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TOWARDS EXCELLENCE IN DENTAL EDUCATION

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2024 Scientific Annual Meeting of

Association for Dental Education, Asia Pacific

CAMPUS Asia Plus in Dentistry International Symposium 2024

2024 TU-HKU-FJMU International Symposium on Oral Health Science

PROGRAM and ABSTRACT

October 19 (Sat) ~ 20 (Sun), 2024

Tohoku University Graduate School of Dentistry, Sendai, Japan

Hosted by

Tohoku University Graduate School of Dentistry

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JPR Journal of Prosthodontic Research

SUSTAINABLE DEVELOPMENT GOALS

PROGRAM

October 19 (Sat)

8:30-9:00 **Opening Ceremony**

Professor **Ken OSAKA**

President, Association for Dental Education, Asia Pacific (ADEAP)

Dean, Graduate School of Dentistry, Tohoku University, Japan

Professor **Jae-Il LEE**

President, Korean Institute of Dental Education and Evaluation (KIDEE)

Professor **LiJian JIN**

Acting Dean, *Faculty of Dentistry, The University of Hong Kong, China*

Professor **Jiang CHEN**

Dean, School of Stomatology, Fujian Medical University, China

9:00-10:00 **Special Lecture**

Chairperson: Professor **Ken OSAKA**

President of ADEAP

S-1 **Digital Tools, Human Touch: Advancing Dental Education for a Compassionate Future**

Associate Professor **Samantha J BYRNE**

Melbourne Dental School, The University of Melbourne, Australia

10:00-10:30 **Coffee Break**

10:30-12:00 **Keynote Lecture I**

Chairperson: Professor **Nobuhiro TAKAHASHI**

Graduate School of Dentistry, Tohoku University, Japan

K1-1 **Computer-assisted Jaw Reconstruction: from 3D Printing to Artificial Intelligence**

Professor **Richard SU**

Faculty of Dentistry, The University of Hong Kong, China

K1-2 **Artificial Intelligence in Dentistry**

Professor **Hao YU**

School of Stomatology, Fujian Medical University, China

K1-3 **Application of Bioinformatics and Artificial Intelligence in Precision Oral Cancer Research**

Professor **John Junwen WANG**

Faculty of Dentistry, The University of Hong Kong, China

12:00-13:30 **Lunch Break**

13:30-14:30 **Invited Lecture I**

Chairperson: Professor **Hiroshi EGUSA**

Graduate School of Dentistry, Tohoku University, Japan

I1-1 **Metabolic Regulation in Tolerogenic Dendritic cells: Exploring New Approaches for Treating Systemic Lupus Erythematosus**

Associate Professor **Patcharee RITPRAJAK**

Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

I1-2 **Current Opinions in the Maintenance of the Epithelial Plasticity**

Professor **Han SUNG JUNG**

Yonsei University, Seoul, Korea

14:30-17:00 **Poster Presentation and Competition**

17:00-18:00 **Oral Presentation I**

Chairperson: Lecturer **Atsumu KOUKETSU**

Graduate School of Dentistry, Tohoku University, Japan

O1-1 **Utilizing Biofluorescence for Biofilm Detection and Oral Disease Prevention**

Research Professor **Eun-Song LEE**

Yonsei University College of Dentistry, Seoul, Korea

O1-2 **Oral Management of Sjögren's Syndrome: From Chairside to Laboratory**

Associate Dr **Haixia XING**

Department of General Dentistry, Peking University School and Hospital of Stomatology, Beijing, China

O1-3 **The Impact of Online Learning Methods on Dental Student Self-Esteem: A Lesson from COVID 19 Pandemic**

Assistant Professor **Nieka A. WAHONO**

Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

O1-4 **Future Directions for Undergraduate Dental Education: A Case Study of Chulalongkorn University**

Assistant Professor **Supachai CHUENJITWONGSA**

Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

18:30-20:30 **Welcome Reception**

October 20 (Sun)

8:30-9:30 **Special Lecture**

Chairperson: Professor **Wen-Liang LO**

School of Dentistry, National Yang Ming Chiao Tung University, Taiwan

S-2 **WHO Global Oral Health Meeting and education forces**

Professor **Corrado PAGANELLI**

School of Dentistry, University of Brescia, Italy

9:30-10:00 **Coffee Break**

10:00-11:00 **Keynote Lecture II**

Chairperson: Associate Professor **Masahiro YAMADA**

Graduate School of Dentistry, Tohoku University, Japan

K2-1 **WNT7A, its secret of secretion and activation in HNSCC**

Professor **Dali ZHENG**

School of Stomatology, Fujian Medical University, China

K2-2 **Biomechanical considerations of implant prosthetic treatment based on force control**

Professor **Nobuhiro YODA**

Graduate School of Dentistry, Tohoku University, Japan

11:00-12:00 **Invited Lecture II**

Chairperson: Associate Professor **Shinnosuke NOGAMI**

Graduate School of Dentistry, Tohoku University, Japan

I2-1 **Common medical and dental problems in older adults**

Professor **Alice CHAN**

Faculty of Dentistry, The University of Hong Kong, China

I2-2 **A New Perspective on the Number of Teeth in Older Adult**

Associate Professor **Satoshi YAMAGUCHI**

Graduate School of Dentistry, Tohoku University, Japan

I2-3 **Dysphagia Rehabilitation - Treatment and Research**

Assistant Professor **Naru SHIRAISHI**

Graduate School of Dentistry, Tohoku University, Japan

I2-4 **Gut Microbiota: Bridging Oral Health and Systemic Diseases**

Dr **Guo Wu GAN**

School of Stomatology, Fujian Medical University, China

12:00-13:00 **Lunch Break**

13:00-14:00 **Invited Lecture III**

Chairpersons: Professor **Hao YU**

School of Stomatology, Fujian Medical University, China

I3-1 **Friend or Foe: Dentistry Amidst the Inevitable Rise of Artificial Intelligence**

Dean Dr. **Nia Ayu Ismaniati NOERHADI**

Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

I3-2 **A series of studies on coronectomy to prevent the injury of inferior alveolar nerve caused by mandibular wisdom tooth extraction**

Clinical Professor **Nianhui CUI**

Peking University, School and Hospital of Stomatology, Beijing China

14:00-14:30 **Coffee Break**

14:30-15:30 **Invited Lecture IV**

Chairpersons: Lecturer **Tetsuhiro KAJIKAWA**

Graduate School of Dentistry, Tohoku University, Japan

I4-1 **Leveraging Artificial Intelligence to Transform Orthodontics**

Professor **Zhiyi SHAN**

Faculty of Dentistry, The University of Hong Kong, China

I4-2 **Optimizing Intraoral Scanning Accuracy: Insights into Interocclusal Relationships**

