries by trained clinicians, using different types of malocclusion and the World Health Organization's caries diagnostic criteria to evaluate the malocclusion and dental caries status. The basic data on the children were collected by questionnaires, including age, gender, parental education, parental accompaniment, and the children's knowledge of malocclusion and treatment needs. Data were analyzed using Chi-square test and logistic regression after data collection was completed.

Results: The total prevalence of malocclusion in Zhuang children aged 7-8 years old was 58.5%, with the highest prevalence of anterior crossbite tendency, and the prevalence of anterior crossbite and anterior edge-to-edge occlusion was 15.1% and 7.7%, respectively. This was followed by anterior deep overjet at 13.3% and inter-incisor spacing at 10.3%. The lowest prevalence was 2.7% for anterior open bite. Gender, parental accompaniment, parental education, and DMFT of the first primary molar were important factors in the occurrence of malocclusion in Zhuang children.

Conclusions: Malocclusion is a common oral problem in Zhuang children. Therefore, the dangers of early childhood malocclusion should be emphasized, and prevention and intervention on the influential factors of malocclusion are considered necessary.

S5-04

Oral Health Status of Preschool Children in Changchun, Jilin Province

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Objectives: The aim of this research was to measure the oral health related quality of life (OHRQoL) of preschool children and their families in Jilin Province.

Methods: Using a cross-sectional design, we included 3 to 6-year-old children from Changchun, Jilin Province. Mean dmft (decayed missed filled permanent tooth in primary dentition) and caries prevalence scores were evaluated. Children's OHRQoL was measured using the Early Childhood Oral Health Impact Scale (ECOHIS).

Results: Out of 1240 preschool children in Jilin Province (584 boys and 566 girls, 50.8 vs 49.2%, response rate: 89.15%) were invited to participate in this study. It showed that the prevalence of caries was 73.6% and that of dental treatment was 33%. The mean dmft in city (4.0) was lower than that in countryside (5.6). 88.2% of the children were in city (72.4% of them had caries) and 11.8% were in countryside (82.4% had caries, p=0.013), 78.7% of the fathers received higher education (72.3% of the children had caries, p=0.055), 81.5% of mothers had higher education (71.1% of the children had caries, p=0.001), 53% children had pain in the teeth (83.7% of the children had caries, p=0.001), 43.4% of guardians been upset (79.6% of the children had caries, p=0.001). The above results were statistically significant except for fathers' education. Multivariate regression analysis showed that living environment, mothers' education were correlated with caries (p<0.05).

Conclusions: Poor oral health was associated with worse child OHRQoL. Effective oral education for guardian should be further explored as a target for intervention.

S5-05

Microbial Profiles of the Extrinsic Black Tooth Stain in Primary Dentition

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Objectives: To investigate the microbiotic features of the extrinsic black tooth stain (EBS) in primary dentition.

Methods: This study invited children aged 3-6 with or without EBS from 11 kindergartens. They were divided into Group A (GpA) and Group B (GpB). A trained dentist recorded the EBS status using the modification of the Lobene index. Another dentist collected supragingival plaque samples from labial or buccal surfaces of teeth. 16S rRNA sequencing targeting at the V3-V4 hypervariable regions were used to compare the microbial profiles between the GpA and GpB. The dominant bacteria were determined using Wilcoxon rank-sum test and linear discriminant analysis effect size (LEfSe). MaAslin2 linear modeling for determining multivariate associations between clinical data and microbiome profiles. NetworkX analysis was performed to study the interactions of species in the same environment, and functional features were predicted using PICRUSt. The biomarkers were verified by absolute quantitative Polymerase chain reaction (qPCR).

Results: A total of 130 caries-free participants with (n = 100, GpA) and without (n = 30, GpB) EBS were recruited. LEfse analysis showed that *Abiotrophia*, *Lautropia*, *F0332*, *Pseudopropionibacterium* were statistically significant abundant in the GpA, and *Gemella* in the GpB ($p<0.05$). Moreover, the number of copies was significantly higher in GpA for Abiotrophia, Lautropia, and Pseudopropionibacterium ($p=0.042$, $p=0.03$, and $p=0.044$, respectively) and in GpB for Gemella ($p=0.005$). MaAslin2 linear model analysis showed that the abundance of Pseudopropionibacterium was positively correlated with the modified Lobene index.

Conclusions: The microbiome in EBS was characterized by *Abiotrophia*, *Lautropia*, *F0332*, *Pseudopropionibacterium*. *Pseudopropionibacterium* may be a specific pathogenic bacterium of EBS in primary teeth.

S5-06

The Oral Conditions of Cambodian Public Primary School Children Before and After the COVID-19 Pandemic

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Objectives: The study aimed to investigate the oral conditions of Cambodian primary school children before and after the COVID-19 pandemic by cross-sectional study.

Methods: We visited a public primary school in Cambodia as part of dental support activities, once annually from 2017-2019 and 2023. We conducted oral examinations and oral health education with a total of 3,430 students (grades 1-6) and calculated the prevalence of dental caries, number of decayed and filled teeth (DFT), and percentage of decayed and filled teeth (DFT rate). We analyzed each data on dental caries condition before the COVID-19 pandemic (2017-2019) and after the pandemic (2023).

Results: The prevalence of dental caries was very high, over 95% each year in both lower (grades 1-3) and upper (grades 4-6) groups, and there was no significant difference before and after the COVID-19 pandemic. The mean DFT and the DFT rate tended to decrease year by year, and both data in 2023 were the lowest in both groups. Especially, the DFT rate for lower grades was significantly lower in 2023 (13.4%) than in 2017 (17.4%), 2018 (16.2%) and 2019 (16.4%).

Conclusions: The prevalence of dental caries among primary school children has remained very high (>95%) in Cambodia. The mean DFT and the DFT rate of Cambodian primary school children in 2023 were lower than those collected in 2017-2019. The oral health education that we provided as part of our continuous dental support activities, along with changes in lifestyle habits, may have influenced changes in the oral conditions of children.