Associate Professor **Yu PAN**

School of Stomatology, Fujian Medical University, China

I4-3 **Role of Osteocytes during Orthodontic Tooth Movement**

Assistant Professor **Fumitoshi OHORI**

Graduate School of Dentistry, Tohoku University, Japan

I4-4 **The application of graphene materials for dental use**

Clinical Practitioner **Iris YIN**

Faculty of Dentistry, The University of Hong Kong, China

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16:00-17:00 **Invited Lecture V**

Chairpersons: Professor **Guang HONG**

Graduate School of Dentistry, Tohoku University, Japan

I5-1 **Gelatinolytic activity in dentin upon adhesive treatment**

Professor **Xin LI**

Faculty of Dentistry, The University of Hong Kong, China

I5-2 **pH-Responsive nanocomplex for caries prevention and treatment**

Associate Professor **Wen ZHOU**

School of Stomatology, Fujian Medical University, China

I5-3 **Functionalized mesoporous silica applied for infectious bone rehabilitation**

Dr **De Xiong LI**

School of Stomatology, Fujian Medical University, China

I5-4 **The Dual Role of Neutrophils in Periodontal Disease: Protective Immunity and Tissue Destruction**

Assistant Professor **Tetsuhiro KAJIKAWA**

Graduate School of Dentistry, Tohoku University, Japan

17:00-17:30 **Closing Ceremony & Award Presentation**

Professor **Guang HONG**

Vice-Dean, *Graduate School of Dentistry, Tohoku University, Japan*

Secretary-General, Association for Dental Education, Asia Pacific (ADEAP)

18:30-20:30 **Gala Party**

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Nadia Kartikasari
Universitas Airlangga, Indonesia

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Ran Amagai
Tohoku University Graduate School of Dentistry, Japan

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Hui Yang
Tohoku University Graduate School of Dentistry, Japan

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Peng Chen
Tohoku University Graduate School of Dentistry, Japan

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Kyaw Zaww
Tohoku University Graduate School of Dentistry, Japan

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Li Chang
Tohoku University Graduate School of Dentistry, Japan

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Linjuan GAO
School of Stomatology, Fujian Medical University, China

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Monica Zhang Yuqing
Faculty of Dentistry, The University of Hong Kong, China

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Nengwen HUANG
School of Stomatology, Fujian Medical University, China

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Tohoku University Graduate School of Dentistry, Japan

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Tohoku University Graduate School of Dentistry, Japan

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National Dental Centre Singapore, Singapore

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Tohoku University Graduate School of Dentistry, Japan

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Chiang Mai University, Thailand

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School of Stomatology, Fujian Medical University, China

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Tianjin Medical University, China

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Thantida Kaenchai

Chiang Mai University, Thailand

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Yanfan CAO

School of Stomatology, Fujian Medical University, China

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Yuki Abiko

Tohoku University Graduate School of Dentistry, Japan

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Zelda Ziyi Zhao

Faculty of Dentistry, The University of Hong Kong, China

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Chayanit Chaweewannakorn

Faculty of Dentistry, Chulalongkorn University, Thailand

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Ratri Maya Sitalaksmi

Universitas Airlangga, Indonesia

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Tohoku University Graduate School of Dentistry, Japan

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Tohoku University Graduate School of Dentistry, Japan

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Faculty of Dentistry, The University of Hong Kong, China

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Faculty of Dentistry, Chulalongkorn University, Thailand

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Faculty of Dentistry, Chulalongkorn University, Thailand

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University School & Hospital of Stomatology, China

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Faculty of Dentistry, The University of Hong Kong, China

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Faculty of Dentistry, The University of Hong Kong, China

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Tohoku University Graduate School of Dentistry, Japan

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School of Stomatology, Fujian Medical University, China

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School of Stomatology, Fujian Medical University, China

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School of Stomatology, Fujian Medical University, China

S-1

Digital Tools, Human Touch: Advancing Dental Education for a Compassionate Future

Samantha J BYRNE[1]
[1] *Melbourne Dental School, Faculty of Medicine, Dentistry and Health Sciences, The University of Melbourne, Australia*

Abstract

The landscape of dental education is rapidly evolving. As educators, clinicians and researchers, we must prepare our graduates to practice with high levels of knowledge and skill, readiness to adapt to changes in digital technologies during their practicing careers as well as equip them to care for themselves, their patients and the planet. This presentation will explore priority areas for curriculum development in dental education and the transformative potential of technologies. Key research questions in dental education will be proposed that will enable us to shape the future of dental education in a way that is both technologically advanced and deeply humanistic.

Biography:

Dr. Samantha is an Associate Professor and Director of Students and Education at the Melbourne Dental School at the University of Melbourne. Samantha graduated with a Bachelor of Dental Science from the University of Queensland in 1996. She then completed her PhD in 2006 where she explored the microbial composition of dental plaque associated with periodontal disease progression. Samantha is currently leading a curriculum redesign of the Bachelor of Oral Health and Doctor of Dental Surgery programs at the Melbourne Dental School. Samantha is also currently studying for a Doctor of Education examining the relationship between student perceptions of pre-class learning on the flipped classroom and their self-regulated learning behavior.

S-2

WHO Global Oral Health Meeting and education forces

Corrado PAGANELLI
School of Dentistry, University of Brescia, Italy

Abstract

As academic leaders in the oral health profession, we will be called upon at national level to consult, create and deliver on national strategies that will evolve from the Global Oral Health Action Plan (2023–2030). Creating a priority action list and supporting resources will enable Deans and senior faculty to prepare for and deliver on the Action Plan. To effectively do this we need to be well informed on the staged development and delivery of the strategy and what the practical implications of this will mean to our oral health curriculum, clinical and pedagogical practices.

Biography

Professor Corrado Paganelli DDS, MD is currently chair of the Board of IFDEA (International Federation of Dental Educators and Associations) and FEHDD (Forum of European Heads and Deans of Dental Schools), and former President CECDO (Council of European Chief Dental Officers) and ADEE (Association for Dental Education in Europe) and ICD (International College of Dentists). Now, Dr. Corrado is a Dean of Dental School/Clinic of the University of Brescia, Italy. He also is the Past President of IADR Nutrition group, and chairs the dental expert panel (Expamed) for the EU Commission of the Regulation (EU) 2017/745 on Medical Devices.
Head of the invited delegation to establish a dental curriculum in Ethiopia and in Ukraine. Member of Academy of Dentistry International, Club International de Morphologie Faciale. Honorary position as Head of the Postgraduate Education for Orthodontics in Bratislava (SK) at the Slovak Medical University (since 2010). Honorary Fellowship (since 2008) and Visiting Professor (2010) at King's College of London. Honorary Visiting professor (since 2018) at Hong Kong University Faculty of Dentistry. Fellowship ad hominem of The Royal College of Surgeons of Edinburgh (UK). Fellowship ad eundem of the Royal College of Surgeons of Ireland. DentEd certificate as a contributor to the standardization of Dental Education.