A Novel Mouthwash for Total Oral Care
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Objectives: Mouthwash is a well-accepted format for consumers globally, and the main purpose of using it is for clean and fresh breath. Mouthwash is a good product for oral health care, since it can reach tooth, gum and mucosa simultaneously while rinsing, and it can be also used multiple times daily. Thus, a functional mouthwash was developed for total oral care, incl. anti-bacterial, anti-inflammation and also repair benefits, beyond fresh breath.

Methods: The anti-inflammation and repair efficacy of the mouthwash was evaluated via a 2D cell model and a 3D EpiOriis model. Meanwhile, an 8-week double-blind clinical study of 80 subjects was conducted at West China Hospital of Stomatology Sichuan University, to verify the efficacy of this mouthwash on gingivitis and gingival bleeding.

Results: The mouthwash could effectively reduce Interleukin-6 (IL-6), Interleukin-8 (IL-8) and Prostaglandin E2 (PGE2), and also repair the damaged oral mucosa by promoting the migration ability of TR146 cells. The clinical results also proved that the use of the mouthwash for 8 weeks could effectively reduce the plaque, gingival inflammation, as well as gingival bleeding.

Conclusions: The novel mouthwash can improve oral health with proven efficacy *in-vitro* and clinically.

Study of Risk Factors of Adolescent Psychosocial Impact of Dental Aesthetics: A Latent Profile Analysis
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Objectives: To compare the microhardness of demineralized dentin restored with Renewal MI, a reactive phosphate fillers-containing composite material, to resin composite (FiltekTM Z350 XT) and resin-modified glass ionomer cement (RMGIC, GC Fuji II LC®).

Methods: In ten third molars, class V cavities were prepared (two cavities on the buccal surface and two on the lingual surface) and exposed to the demineralizing solution (pH 4.4) for 48 hours. On each tooth, demineralized cavities were then randomly restored with one of three following materials: (1) Renewal MI composite, (2) composite resin, (3) RMGIC, a fluoride-containing material (positive control group). The 4th cavity with no restoration served as baseline control. Vicker's microhardness of dentin adjacent to the restoration was measured in quadruplicate, at distances of 50, 100, 200 and 300 µm from the margin of restoration. The average at each depth was analyzed and compared amongst groups.

Results: At the depth of 50 µm, the highest mean microhardness was observed in dentin restored with RMGIC (67.94±3.82), followed by Renewal MI composite (63.57±2.14), resin composite (47.05±2.29) and control group (45.84±3.52), respectively. These findings were also similar at all measuring depths, with the mean microhardness increasing at each depth.

Conclusions: After restoration, the microhardness of demineralized dentin might be increased and varied depending on the properties of the materials. At least at a depth of 300 µm, Renewal MI restoration could increase the microhardness of demineralized dentin, which was higher than that of the conventional resin composite restoration.

S5-09

Determinants that Affecting Low Outcomes of Dental and Oral Health Programs in Primary Schools in Indonesia: A Scoping Review

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Objectives: It is necessary to develop oral health that focuses on efforts to improve health and prevent disease instead healing and recovery efforts, especially in elementary school-age children. One of the health efforts is the School Dental Activity Program (UKGS). UKGS is one of the efforts made to maintain the oral health of elementary school children by fostering a healthy school environment. However, in its implementation, the achievement of the UKGS program is not optimal enough because it is influenced by many factors; the problems are based on several previous studies. This study aims to analyze and examine journals related to the determinants that affect the low achievement of the oral health program in primary schools.

Methods: We used PICO (Problem/Population/Patient, Intervention/Indicators, Comparison Outcome, Study design) as searching strategies. The keywords are "determinant factor" AND "school dental health effort" AND "school children" in online databases (Pubmed, Sciencedirect, Google Scholar, and ProQuest.

Results: There are several determinants that affect the low achievement of dental and oral health programs in primary schools.

Conclusions: There are several things that cause the low coverage of dental and oral health programs in primary schools, especially UKGS, namely, implementing personnel, UKGS operational funds, UKGS kits and their extension media, special space for the implementation of UKGS, coaching parents, teachers, and little dentists, and community social life.

S5-10

Analysis of Public Concern on Pit and Fissure Sealant Based on BAIDU Index

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Objectives: Through analyzing the characteristics of the public's concern on "Pit and Fissure Sealant (PFS)" caries prevention methods, to provide information for the popularization and promotion of PFS method.

Methods: Baidu Index big data analysis tool was used to obtain the relevant search index trend, demand graph and population portrait with the keyword PFS in the period from January 1,2011 to July 29, 2023.

Results: In the past 12 years, the public's attention to PFS showed an overall rising trend. And there was an obvious time rule in the annual cycle, with the lowest attention around the Spring Festival every year, gradually rising to a small peak in the school season in March, peaking around the National LOVE-TEET-Day in September. In the keywords of the demand graph, there is high attention to "what is PFS", "the price" and "how to prevent dental caries". According to the geographical division, the search index display from high to low in East China, North China, South China, Central China, Southwest, Northeast, Northwest. By city, the top six are: Beijing, Shanghai, Hangzhou, Guangzhou, Shenzhen, Chengdu; By province, the top six are: Guangdong, Zhejiang, Beijing, Shandong, Jiangsu and Shanghai. In terms of age, 30-39 years old had the highest attention. In terms of gender, women pay more attention than men.

Conclusions: The concern on PFS is increasing gradually. However, there is an obvious unbalanced distribution. There is a clear demand for the definition, price and function of PFS, which is the focus of oral science popularization and public policy.

S5-11

Predicting Early Childhood Caries at Single-Tooth Resolution via Spatiotemporal Variations of Plaque Microbiota

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Objectives: Early Childhood Caries (ECC), a major burden to child health worldwide, can inflict any tooth, thus single-tooth-level prevention of ECC is crucial. Microbiota-based prediction of ECC is promising yet not well established.