K1-1

Computer-assisted Jaw Reconstruction: from 3D Printing to Artificial Intelligence

Richard Su
Professor
Hong Kong University
richsu@hku.hk

Abstract

The maxilla and mandible provide skeletal support for the middle and lower third of our faces, thus playing a crucial role in maintaining the upper airway, chewing, swallowing and speech. Reconstruction of jaw is often mandatory after segmental resection to restore proper facial esthetics and function. Microvascular bone flap reconstruction has gained its popularity in jaw reconstruction in the recent years due to its consistent shape, ample length, low donor-site morbidity, and allowing osseointegrated dental implants for masticatory function rehabilitation. The past few years has witnessed the great advancement in computer-assisted jaw reconstruction. Preoperative virtual surgical planning increased the proficiency and predictability of jaw reconstruction. The application of three-dimensional (3D)-printed surgical guides and patient specific surgical plates further improved the accuracy of free flap reconstruction. In this presentation, I will discuss our digital workflow of computer-assisted maxillary and mandibular reconstruction based on virtual surgical planning and 3D printing. And most recently, we developed artificial intelligence-enabled computer-assisted jaw reconstruction, which further streamlined the surgical process and improved treatment outcome.

Biography

Prof. Richard Yuxiong Su currently works as Clinical Professor and Chief of Division of Oral and Maxillofacial Surgery, Faculty of Dentistry, The University of Hong Kong. He is also an Honorary Professor at the Department of Otorhinolaryngology, Chinese University of Hong Kong. Prof. Su is a Councillor of International Academy of Oral Oncology. He serves as international faculty and Asia Pacific Board member of the AO Craniomaxillofacial Foundation. He also works as a Section Editor of International Journal of Oral and Maxillofacial Surgery, an Associate Editor of Frontiers in Oncology (Head and Neck Cancer Section) and Deputy Editor of Craniomaxillofacial Trauma & Reconstruction. His main research areas include clinical and translational research in oral and maxillofacial oncology, microsurgical reconstruction, and salivary gland diseases, with special focus on computer-assisted surgery and 3D printing in head and neck reconstruction. He has published more than 150 manuscripts in peer-reviewed international journals. Prof. Su is the inventor of seven patents, including two US and EU patents and five China patents. He has been awarded ten peer-reviewed external research grants as the principal investigator. Prof. Su has been invited to give lectures in numerous international and regional conferences and courses. He is ranked by Clarivate Analytics in the top 1% researcher worldwide by citations in 2021 and 2022.

K1-2

Artificial Intelligence in Dentistry

Prof Hao Yu
Professor
Fujian Medical University
haoyu-cn@hotmail.com

Abstract

Artificial intelligence (AI) represents a wide array of evolving technologies that increasingly permeate everyday life. To explore the trajectory of AI within the dental sector, an extensive electronic search was conducted, supplemented by direct inquiries to companies offering AI-driven services in dentistry. Predominantly, AI applications in dentistry focus on diagnostic processes utilizing radiographic or optical images. Other dental tasks benefit less from AI integration, primarily due to limitations in data availability, uniformity, and the computational demands of processing 3D data. This review provides a comprehensive overview of current AI applications in clinical dentistry, aiming to enhance dental professionals' understanding of AI as a valuable tool. By incorporating AI, dental practitioners can achieve greater accuracy and efficiency in their routine tasks, ultimately elevating patient care standards. This presentation helps demystify AI technologies for dental professionals, encouraging more informed engagement with AI tools to optimize clinical outcomes.

Biography

Dr Hao Yu is a Clinical Professor (Prosthodontics) and an Associate Dean at the School and Hospital of Stomatology of Fujian Medical University, China. He earned doctorates from both Wuhan University (China) and University of Zurich (Switzerland). He also holds adjunct professorships at the dental schools of University of Zurich (Switerzland) and Nagasaki University (Japan). He is the vice president of Fujian Prosthodontics and Dental Materials Society, the vice president of Western Returned Scholars Association at Fujian Medical University, a standing committee member of Chinese Prosthodontics Society (CPS), and a standing committee member of Chinese Dental Materials Society. Dr Yu’s research interests include dental materials, tooth bleaching, prevention of dental erosion, and dental education. He published more than 100 peer reviewed journal articles and abstracts in international conferences, and served as Guest Editors of BioMed Research International and Frontiers in Materials. Dr Yu was awarded the Science & Technology Award for Young Talents of Fujian Province in 2021, the Fujian Medical Science and Technology Award in 2023, and was elected as a Fellow of International College of Dentists (FICD) in 2018.

K1-3

Application of Bioinformatics and Artificial Intelligence in Precision Oral Cancer Research

John Junwen WANG
Professor
Hong Kong University
junwen@hku.hk

Abstract

The advances of next generation sequencing (NGS) and artificial intelligence (AI) are revolutionize biology and medicine. Precision dentistry is an emerging area in dentistry that utilizes personalized genomic, diet information and life habit to guide diagnosis, treatment and prognosis of dental diseases. I will introduce several recent works from my lab on utilizing genomics and AI tools to deepen biological understanding and to enhance patient care. Firstly, I will introduce how we are using genomics, transcriptomics and proteomics data to detect genes, pathways and signatures that are key to the pathogenesis of hypopharynx cancer in multiple cohorts of Chinese patients. Secondly, we are building a data portal of oral cancers that integrates over gene expression and clinical data from over 40 studies. Users can carry out analysis such as differentially expressed gene, pathway enrichment, survival analysis on the portal. Thirdly, I will report our findings on how AlphaFold performs on predicting functions of pathogenic variants and some surprise observations. Finally, we are developing a deep learning model to integrate single cell multi-omics data from Neat-seq technology and to infer gene regulatory networks. These bioinformatics and AI methods will contribute to not only oral cancer, but other dental disease areas.