Methods: By longitudinally sampling over 2000 supragingival microbiota via metagenomics for 107 four-year-old preschoolers over 13 months, we established a whole-mouth, single-tooth-resolution model of microbiome development in healthy and ECC children, where a tooth either stays healthy, transitions into cariogenesis or undergoes caries exacerbation.

Results: In healthy children, the microbiomes vary along an ecological gradient from the front (anterior/incisors) to the back (posterior/molars). However, the spatial pattern is attenuated in caries-active children, suggesting caries-induced spatial reorganization of microbiota. By disentangling spatial heterogeneity of microbiota during ECC development, "Spatial Microbial Indicators of Caries" (sMiC) can, at single-tooth resolution, diagnose ECC in disease-onset or progression hosts with 90% accuracy and moreover, predict future new ECC onset two-month ahead for clinically-perceived healthy teeth with 84% accuracy. Intriguingly, performance of ECC-onset prediction, albeit locality dependent, peaks not at the level of single-tooth but of 'zone' that consists of 2~4 neighboring teeth.

Conclusions: A high spatiotemporal-resolution, microbiome-based map of ECC development that features regionality was thus proposed, which distinguishes between healthy tooth growth and cariogenesis, and enables whole-mouth-wide, single-tooth-specific prognosis of ECC.

Session 6

S6-01

Effects of PDA-GO/CS Composite Scaffold on Biological Properties of Human Dental Pulp Stem Cells

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Objectives: The study aimed to synthesize Polydopamine (PDA)-Graphene Oxide (GO) / Chitosan (CS) composite scaffold and evaluate its physicochemical, antimicrobial, and biocompatible properties.

Methods: PDA-GO complex was generated by reducing GO with PDA, and then combined with CS to create the composite scaffold. The optimal mass fraction was determined, and the scaffold's biocompatibility was assessed using Phalloidin and Live and Dead fluorescent staining. The effects of PDA-GO/CS on the osteogenic differentiation of hDPSCs were evaluated using ALP staining, RT-qPCR, and Alizarin red S staining.

Results: The results showed that 0.3% PDA-GO/CS scaffolds exhibited improved antibacterial activity, hydrophilicity, and reduced degradation rate. The scaffold demonstrated superior biocompatibility, promoting early proliferation, migration, and osteogenic differentiation of human dental pulp stem cells.

Conclusions: PDA-GO/CS composite scaffold is a promising material for bone tissue engineering applications.

S6-02

Regulation of Cariogenicity of *Streptococcus mutans* Biofilms by GO-PEI-*gcrR* Gene Composites

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Objectives: *Streptococcus mutans* (*S. mutans*) extracellular polysaccharides (EPS) is an important component of plaque biofilm and the main virulence factor of caries. *S. mutans* response regulator *gcrR* plays a negative role in regulating EPS synthesis and adhesion related genes. However, how to effectively deliver *gcrR* remains to be explored. Graphene oxide (GO) with negative charge can combine with cationic polymer polyethyleneimine (PEI) to form an excellent gene vector. Therefore, to explore whether GO-PEI can effectively carry and transport *gcrR*, so as to achieve the purpose of targeted inhibition of *S. mutans* caries.

Methods: The GO-PEI vector was constructed and related physical properties were measured. The ability of GO-PEI binding to *gcrR* was determined by agarose gel electrophoresis. The cytotoxicity was detected by CCK-8 method. The morphology and amount of biofilm were detected by scanning electron microscope (SEM) and crystal violet (CV) staining respectively. The yield of lactic acid was determined by lactate dehydrogenase experiment. qRT-PCR was used to detect the expression of genes related to polysaccharide metabolism.

Results: The GO-PEI vector was successfully prepared and effectively combined with the delivery of *gcrR* gene into *S. mutans*. The complex had little significant cytotoxicity at appropriate concentration, and GO-PEI-*gcrR* could inhibit EPS metabolism and biofilm cariogenicity of *S. mutans*.

Conclusions: The advantages of GO and PEI were combined to achieve efficient loading, protection and delivery of *gcrR*. The transformation of GO-PEI-*gcrR* inhibited the cariogenicity of *S. mutans* biofilms.

S6-03
Prevention of Enamel Demineralization by TiF$_4$ and Mixed Nano-TiO$_2$

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Objectives: The study aimed to investigate the effect of TiF$_4$ varnish mixed with nano-TiO$_2$ on preventing enamel demineralization *in vitro*.

Methods: Forty bovine dental enamel blocks (300-360 HV) were selected and randomly divided into TiF$_4$, TiF$_4$+TiO$_2$, TiO$_2$, Duraphat, and untreated groups. All enamel surfaces of all groups were coated with varnish, except the control group. Then, the pH demineralization cycle was carried out for 7 days, and the changes of surface and different depth hardness of the enamel were measured by a microhardness tester, and the surface morphology of the enamel was observed by scanning electron microscopy.

Results: The surface microhardness loss ratio (%SML) showed that TiF$_4$ and TiF$_4$+TiO$_2$ were significantly lower than the Duraphat group ($p<0.05$), and TiF$_4$+TiO$_2$ was lower than the TiF$_4$ group, but no significant difference was seen ($p>0.05$). The cross-sectional microhardness showed that the TiF$_4$, TiF$_4$+TiO$_2$, and Duraphat groups had greater microhardness values at 70 μm, 70 μm, and 50 μm from the enamel surface layer than the untreated group, respectively ($p<0.05$), and TiF$_4$+TiO$_2$ was greater than the TiF$_4$ group at 30 μm, but the difference was not statistically significant ($p>0.05$). The results of scanning electron microscopy showed that compared with Duraphat, TiF$_4$, TiF$_4$+TiO$_2$ induced a formation of a coating layer, and TiF$_4$+TiO$_2$ was denser than TiF$_4$.

Conclusions: The preventing enamel demineralization effect of TiF$_4$ and TiF$_4$+TiO$_2$ was stronger than that of Duraphat. However, the effect of mixing nano-TiO$_2$ in TiF$_4$ was not significant in preventing enamel demineralization.