Biography

Professor Wang is currently a professor in Faculty of Dentistry, the University of Hong Kong (HKU). He was a full Professor of Biomedical Informatics at Mayo Clinic in Arizona, and affiliate Professor at Arizona State University, USA. He obtained his PhD from University of Washington, Masters from University of Pennsylvania, USA and Jiangnan University, and BE from Huazhong Agricultural University, China. Prof. Wang's research interests are in Bioinformatics, gene regulatory network construction, AI and methodology development for data analysis. He has published over 130 papers in journals such as Nature genetics, Nature Communications, Nature Machine Intelligence, Circulation, NAR, Bioinformatics, and has obtained funding from RGC of Hong Kong, and NIH of USA as project leaders. He was an ISI top 1% cited scholar, an outstanding young researcher awardee at HKU, and is currently an associate editor of Journal of Cancer Immunology, Immunotherapy.

K2-1

WNT7A, its secret of secretion and activation in HNSCC

Prof Dali Zheng
Professor
Fujian Medical University
dalizheng@fjmu.edu.cn

Abstract

Wnt signaling is a critical pathway involved in organ development, tumorigenesis, and cancer progression. WNT7A, a member of the Wnt family, remains poorly understood in terms of its role and the underlying molecular mechanisms it entails in head and neck squamous cell carcinoma (HNSCC). According to the Cancer Genome Atlas (TCGA), transcriptome sequencing data of HNSCC, the expression level of WNT7A in tumors was found to be higher than in adjacent normal tissues, which was validated using Real-time RT-PCR and immunohistochemistry. Unexpectedly, overexpression of WNT7A did not activate the canonical Wnt-β-catenin pathway in HNSCC. Instead, our findings suggested that WNT7A potentially activated the FZD7/JAK1/STAT3 signaling pathway, leading to enhanced cell proliferation, self-renewal, and resistance to apoptosis. Furthermore, in a patient-derived xenograft (PDX) tumor model, high expression of WNT7A and phosphorylated STAT3 was observed, which positively correlated with tumor progression. Our results also indicated that the palmitoylation of WNT7A was important for its secretion and function. But which are the major palmitoyl transferases, and how the palmitoylation affects the secretion and stability of WNT7A still need further investigation.

Biography

Dr. Dali ZHENG is a professor of Fujian Key laboratory of Oral Diseases, School and Hospital of Stomatology, Fujian Medical University. He received BSc degree in Biochemistry from Fudan University, graduated with MSc in Immunology from Fujian Medical University, and obtained PhD in Biochemistry and Molecular Biology from Shanghai Jiaotong University. He was a postdoctoral research fellow at University of Missouri (USA) and Washington University in St Louis (USA) from 2009 to 2013, and research associate at Moffitt Cancer Center and University of South Florida (USA) from September of 2013 to January of 2018. He won the title of "Distinguished Professor of Minjiang Scholarship" in 2018 and is serving as academic editor for Biomedical Reports, Journal of Oncology, reviewer for several international journals such as Cancer Letters, Signal Transduction and Targeted Therapy, Cells, and so on. He published more than 80 research papers in international journals including Nature Nanotechnology, Oncogene, JCI, PNAS, and BMC Cancer and won First-class prize of Natural Science Award of Ministry of Education (4th authorship) in 2016 and Second-class prize of Scientific Innovation Award of Fujian Province (2nd authorship) in 2017. His research is mostly focused on the molecular biology of oral cancer and oral microenvironment.

K2-2

Biomechanical considerations of implant prosthetic treatment based on force control

Dr. Nobuhiro YODA
Professor / D.D.S., Ph.D.
Division of Advanced Prosthetic Dentistry,
Tohoku University Graduate School of Dentistry, Sendai, Japan

Abstract:

While peri-implantitis can cause bone resorption around the implant, excessive functional load can also cause peri-implant bone changes. Controlling the applied force is crucial for dental implants to function properly over the long term. Many books and articles have presented various principles and guidelines for "force control" in implant treatment, but the available evidence is inconsistent. Biomechanical and biological data to verify the effect of different forces on bone remodeling are still insufficient, and clinical evidence has not yet been established. Many biomechanical factors can affect the outcome of implant treatment and these can vary widely among cases, making them difficult to demonstrate through clinical research. However, as professionals involved in implant clinical practice, it is our responsibility to seek the most useful evidence.

Bone remodeling caused by forces exerted on an implant is an essential aspect of force control in implant dentistry. We developed an in vivo force-measurement device to measure the force exerted on the implant during function in vivo, and investigated the influence of the force on mechanical stimulation in the peri-implant bone by finite element analysis. Moreover, the impact of the cantilever bridge configuration on the force exerted on the implant and mechanical stimuli in the peri-implant bone was explored. Furthermore, we developed a method to calculate a patient-specific bone-remodeling algorithm using the results of both computational simulations and clinical outcomes. The developed method is expected to enable the construction of a preoperative implant treatment planning system based on the computational prediction of peri-implant bone remodeling.

Biography:

Nobuhiro Yoda is Professor of the Division of Advanced Prosthetic Dentistry, Tohoku University Hospital, Japan. He undertook undergraduate training at Tohoku University School of Dentistry (DDS, 2003), and subsequently, pursued postgraduate education at Tohoku University Graduate School of Dentistry (Ph.D., 2007). Nobuhiro joined the Faculty of Engineering and Information Technologies at the University of Sydney as a visiting researcher from 2014 to 2016 and engaged in collaborative research on dental biomechanical bone remodeling simulation. He works clinically at Tohoku University Hospital as a dentist and a Prosthodontic Specialist certified by the Japan Prosthodontic Society (2010), as well as a Dental Implant Specialist from the Japanese Society of Oral Implantology (2018). Furthermore, Nobuhiro became an ITI fellow in 2022.

I1-1

Metabolic Regulation in Tolerogenic Dendritic cells: Exploring New Approaches for Treating Systemic Lupus Erythematosus

Dr. Patcharee RITPRAJAK
Associate Professor / D.D.S., Ph.D.
Department of Microbiology, Faculty of Dentistry
Chulalongkorn University, Bangkok, Thailand

Abstract:

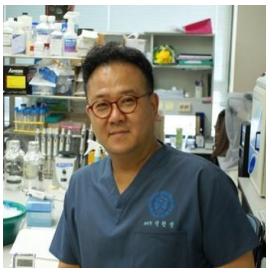
Systemic lupus erythematosus (SLE) is an autoimmune disease resulting from loss of immune tolerance to self-antigens leading to aberrant immune responses, inflammation, and affects multiple organs. Immunosuppressive treatment is commonly used to mitigate autoimmunity's harmful effects, but it suppresses the entire immune system, increasing infection risk. Additionally, certain immunosuppressants, like corticosteroids, have long-term risks and serious side effects. Recent advances in the treatment of SLE have been centered on the induction of specific immune tolerance to mitigate the complications associated with the prolonged administration of immunosuppressive medications. Dendritic cells (DCs) represent the most potent antigen-presenting cells with multifunctional roles in the regulation of immune activation and tolerance. The altered tolerogenicity of DCs has been implicated in the pathogenesis of SLE, thereby underscoring the significance of DC-targeted therapeutic strategies aimed at promoting self-tolerance in the management of SLE and other autoimmune disorders. Metabolic dysregulation in autoimmune diseases, particularly in DCs, contributes to tissue inflammation and disease development. It is essential to understand and manipulate the cellular metabolism of DCs for effective management of these diseases. Our current study aims to identify specific metabolic pathways that regulate DC function in a lupus mouse model. We believe that modulating the cellular metabolism of DCs may open up new possibilities for treating cancer and autoimmune diseases.

Biography:

Our laboratory is dedicated to conducting extensive and advanced research to gain a deep understanding of the intricate cellular and molecular mechanisms that govern the behavior of dendritic cells in the specific context of immune activation and immune tolerance. Our research focuses on uncovering the complex interactions and functions of dendritic cells in the immune system. We are driven by a strong passion to leverage the therapeutic potential of our research findings for the development of novel treatment approaches for cancer and immune-mediated diseases. Our ultimate goal is to contribute to the advancement of medical knowledge and the improvement of patient care. Our research efforts encompass comprehensive studies that incorporate the use of both naïve and genetically engineered mice. These studies are carefully designed to delve into the multifaceted realm of dendritic cell immunology, particularly within the intricate landscape of cancer and autoimmune diseases. By meticulously examining these aspects, we aim to unearth new and innovative therapeutic targets that hold significant promise for addressing and treating these complex conditions. We are committed to pushing the boundaries of knowledge in this field and are dedicated to making meaningful contributions to the scientific community.

I1-2

Current Opinions in the Maintenance of the Epithelial Plasticity



Han SUNG JUNG
Professor / PhD
Yonsei University, Seoul, Korea

Abstract:

Taste receptor cells are sensory cells embedded in the papilla of the oral cavity. These cells have a definite life span of 8-12 days and are renewed continuously by a pool of stem/progenitor cells outside the taste bud. Genetic lineage tracing has identified that Lgr5+ stem/progenitor cells at the circumvallate papilla (CVP) trench play a crucial role in taste bud regeneration. These cells give rise to all taste and non-taste epithelial cells during homeostasis and regeneration. This research could lead to the development of new treatments for taste disorders or enhancing taste perception. It remains to be identified whether the CVP harbors another pool of stem cells that can regenerate the epithelium in the absence of Lgr5 expressing stem/progenitor cells. Lgr5 expressing cells in the CVP of mice were specifically ablated using Lgr5DTR/+mice that have diphtheria toxin receptor (DTR) gene knocked into the Lgr5 locus. Administration of diphtheria toxin led to the loss of Lgr5 expressing cells in the CVP. Ablation of Lgr5 expressing cells led to the degeneration of taste buds and taste receptor cells expressing K8 with degeneration of basal cells and basement membrane within 24h after DT injection. Interestingly, after 72h of injection, it was observed that the basal cells and basement membrane had wholly regenerated in the CVP, but no taste buds were observed. By 2 weeks after the injection, the taste buds were also regenerated in the CVP. Lineage tracing showed that cells from Von Ebner's gland duct migrated and regenerated the basal cells of the CVP and differentiated into taste receptor cells. These data indicate that cells from the associated organ, like Von Ebner's gland, drive the regeneration of taste buds and CVP without its resident Lgr5+ stem cell pool.

Biography:

Dr. Han-Sung Jung is a professor in the Faculty of Dentistry at Yonsei University, Seoul, Korea. Dr. Jung is a scientist who has specialized in embryonic development and earned a Ph.D. in Developmental Biology from University College London. The Jung laboratory focuses on understanding how organs form in developing embryos and how they regenerate in adults. When developmental and regenerative processes go away, birth defects, cancer, and other diseases can result. The group's research is centered on understanding how development and regeneration commonly occur that result from abnormalities in these processes. A central focus in the lab is craniofacial and dental development, as malformations in these organs are among the most common congenital anomalies. We intend to use the insights from variable experiments in mice to guide us in using stem cells in regenerating dental and craniofacial tissues as a paradigm for developing replacement organs. Another central area of study is the regeneration of the taste bud epithelium. The remarkable ability of the mammalian taste epithelium to renew has long fascinated biologists. Our research aims to address fundamental questions, including the identity, regulation, and plasticity of taste epithelial stem cells. Finally, the laboratory is interested in how positive and negative signaling modulators affect Ameloblastoma.

I2-1

Common medical and dental problems in older adults

Alice CHAN
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Abstract

Population is ageing. The older adult population is growing in number and proportion worldwide. There will be 1.6 billion of older adults aged 65 or above, consisting 1 in 6 of our population by 2050. Ages changes, chronic medical conditions and polypharmacy make older adults more vulnerable to oral diseases; numerous evidence showed that oral health was associated with general health and overall well-being of older adults. World Health Organization and FDI World Dental Federation acknowledged oral health as a crucial factor in healthy ageing. With the increasing demand in oral health care in older adults, oral health care professionals should be equipped with knowledge and skill in geriatric oral care. They should understand the interlaced oral and systemic health in order to provide a personalized, comprehensive and integrated care plan for older adults. This presentation will give you an overview of the common medical and dental problems and their impacts in older adults.

Biography

Dr Chan is the Senior Clinical Practitioner of the Faculty of Dentistry, The University of Hong Kong (HKU). She received her postgraduate and specialist training in prosthodontics in the University of Hong Kong and is a registered prosthodontist in Hong Kong. She is a fellow of the Royal College of Surgeons of Edinburg, the College of Dental Surgeons in Hong Kong and the Hong Kong Academy of Medicine. Dr Chan practiced in dentistry for 15 years before she became an academics. Her research interest is oral health care in older adults. She has published 18 scientific articles in international peer-reviewed journals. She has received four awards in international conferences including the Outstanding Research Award in the 15th International Conference of the Asian Academy of Preventive Dentistry, the 3rd prize of poster presentation in the 2nd General Meeting of Asian-Oceanian Federation of Conservative Dentistry, the Best poster award in the 2022 TU-HKU-FJMU International Symposium Oral Health Sciences and the Most popular poster award in the 11th Hong Kong International Dental Expo and Symposium 2022. She serves as a journal editor in Frontiers in Oral Health and journal reviewers in several journals including Journal of Dentistry and Caries Research.