S6-04
Antibacterial Properties and Biosafety of Organic/Metal Halide Hybrid Materials [(BTPPI)$_2$(Ag$_2$I$_4$)] and [(BTPPI)$_2$(Cu$_2$I$_4$)]

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Objectives: To obtain novel oral antimicrobial materials with favorable biosafety, two novel low-dimensional organic/metal halide hybrid materials, namely [(BTPPI)$_2$(Ag$_2$I$_4$)] and [(BTPPI)$_2$(Cu$_2$I$_4$)].

Methods: The antimicrobial effects and mechanisms were investigated against common oral cariogenic bacteria, namely *Streptococcus mutans* (*S. mutans*), as well as *Staphylococcus aureus* (*S. aureus*), *Streptococcus haematobium* (*S. haematobium*), *Escherichia coli* (*E. coli*), and *Pseudomonas aeruginosa* (*P. aeruginosa*). Biosafety was assessed through hemolysis tests, cell proliferation assays, and toxicity detection.

Results: 1. The minimum inhibitory concentrations of [(BTPPI)$_2$(Ag$_2$I$_4$)] and [(BTPPI)$_2$(Cu$_2$I$_4$)] against *S. mutans* were determined to be 4 μg/mL and 8 μg/mL, respectively. These materials also exhibited excellent inhibitory effects against *S. aureus* and *S. haematobium*. Additionally, [(BTPPI)$_2$(Ag$_2$I$_4$)] demonstrated a certain inhibitory effect on *E. coli* and *P. aeruginosa*. 2. Both compounds effectively inhibited the formation of single-species biofilms of *S. mutans* Live/dead bacterial staining revealed that [(BTPPI)$_2$(Ag$_2$I$_4$)] exerted a significant bactericidal effect on *S. mutans* at a concentration of 10 μg/mL, while [(BTPPI)$_2$(Cu$_2$I$_4$)] displayed significant bactericidal activity at a concentration of 40 μg/mL. 3. Concentrations ranging from 1.25 μg/mL to 40 μg/mL of [(BTPPI)$_2$(Ag$_2$I$_4$)] did not exhibit significant hemolysis. However, significant hemolysis was observed at a concentration of 20 μg/mL for [(BTPPI)$_2$(Cu$_2$I$_4$)]. 4. Concentrations ranging from 1 μg/mL to 8 μg/mL of [(BTPPI)$_2$(Ag$_2$I$_4$)] and [(BTPPI)$_2$(Cu$_2$I$_4$)] displayed mild to moderate cytotoxicity against human periodontal fibroblasts and human dental bursal cells.

Conclusions: [(BTPPI)$_2$(Ag$_2$I$_4$)] and [(BTPPI)$_2$(Cu$_2$I$_4$)] possess excellent antimicrobial properties and acceptable biosafety characteristics. These materials exhibit significant potential for further improvement and unique development in the field of oral therapy.

Effects of Inulin Toothpaste on Oral Microbiome Balance and H2S Inhibition *In Vitro*

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Objectives: The purpose of this study is to use *in vitro* models to study the functional effects and mechanism of the prebiotic inulin and toothpaste formulations containing inulin on oral microbiome.

Methods: The optimal dosage of prebiotic inulin raw materials was analyzed by investigating the growth-promoting effect, then further explored the effect of toothpaste formula containing inulin on the structure of oral flora, the effect and mechanism of bad breath inhibition by 16S rRNA amplicon sequencing technology and H2S inhibition effect experiment.

Results: The results of the growth promotion effect experiment showed, inulin could promote the growth of probiotics, and the optimal addition amount of inulin in toothpaste formula was 5%. The 16S rRNA amplicon sequencing technology was used to characterize the bacterial flora structure of the saliva samples from bad breath subjects before and after toothpaste treatment. It showed that DARLIE prebiotic toothpaste containing 5% inulin significantly reduced harmful oral pathogens and promotes the proportion of oral beneficial bacteria. The *in vitro* H2S inhibition test results showed that this toothpaste effectively inhibited the production of hydrogen sulfide. These results suggested that the inulin inhibited the bad breath by balancing the structure of the oral flora and inhibiting the production of hydrogen sulfide.

Conclusions: Multi-dimensional *in vitro* experiments have proved the growth-promoting effect of inulin prebiotics on oral beneficial bacteria, and also verified that adding the optimal concentration of inulin to toothpaste can effectively inhibit bad breath.

Inhibiting Endotoxin-Induced Inflammation on Implant by the Application of Colloidal Phenolamine Fusion Coating

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Objectives: To investigate the effect of colloidal phenolamine fusion coating on inhibiting endotoxin-induced inflammation on implant surface after the treatment of peri-implantitis.

Methods: Lipopolysaccharide (LPS) was adsorbed onto the titanium surface to construct a bacterial plaque pollution model. Subsequently, the solution of phenolamine prepolymer (Tanfloc) was adjusted to neutral pH to form colloids and then rapidly coated the colloids onto the sample surface to evaluate the inflammatory cell response and osseointegration effect through *in vivo* and *in vitro* experiments.

Results: A continuous coating was formed rapidly on the titanium surface under mild conditions through the fusion of adhered colloids of Tanfloc. The results showed that the Tanfloc colloid fusion coating inhibited destructive inflammation, promoted osteogenesis *in vitro*, and enhanced osteointegration *in vivo*.

Conclusions: The colloidal phenolamine fusion coating highlight the suitability of its future intraoral application in clinical practice, thus may effectively decrease the failure rate of implant by Inhibiting endotoxin-induced inflammation on implant surface after the treatment of peri-implantitis.

S6-07

A Novel Chairside Method for Peri-implantitis with Metal-polyphenol Networks for Implant Functional Construction

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Objectives: Enhance bone osseointegration on implant surface after the treatment of peri-implantitis at chairside.