I2-2

A New Perspective on the Number of Teeth in Older Adult

Dr. Satoshi Yamaguchi
Associate Professor / DDS, PhD
Division of Aging and Geriatric Dentistry, Department of Rehabilitation Dentistry, Tohoku University Graduate School of Dentistry, Sendai, Japan

Abstract:

It has been suggested that tooth loss and periodontal disease may increase the risk of Alzheimer's disease (AD). However, no report demonstrated a longitudinal association between hippocampal atrophy, an imaging biomarker of AD, and the number of teeth or periodontal disease; instead, negative results were reported. Most of the known risk factors for AD have been reported to be associated with hippocampal atrophy, and it is important to show an association between the number of teeth and periodontal disease and hippocampal atrophy to reveal that a poor oral environment may be a risk for AD. Recently, we have successfully shown that hippocampal atrophy rate is longitudinally associated with the number of teeth and that this association varies with the severity of periodontal disease by using a statistical model that accounts for the interaction between the number of teeth and periodontitis. These results showed that fewer teeth were associated with a faster rate of left hippocampal atrophy in patients with mild periodontitis. However, having more teeth was associated with a faster rate of atrophy in those with severe periodontitis. In addition, our unpublished research suggests that the burden experienced by family caregivers caring for older persons with declining oral health may increase as the number of teeth in the care recipient increases. In this presentation, I would like to show that, depending on conditions such as periodontitis, retaining more teeth in the oral cavity of older adults may be a risk for systemic disease and care burden, and discuss important and new perspectives for the future in geriatric dentistry.

Biography:

Dr. Satoshi Yamaguchi is an associate professor of the Division of Aging and Geriatric Dentistry at Tohoku University Graduate School of Dentistry. His research focuses on the application of medical image analysis to geriatric dentistry. He has particular expertise in MRI analysis. He has reported several unique studies, including MRI analysis of activity distribution within the masticatory muscles. Recently, using brain MRI data from an epidemiological study, he found that the rate of hippocampal atrophy in humans, an imaging biomarker of Alzheimer's disease, was longitudinally associated with the number of teeth and that this association varies with the severity of periodontal disease. The results of this study were well received by neurological experts and published in Neurology, a journal published by the American Academy of Neurology. His current research focuses on analyzing the impact of the oral environment of older adults on medical and nursing care.

I2-3

Dysphagia Rehabilitation - Treatment and Research

Dr. Naru SHIRAISHI
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Tohoku University Graduate School of Dentistry, Sendai, Japan

Abstract:

The Center for Dysphagia in Tohoku University Hospital includes specialists from medical and dental fields, such as otolaryngologists, physiatrists, dentists, pharmacists, nurses, speech therapists, managerial dieticians, and dental hygienists. Since Tohoku University Hospital is a large-scale medical institution with 44 clinical departments and 1,207 hospital beds, we handle a wide variety of primary diseases, some of which carry a potential risk of dysphagia. Early detection and control of these risks are crucial for patient health and early discharge. Therefore, we started a screening exam for swallowing ability by floor nurses in 2021. This screening system and our medical and dental care approaches will be introduced in this presentation. Previous studies investigated the effects of neuromuscular electrical stimulation therapy (NMES) as a swallowing rehabilitation equipment. On the other hand, the problems with the currently used NMES are the difficulties of selective application of electrical stimulation to the suprahyoid muscle group, which is located relatively deep. Also, the stimulation intensity of NMES can be high to obtain appropriate muscle activity and is accompanied by discomfort and pain. Our group recently focused on repetitive peripheral nerve magnetic stimulation (rPMS). Since rPMS uses magnetism to generate eddy currents within muscles, it can stimulate motor nerves (Aα fibers) deep within the skin while suppressing stimulation of pain nerves (Aδ fibers and C fibers) on the surface of the skin, suppressing discomfort and pain. This novel swallowing rehabilitation method will be also introduced in this presentation.

Biography:

Dr. Shiraishi earned a Doctor of Dental Surgery (DDS) degree from Tohoku University School of Dentistry in 2006, followed by a Ph.D. from Tohoku University Graduate School of Dentistry in 2010. Currently serving as the Director of the Swallowing Center for Dysphagia at Tohoku University Hospital, Dr. Shiraishi specializes in Prosthodontics, Maxillofacial prosthetics, and Dysphagia Rehabilitation. Their clinical expertise is complemented by a deep research interest in the relationship between oral and cognitive functions using rodent models, as well as conducting clinical studies focused on dysphagia rehabilitation. Dr. Shiraishi's work bridges clinical practice and research, contributing significantly to advancements in oral health and rehabilitation therapies.

I2-4

Gut Microbiota: Bridging Oral Health and Systemic Diseases

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Abstract

The gut microbiota plays a crucial role in human health, influencing various physiological processes and immune responses. This lecture delves into the intricate relationship between oral health and the gut microbiota. Firstly, it elucidates the pivotal role of gut microbiota in maintaining overall health. Secondly, it discusses the correlation between periodontitis and alterations in gut microbiota composition, highlighting potential mechanisms linking the two, including the dysregulation of TH17/Treg balance. Additionally, it introduces the intriguing concept that oral saliva may harbor bacteria capable of surviving in the intestine, potentially impacting gut microbiota composition and systemic health. Furthermore, it examines the emerging evidence suggesting a link between apical periodontitis and disturbances in gut microbiota. Importantly, both apical periodontitis and periodontitis can compromise intestinal barrier function, leading to systemic repercussions. Moreover, apical periodontitis has been associated with disruptions in intestinal metabolism, particularly bile acid metabolism, which may have far-reaching implications for systemic health. These insights underscore the interconnectedness of oral and systemic health, emphasizing the potential of targeting gut microbiota to mitigate the risk of systemic diseases originating from oral conditions. Recognizing these complex interrelations provides a foundation for comprehensive approaches to promoting overall health and well-being.

Biography

Dr. Gan is Senior Clinical Assistant Professor of School and Hospital of Stomatology, Fujian Medical University, he received his PhD degree from Fujian Medical University in 2022, specializing in endodontics, with a primary focus on the correlation between apical periodontitis and systemic diseases. He participated in one project of National Natural Science Foundation of China, led one project of Natural Science Foundation of Fujian Province, and one project of Fujian Provincial Health Department. He has published two articles in the International Endodontic Journal and one article in the International Journal of Oral Science on apical periodontitis promoting atherosclerosis.

I3-1

Friend or Foe: Dentistry Amidst the Inevitable Rise of Artificial Intelligence

Dr. Nia Ayu Ismaniati Noerhadi, DDS., MDSc.,
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Department of Orthodontics, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonessia

Abstract:

This presentation will mainly cover the growth of Artificial Intelligence (AI) that is vastly advancing in a lot of sectors, including but not limited to the discipline of health- and dental care. The increase in demand and use for AI and other modern technologies has generated an intriguing debate amongst dental practitioners and academicians, which led to the importance for open discourse and more elaborate literature concerning its extent of applications in general dental practices, management as well as academia. In dental practice, the development of AI enabling better diagnosis, treatment planning, patient care and contributing to scientific research, due to its ability to analyze and organize large volumes of medical data. As with the growth of any other contemporary technology in education, one must observe this with an open mind. Although the attitude and reception towards the rise of AI in this field has been relatively positive, critical discussion to balance its risk and its effects are advisable. Artificial intelligence (AI) in the orthodontic fields has also been significantly grown, leading to be more accurate and efficient diagnosis. It has been widely used in cephalometrics, dental and facial analysis, skeletal-maturation-stage determination, as well as upper airway obstruction assessment. In addition to analysis, digital dental models and 3-D photogrammetry techniques enable the creation of accurate virtual models of the dentition and surrounding tissues. Thus, it helps Orthodontist analyze data more easily and quickly. Moreover, data visualization techniques allow Orthodontist to present complex information, more understandably and interactively to the patients, so it is facilitating their understanding of treatment options, and potential outcomes. The question is how far the AI can replace the thorough examination and analysis carried out by Orthodontists?
Keywords: Artificial Intelligence, AI in Dental Practice, AI in Dental Education, Orthodontic Practice, Orthodontic Diagnostics, Orthodontic Treatment Plan.

Biography:

Dr Nia Ayu Ismaniati is the Dean of the Faculty of Dentistry, Universitas Indonesia. She is an Associate Professor of Orthodontic at Universitas Indonesia. She earned her dental degree from Universitas Indonesia and completed her postgraduate training in Melbourne University to pursue the Master of Dental Science in Orthodontic. She achieved a recognition as Consultant in Orthodontic from the Indonesian Collegium Board of Orthodontic. She graduated with Cum Laude predicate for her doctoral degree in Faculty of Dentistry, Universitas Indonesia. She is active as a lecturer at the Bachelor in Dentistry Study Program and Orthodontic Specialistic Study Program. She was also appointed as internal and external national examiner of the comprehensive exam for Orthodontic Specialistic Study Program. She was appointed as Head of Sub Directorate for Alumni Relations at the Directorate of Career Development and Alumni Relations, Universitas Indonesia before she was posted as Director of Management and Business Development Unit, Universitas Indonesia. She is also a founder for Smile Darmawangsa Dental Care.

I3-2

A series of studies on coronectomy to prevent the injury of inferior alveolar nerve caused by mandibular wisdom tooth extraction

Dr. Nianhui CUI
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Peking University, School and Hospital of Stomatolgy, Beijing China

Abstract:

Inferior alveolar nerve injury is a common complication in alveolar surgery, especially in the extraction of high-risk impacted mandibular wisdom teeth, the proportion of damaged nerves reported in the literature ranges from 0.5% to 35%, and permanent damage could reach 3.5%. At present, there is no effective treatment for nerve injury, so it is particularly important to prevent injury. Coronectomy originated from the root preservation during tooth extraction and has gradually standardized into an independent technique since the 1990s, aiming at the extraction of mandibular impacted molars with high risk of nerve damage. After long-term clinical observation and tracking, it has played a certain of preventive effect. Since 2015, our research team has systematically conducted clinical studies on coronectomy, including quantitative study on nerve damage, 3D analysis of reserved root movement, repair of distal bone defect of the second molar after coronectomy, rapid traction of reserved root combined with secondary extraction technology, and recently completed research on the accuracy of coronectomy under dynamic navigation. These studies analyzed the effects of coronectomy on nerves and the outcome of tooth root reservation from multiple perspectives, and proposed the surgical criteria of tooth root preservation and reduction of secondary eruption. At the same time, rapid root movement through traction method expanded the indication of coronectomy, and combined with dynamic navigation technology, improved surgical accuracy.

Biography:

Standing Committee of the Dental and alveolar Surgery Committee of Chinese Stomatology Association. Deputy Chairman of the Dental and alveolar Surgery Committee, Standing Committee of the Oral and Maxillofacial Surgery Committee of Beijing Stomatology Association. I have been engaged in clinical, scientific research and teaching work in oral and maxillofacial surgery for a long time. Clinical work mainly focuses on dental and alveolar surgery, and carries out clinical and scientific research work on the diagnosis and treatment of wisdom teeth throughout their life cycle (extraction, transplantation, coronectomy, etc.). In addition, he has rich experience in the diagnosis and treatment of trigeminal nerve diseases and injuries. The basic research work focuses on the mechanism of jaw destruction, the inhibition of bone destruction, alveolar bone regeneration and repair materials. Participated in the compilation of "Oral and maxillofacial surgery" textbooks, " Navigation in oral and maxillofacial surgery" and other monographs.

I4-1

Leveraging Artificial Intelligence to Transform Orthodontics

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Abstract

The emergence of artificial intelligence (AI) as a transformative force in various fields has prompted significant advancements in orthodontics. This talk delves into the current applications of AI in orthodontics, focusing on three key areas: diagnostics, treatment planning, and clinical practice. AI's role in boosting diagnostic precision and efficiency lays the foundation for personalized treatment plans tailored to individual patients. Treatment planning benefits from AI's capacity to analyse extensive datasets, allowing orthodontists to make well-informed decisions for enhanced patient outcomes. Moreover, AI-driven systems have revolutionized clinical operations through optimized practice management, seamless remote care, and streamlined documentation. However, realizing AI's full potential in orthodontics requires overcoming challenges such as data privacy concerns, algorithmic biases, and fostering interdisciplinary collaboration. This talk underscores the importance of staying abreast of AI's applications, challenges, and prospects to harness its transformative power and elevate patient care in orthodontics.