Methods: The phlorotannin, chlorhexidine (CHX) and strontium chloride mixture was applied to the alkali-treated titanium surface and left for 2 minutes to ensure coating formation under mild conditions. The coating was observed by scanning electron microscopy (SEM), and its chemical composition and structure were measured by X-ray photoelectron spectroscopy (XPS).

Results: A micro-nano structured coating was formed on the titanium surface this coating can mask residual bacterial membranes and neutralizes endotoxins to condition the peri-implant inflammatory environment. The micro-nanostructure is beneficial for protein adhesion, cell colonization, and differentiation. The coating inherited the antibacterial property of CHX, but its cytotoxicity is lower because of the phlorotannin. All results indicated the coating could form on implant fast and is convenient for chairside operation.

Conclusions: The three functional molecules co-constructed the anti-inflammatory, antibacterial and osteogenic surface, thus enhancing the bone osseointegration on the implant surface after the treatment of peri-implantitis.

S6-08

***In Vitro* Evaluation of Microleakage and Penetration Depth of a Hydrophilic Sealant**

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Objectives: To compare the microleakage, penetration depth of hydrophilic UltraSeal XT^{TM} hydro^{TM} sealant and hydrophobic Clinpro^{TM} sealant when applied to dry, slightly moist and saliva-contaminated surfaces and also compare the different surface conditions within the same sealant types.

Methods: Sixty extracted sound third molars were randomly assigned into two groups: Group 1 UltraSeal XT^{TM} hydro^{TM} sealant and Group 2 Clinpro^{TM} sealant, and further subdivided into three groups based on the enamel surface conditions (dry, slightly moist, and saliva-contaminated). Sealants were applied to occlusal surfaces according to their respective groups. After 5,000 cycles of thermocycling, the occlusal surface of each sample was immersed in a 50% silver nitrate solution for 24 hours, followed by 8 hours of immersion in a developer solution. The samples were sectioned twice in the buccolingual direction, and the penetration depth and leakage were measured using a light microscope.

Results: Group 1 exhibited significantly less microleakage than Group 2 on slightly moist enamel surfaces ($p<0.001$). Microleakages under other surface conditions were comparable between groups ($p>0.05$). There was no statistically significant difference in penetration depth between two groups ($p>0.05$). Both sealants exhibited significantly less microleakage and greater penetration depth on dry enamel surfaces compared to slightly moist and saliva-contaminated enamel surfaces ($p<0.001$).

Conclusions: The hydrophilic UltraSeal XT^{TM} hydro^{TM} sealant demonstrated comparable penetration depth to the hydrophobic Clinpro^{TM} sealant; nevertheless, the hydrophilic sealant may be preferable to the hydrophobic sealant when sealing over a slightly moist surface due to less microleakage.

S6-09

Microhardness of Demineralized Dentin Restored with Renewal MI Composite, Resin-Modified Glass-Ionomer Cement and Resin Composite

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Objectives: To compare the microhardness of demineralized dentin restored with Renewal MI, a reactive phosphate fillers-containing composite material, to resin composite (FiltekTM Z350 XT) and resin-modified glass ionomer cement (RMGIC, GC Fuji II LC®).

Methods: In ten third molars, class V cavities were prepared (two cavities on the buccal surface and two on the lingual surface) and exposed to the demineralizing solution (pH 4.4) for 48 hours. On each tooth, demineralized cavities were then randomly restored with one of three following materials: (1) Renewal MI composite, (2) composite resin, (3) RMGIC, a fluoride-containing material (positive control group). The 4th cavity with no restoration served as baseline control. Vicker's microhardness of dentin adjacent to the restoration was measured in quadruplicate, at distances of 50, 100, 200 and 300 µm from the margin of restoration. The average at each depth was analyzed and compared amongst groups.

Results: At the depth of 50 µm, the highest mean microhardness was observed in dentin restored with RMGIC (67.94±3.82), followed by Renewal MI composite (63.57±2.14), resin composite (47.05±2.29) and control group (45.84±3.52), respectively. These findings were also similar at all measuring depths, with the mean microhardness increasing at each depth.

Conclusions: After restoration, the microhardness of demineralized dentin might be increased and varied depending on the properties of the materials. At least at a depth of 300 µm, Renewal MI restoration could increase the microhardness of demineralized dentin, which was higher than that of the conventional resin composite restoration.

S6-10

WNT7A Promotes Tumorigenesis of Head and Neck Squamous Cell Carcinoma via Activating JAK1/STAT3

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Objectives: Canonical and noncanonical Wnt signalling are critical pathways involved in organ development, tumorigenesis and cancer progression. WNT7A is one member of the Wnt family, but its role and underlying molecular mechanisms in head and neck squamous cell carcinoma (HNSCC) are still elusive. The aim of the current study is to explore the role and underlying molecular mechanisms in the tumorigenesis of HNSCC.

Methods: The expression of WNT7A in HNSCC was analyzed by real-time PCR and immunohistochemical staining. The effect of WNT7A on cell proliferation and self-renewal of HNSCC cells was measured. Transcriptome sequencing and qPCR were performed to investigate the regulated genes by WNT7A. The activation of the JAK1/STAT3 pathway was detected by Western blot and Chromosome Immunoprecipitation. The effect of WNT7A was validated in a patient-derived xenograft (PDX) tumor model.

Results: WNT7A was upregulated in HNSCC specimens compared with adjacent normal tissues and can promote the proliferation of HNSCC cells. Unexpectedly, overexpression of WNT7A does not activate the canonical Wnt/β-catenin pathway in HNSCC. Instead, our findings suggest that WNT7A potentially activates the JAK1/STAT3 signalling pathway. In PDX tissues, high expressions of WNT7A and phosphorylated STAT3 were observed, which positively correlated with tumor progression.

Conclusions: These findings underscore the significance of WNT7A in HNSCC progression and propose the targeting of key molecules within the WNT7A/JAK1/STAT3 pathway as a promising strategy for the precise treatment of HNSCC.

S6-11
Research Progress on the Role and Application of Polyunsaturated Fatty Acid Metabolites in Oral Diseases
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Objectives: This review aims to explore the role and application research progress of polyunsaturated fatty acid (PUFA) metabolites in oral diseases.

Methods: We first briefly review the metabolic pathways and key enzymes of PUFAs, as well as their biological functions. Then, we discuss in detail the role of PUFA metabolites in various oral diseases, including oral mucosal diseases, periodontal diseases, dental and pulp diseases, oral cancer, and temporomandibular joint disorders (TMD).

Results: Studies have shown that PUFA metabolites play an important role in regulating inflammation, immune responses, and tissue repair, and are closely involved in the development and progression of oral diseases. Moreover, PUFA metabolites have potential application value in the diagnosis, treatment, and prevention of oral diseases.

Conclusions: Therefore, research on the role and application of PUFA metabolites in oral diseases contributes to a deeper understanding of the pathogenesis of oral diseases and provides innovative perspectives and approaches for the prevention and clinical treatment of oral diseases.

Session 7

S7-01

MMP10 Regulates the Lymph Node Metastasis of Oral Squamous Cell Carcinoma Cells

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Objectives: Matrix metalloproteinases (MMPs) are a class of protein hydrolases that depend on zinc and calcium ion activity and are capable of degrading multiple components of the extracellular matrix. The matrix and cleavage products of MMP are able to directly regulate cell growth, differentiation and apoptosis, as well as chemotaxis, migration and angiogenesis. Therefore, aberrant MMP expression can be detected in almost all primary and recurrent tumors. The aim of this study was to identify the role of MMP10 in the cell biological function of Oral Squamous Cell Carcinoma Cells (OSCC).

Methods: We analyzed the expression and survival data analysis were done using data from the Cancer Genome Atlas (TCGA) and the Clinical Proteomic Tumor Analysis Consortium (CPTAC) database, then expression of MMP10 in clinical OSCC samples was detected by using qRT-PCR. We reduced the expression of MMP10 to elucidate the effects of MMP10 on proliferation, migration and invasion. Genes associated with MMP10 were validated by qRT-PCR.

Results: The MMP10 expression was raised in HNSC and OSCC, and the high MMP10 expression in HNSC with a poor prognosis outcome. The MMP10 expression was upregulated in OSCC tissues when compared with adjacent tissues. Knockdown the expression of MMP10 inhibited the cell migration and invasion *in vitro* and lymph node metastasis *in vivo*. And the expression of MMP10 was regulated by WNT3A.

Conclusions: The results of present study indicate that MMP10 plays a significant role in the invasion and migration of OSCC. MMP10 may be a possible target gene for the therapy of OSCC by inhibiting metastasis.

S7-02

Caries Lesions Diagnosis with Deep Convolutional Neural Network in Intraoral QLF Images by Handheld Device

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Objectives: This study aimed to investigate the effectiveness of the deep convolutional neural network (CNN) in the diagnosis of caries lesions in quantitative light induced fluorescence (QLF) images taken by a self-manufactured handheld device.

Methods: A toothbrush-like device, consisting a 540nm UV light-emitting lamp with a filter, was invented and manufactured to obtain the intraoral images. A total of 133 study cases with 9,478 QLF images of teeth in various surfaces were included. Each tooth surface was evaluated by two endodontists for cases lesion based on the ICDAS, while another endodontist accordingly annotated the QLF image by a labeling tool. The database was randomly divided into development, validation and testing cohorts by 7:2:1. A CNN model was modified and trained to detect caries lesion in QLF images. The accuracy, sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and area under the receiver operating characteristic curve (AUC) were calculated for the model performance.

Results: The mean DMFT was 6.77 and caries prevalence was 19.59% in total. The caries lesions presented as fluorescence loss in the QLF images as the demineralization progressed. The overall accuracy of the CNN model was 0.88, sensitivity was 0.89, specificity was 0.87, PPV was 0.87, NPV was 0.89 and the AUC was 0.88. The highest accuracy was achieved in the molar teeth (0.91) and occlusal surface (0.94).

Conclusions: With typical characteristics in QLF images, caries lesion can be detected by CNNs, a device by which can be further developed for caries screening in clinical practice or at home.

S7-03

Relationship between Determinant Factors of Tooth Decay and Filling in Indonesia Using Geographic Information System

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Objectives: To determine the relationship between sociodemographic and healthcare services factors that affect tooth decay and filling in Indonesia.

Methods: A cross-sectional study using secondary data from The Indonesian Basic Health Research 2018 as classified based on the WHO age group. These variables are sociodemographic factors, dental utilization, decay, and filling. The healthcare facilities data using Indonesian Health Facility Research 2019. The number of dentists data through the Indonesian Medical Council on December 2021. These variables were tested statistically and mapped using QGIS.

Results: In the 35-44 years group, the Mann-Whitney test showed a significant difference ($p<0.05$) between the female sex, living in an urban area towards tooth decay and filling. Kruskal-Wallis test showed a significant difference ($p<0.05$) between all characteristics of sociodemographics. In the 65+ years group, only educational level and employment status had a significant towards tooth decay but all characteristic sociodemography variables had a significant difference with tooth filling. Spearman test showed a correlation statistically ($p<0.05$) between the number and ratio of healthcare facilities and dentists towards tooth decay and filling. Based on the mapping, high caries and low filling are in line with the distribution of low dentist and healthcare facilities.

Conclusions: There is a relationship between sociodemographic factors and healthcare services that affect tooth decay and filling. Efforts to equitable distribution of healthcare facilities and dentists, as well as an intervention to increase utilization by looking all aspects of sociodemographic characteristics.

S7-04

The Experience of Using Virtual Reality Simulation for Caries Prevention to Address Dental Anxiety

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Objectives: Dental anxiety induced by dental instruments can hinder both patients and dentists from following treatment; thus, innovative solutions are needed to increase the effectiveness of disease prevention efforts. The use of virtual reality (VR) technology, which is increasingly popular, provides an immersive and enjoyable experience. The aim of this study was to explore the experience of using VR simulation and its impact on dental health behaviour awareness for caries prevention in 10–12-year-old children with moderate to severe dental anxiety.

Methods: This research was conducted from June to July 2023 using a qualitative descriptive design with a Colaizzi analysis approach. The participants (three pairs of children and their parents) were selected via purposive sampling. In-depth interviews were conducted after the participants used a VR application that simulated caries prevention procedures. The inclusion criteria were the ability to use VR equipment, good communication skills, good physical and mental health.

Results: The use of a VR application was found to generate positive experiences, reduce dental anxiety and increase perception of caries prevention procedures. Participants stated that using VR technology made simulation more engaging and interactive. The sensation of being in a treatment room created a pleasant impression that aroused curiosity to try the activity in real life. Cost and technical limitations were revealed as challenges and barriers by the participants' parents.

Conclusions: The use of VR media has the potential to generate positive experiences, reduce dental anxiety and thus support the implementation of caries prevention actions.

S7-05

Knowledge, Attitudes, and Practices Regarding Teledentistry Among Dentists in Jakarta during the Coronavirus Disease Pandemic

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Objectives: To assess factors associated with knowledge, attitudes, and practices (KAP) related to teledentistry among dentists in Jakarta during the COVID-19 pandemic.

Methods: This cross-sectional study used a self-administered online questionnaire with a purposive sampling technique. Survey items comprised knowledge of, attitude toward, the practice of, and barriers to teledentistry. The Chi-square, Mann- Whitney, and Spearman correlation tests were used to determine factors associated with KAP of teledentistry.

Results: A total of 183 dentists in Jakarta completed the questionnaire. The findings showed that 95.6% of the surveyed dentists had good knowledge, 83.1% expressed positive attitudes, and 60.7% practiced teledentistry during the COVID-19 pandemic. Most participants (86.3%) expressed a willingness to practice teledentistry in the future. The three most significant barriers that obstruct dentists from practicing teledentistry were found to be patient compliance and satisfaction regarding the dentist's physical presence, a low population education level, and a lack of technological infrastructure. A statistically significant relationship was found between teledentistry practice and age, marital status, working experience, and training regarding teledentistry. A positive correlation was found between knowledge of and attitude toward teledentistry.

Conclusions: Dentists in Jakarta have high knowledge of, positive attitudes toward, and good practices for teledentistry. Factors related to teledentistry practice were found to be age, marital status, work experience, and training experience in the last two years.

S7-06

Impact of Online Dental Education on Health Literacy and Behavior Change among Company Employees

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Objectives: This study aims to investigate the impact of using online educational video for improvement of health literacy about preventive dentistry and behavior change in regular dental visits among company employees.

Methods: An online dental educational video was developed covering the oral health, diseases, hygiene habits, and its association with general health. Among 1,005 employees from 17 companies in Niigata, Japan who watched the video, 631 completed the questionnaires on health literacy and oral health behaviors before and after watching. They were included in the analysis and McNemar's test was used to evaluate the video's validity in improving health literacy and oral health behaviors about preventive dentistry. Additionally, a transtheoretical model was used for defining the behavior change stages.

Results: Health literacies, such as the ability to plan and act according to information about preventive dentistry were significantly improved after the video course ($p<0.01$). The video had a positive influence on regular dental visits, with 47.8% individuals in precontemplation stage, 23% in contemplation stage, 38% in preparation stage, and 21.6% in action stage showing improvement in their behavior change stages. The video was found valid for changing behavior on regular dental visits from the precontemplation stage ($p<0.01$); however, no significant validity was observed on behavior change from prior to action to the later stages.

Conclusions: Online dental education was positively associated with improvement in health literacy on preventive dentistry and facilitated behavior change on regular dental visits from the precontemplation stage at the workplace.

A Randomized Clinical Trial to Evaluate the Augmented Reality Guided Interdental Brushing

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Objectives: The purpose of this study was to evaluate whether augmented reality guided interdental brushing is more effective than the traditional education method of interdental brushing.

Methods: 60 Participants aged 20 to 49 were recruited. After measuring the interdental brush size, participants were divided the group of 20 into three groups: those educated using only dentiform model (DM group), those trained with only in-mouth demonstrations (IM group), and those trained with an augmented reality interdental toothbrush guide (AR group). All participants were instructed to use interdental brush on the between the first and second premolars, and between the second and first molars, for a total of eight interdental spaces to measure bleeding on probing (BOP) the bleeding on interdental brushing (BOIB) twice every two weeks.

Results: Finally, 46 people were included in the repeated measure ANOVA analysis. All groups showed a significant decrease in BOP ($p=0.017$) and BOIB ($p<0.001$) by time factor. AR showed the larger BOIB reduction (0.21 ± 0.19) than IM (0.17 ± 0.16), and DM (0.17 ± 0.16), and this difference was even greater stratifying by interdental toothbrush sizes of 0.9mm (AR:0.29 ± 0.21, IM:0.28 ± 0.06 DM:0.22 ± 0.18) and 1.1mm (AR:0.30 ± 0.17, IM: 0.13 ± 0.19 DM: 0.17 ± 0.17). However, there were no statistically significant differences between groups.

Conclusions: Augmented reality guided interdental brushing could be better method to use interdental brush than the classic instruction.

Development and Evaluation of CAMBRA Application for Dental Caries Management in Children and Adolescents

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Objectives: The purpose of this study was to evaluate the effectiveness of the Korean CAMBRA mobile application ('CAMBRA-students') developed for caries management in children and adolescents by users' and professionals' evaluation.

Methods: The professionals consisting of 2 clinical dental hygienists, 1 dental hygiene professor, and 2 computer science professionals evaluated technical errors and problems of the application using the Korean version of the heuristic tool and the Mobile App Rating Scale (MARS). In addition, a total of 90 parents of elementary school students and middle school students selected for the caries management program were evaluated for usability using the user Mobile App Rating Scale (uMARS).

Results: In heuristics tests, 43 comments were made, and 8 usability problems were identified by the experts. The usability evaluation of the application for professionals produces an overall score of 3.65. In the subscales (Engagement, functionality, aesthetics, and information) of the MARS, the 'Application Subjective quality' domain received the lowest score of 2.90 and the 'Information' domain received the highest score of 4.18. The usability evaluation of the application for users produces an overall score of 3.43. In the subscales (Engagement, functionality, aesthetics, and information) of the uMARS, the ' Engagement ' was the lowest with 3.12 points, and the 'Information' was the highest with 3.87 points.

Conclusions: The CAMBRA-students application is expected to be applied in the field of students' oral health care management, and to contribute to the prevention of dental caries of students by activating the dental caries risk management system.

S7-09

Synthesis of Au-AgNPs and Preliminary Investigation on Anti-caries Effect

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Objectives: It is expected that the newly synthesized material (Au-AgNPs) can retain the excellent antibacterial properties of AgNPs and lower potential toxicity for caries prevention.

Methods: The basic structure and microscopic properties of Au-AgNPs were studied in terms of morphology, particle size, composition, and surface modification by UV-VIS, DLS, EDS, TEM and Zeta. *Streptococcus mutans* (*S. mutans*) and *Lactobacillus acidophilus* (*L. acidophilus*) were cultured because of their caries-causing abilities. The anti-caries capability of Au-AgNPs was examined by inhibition circle-agar diffusion method, growth curve MIC determination, photothermal effect experiment, colony plate counting, bacterial microstructure characterization, ROS and crystalline violet staining and live-dead bacterial staining. The biosafety performance of Au-AgNPs was evaluated by hemolysis assay and CCK-8 cell proliferation assay.

Results: Au-AgNPs were synthesized and their particle size was about 20 nm, and Au, Ag, C and O elements were uniformly distributed in it. Au-AgNPs have a good antibacterial effect on *S. mutans* and *L. acidophilus* with MIC: 3.2 pmol/L and 12.8 pmol/L, respectively. The antibacterial performance was enhanced after irradiation with 808 nm NIR. When the concentrations of Au-AgNPs were greater than 3.2 pmol/L and 12.8 pmol/L, the biofilm formation of *S.mutans* and *L.acidophilus* was inhibited. The hemolytic effect of different gradient concentrations of Au-AgNPs on blood cells was comparable to that of AuNPs, and there was no cytotoxicity to periodontal membrane fibroblasts.

Conclusions: Au-AgNPs have good antibacterial properties and biosafety performance. This study provides an experimental basis for the application of anti-caries nanomaterials in clinical practice.

S7-10

Pro-longed Release of Antimicrobial Peptide GL13K-loaded Thermos-sensitive Hydrogel on Titanium Improves Antibacterial and Anti-inflammatory Properties

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Objectives: Application of titanium in orthopedics and dental fields is associated with bacterial infection and chronic inflammation, especially in early stages after implantation. The present study investigated the antibacterial and anti-inflammatory activities of titanium surface, which was immobilized in a thermosensitive poly-(D, L-lactic acid-co-glycolic acid)-polyethylene glycol - poly-(D, L-lactic acid-co-glycolic acid) (PLGA-PEG-PLGA) hydrogel containing antimicrobial peptide GL13K.

Methods: A thermosensitive PLGA-PEG-PLGA hydrogel containing antimicrobial peptide GL13K was immobilized onto titanium surface via dopamine. The antibacterial activity of the modified surface was evaluated by bacterial activity, CFUs, LIVE/DEAD staining and bacteriostatic ring. The anti-inflammatory activity of the modified surface was evaluated by ELSIA, PCR, Flow cytometry and Cytoimmunofluorescence staining.

Results: The FTIR results confirmed successful loading of GL13K. The degradation of hydrogel and release of GL13K persisted for two weeks. The modified titanium surface exhibited better contact and release antibacterial activity against *Porphyromonas gingivalis*. The modified titanium surfaces were biocompatible with RAW264.7. Furthermore, the expression of pro-inflammatory cytokines IL-1β, TNF-α and iNOS were down-regulated, whereas anti-inflammatory cytokines Arg-1, IL-10 and VEGF-A were up-regulated on the modified titanium surfaces by days 3 and 5. The detection of macrophage M1/M2 biomarkers by immunofluorescence staining and flow cytometry confirmed the polarization of macrophages from M1 to M2 phenotype.

Conclusions: The thermosensitive PLGA-PEG-PLGA hydrogel release system carrying antimicrobial peptide GL13K on titanium surface exhibited antibacterial and anti-inflammatory, and promoted macrophage polarization from M1 to M2 phenotype.

S7-11

Simplified Oral Hygiene Index Score Before and After Counseling with Poster and Videos Using Red Dragon Fruit Extract

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Objectives: Dental and oral health plays an important role in supporting one's health. One of the things that can be done to increase knowledge of dental and oral health is counselling. Selection of the use of extension media is a factor that is absolutely necessary because it is able to influence the effectiveness of the extension activities carried out. The aim of the study was to determine the Simplified Oral Hygiene Index (OHI-S) using a disclosing solution from red dragon fruit extract at Rancabentang 3 Elementary School after counselling with different media, namely videos and posters.

Methods: Invitation letters describing this project's aims and procedures were sent to parents of kindergarten children. Parental consent and parental questionnaires were collected. Dental health education was provided and oral examination was performed in kindergarten. The OHI-S examination was carried out by summing Debris Index Simplified (DI-S) and Calculus Index Simplified (CI-S) from 6 tooth surface index in group A which was given counselling with video media and group B with poster media.

Results: The OHI-S index assessment criteria before giving information from group A was 90% moderate and Group B was 100% moderate, after providing information about dental and oral hygiene group A was given counselling with video media 80% good, and in group B with poster media 40% good.

Conclusions: The OHI-S index decreased after counselling and examination of the OHI-S index in elementary school students who were given counselling with videos showed better results than the group who were given counselling with posters.