Biography

Dr. Shan holds the position of Clinical Assistant Professor in Orthodontics at the Faculty of Dentistry, The University of Hong Kong (HKU), where she actively engages in undergraduate and postgraduate education, clinical and basic research, and clinical orthodontic practices. She was granted the Hong Kong Postgraduate Fellowship (HKPF) and earned her PhD from HKU. Prior to this, she completed her BDS and MDS training in orthodontics at Shanghai Jiao Tong University, where she was recognized as an Outstanding Graduate Student. As a licensed practitioner in both Hong Kong and mainland China, Dr. Shan has gained substantial practical experience. With nine years in orthodontic practice, she has developed skills in various orthodontic techniques, including fixed appliances, clear aligners, and lingual appliances. Dr. Shan's research interests encompass CAD/CAM appliances, dentofacial 3D simulation, and orthodontic-periodontal interdisciplinary treatment. Her contributions to the field have been acknowledged through the publication of fourteen articles in reputable journals. She was also awarded the CTOR Award for Student Excellence in Orthodontic Research in 2021 and listed as a finalist for the same award in 2022. Furthermore, Dr. Shan is serving as an invited reviewer for ten SCI journals. Dr. Shan is dedicated to advancing orthodontic knowledge through her efforts in clinical practice, research, and education, and she values the opportunity to contribute to the dental and orthodontic community.

I4-2

Optimizing Intraoral Scanning Accuracy: Insights into Interocclusal Relationships

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Abstract

Intraoral scanners are pivotal in modern dentistry, providing a non-invasive, efficient method for capturing intraoral structures. Precise interocclusal relationships and optimal occlusal morphology reproduction are vital for successful final restorations and reducing potential complications. However, the accuracy of scans can vary depending on the scanning area, leading to different results. Quadrant scans for single-unit restorations have shown superior accuracy in reproducing occlusal morphologies. Nonetheless, not all intraoral scanners offer the same level of quality. Hence, it is crucial to identify any discrepancies during virtual mounting to prevent further occlusal mismatches. This study aimed to evaluate the accuracy of occlusal relationship registration using two intraoral scanners under different teeth preparation conditions (in terms of number, location and scan areas). Trueness and precision of buccal scans and occlusal relationships were quantitatively analyzed using high-precision scanning and reverse engineering software. Results showed that Primescan exhibited superior trueness in occlusal relationships for multiple anterior teeth preparations compared to Trios 4. Precision, however, did not significantly differ between the two scanners. The number of preparations influenced trueness but not precision. Both scanners recommended a longer scan area for anterior teeth, emphasizing the importance of selecting the appropriate scanning area for optimal results in intraoral scanning procedures.

Biography

Dr. PAN Yu (BDS, PhD) is an Clinical Associate Professor at Department of prosthodontics, School and Hospital of Stomatology, Fujian Medical University. She received a PhD degree of Prosthodontics from Fujian Medical University in 2017. Dr.PAN serves as a youth committee of Chinese Specialty Committee on Prosthodontics and Dental materials,as well as a standing member of the Prosthodontics and Materials Technology Professional Committee of the Fujian Provincial Stomatological Association. She has led and participated in several national and provincial-level research projects, published six papers as the first author in SCI-indexed journals, including four in JCR-Q2 journals. She has received one second prize for Medical Science and Technology Progress in Fujian Province (as the sixth completed person), two patents in Fujian Province, and one third prize for outstanding natural science paper in Fujian Province. Her main research interests include artificial intelligence digitization, rapid UV light functionalization, and the biological properties of dental materials.

I4-3

Role of Osteocytes during Orthodontic Tooth Movement

Fumitoshi OHORI
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Division of Orthodontics and Dentofacial Orthopedics,
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Abstract:

Orthodontic tooth movement (OTM) is controlled by a dynamic balance between osteoclastic bone resorption on the compression side and osteoblastic bone formation on the tension side. Osteocytes constitute 90-95% of cells within bone tissue and construct the lacunar-canalicular network. In addition, osteocytes extend the dendrites to the bone surface to contact osteoclasts and osteoblasts, communicating with each other. Recent studies have shown that osteocytes play a key role in bone remodeling during OTM. Tumor necrosis factor-α (TNF-α), one of the pro-inflammatory cytokines, has been found to be expressed on the compression side during OTM. We previously showed that TNF-α was responsible for osteoclast formation by acting on osteocytes during OTM. However, the detailed molecular biological role of osteocytes during OTM is not completely understood. In this presentation, I would like to provide an overview of our recent findings and discuss the role of osteocytes in bone metabolism.

Biography:

Dr. Ohori received his D.D.S. degree from Tohoku University School of Dentistry, Sendai, Japan, in 2016. He then pursued a Ph.D. at the same institution, completing his doctorate at the Tohoku University Graduate School of Dentistry in 2021. During his Ph.D. studies, he was awarded a prestigious research fellowship from the Japan Society for the Promotion of Science (JSPS) as a DC2 Fellow from 2020 to 2021, followed by a PD Fellowship from 2021 to 2022. In 2022, Dr. Ohori was appointed as an Assistant Professor in the Division of Orthodontics and Dentofacial Orthopedics at Tohoku University Graduate School of Dentistry, where he continues to contribute to research and education in the field. His academic excellence has been recognized with numerous awards, including the Excellent Academic Research Award from Tohoku University Graduate School of Dentistry in 2021 and the Excellent Presentation Award at both the 80th Annual Meeting of the Japanese Orthodontic Society in 2021 and the 82nd Annual Meeting in 2023. Additionally, he was honored with the ASBMR 2023 Pre-Meeting Young Investigator Travel Grant at the American Society for Bone and Mineral Research Annual Meeting.

I4-4

The application of graphene materials for dental use

Iris YIN
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Abstract

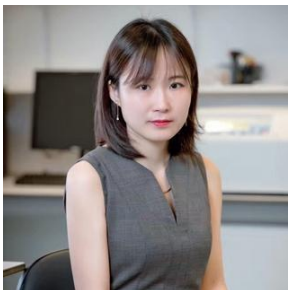
Graphene is a nanomaterial made up of carbon atoms arranged in a two-dimensional structure. Graphene materials possess advantageous physicochemical, mechanical, and morphological characteristics that can be used in biomedical applications. Some graphene materials, such as graphene oxide, contain various reactive oxygenic groups, such as carbonyl and carboxyl groups on the edges and hydroxyl and epoxide groups on the planes, which can strengthen the interaction of components at the interface. They are used in many biotechnologies because of their large surface area, simplicity of chemical functionalization, favourable biocompatibility, and biostability. Graphene materials can be activated and functionalised with metal and metal nanoparticles, polymers, and other small molecules to exhibit multi-differentiation activities, antimicrobial activities, and biocompatibility. They underwent investigations in the fields of preventative dentistry and regenerative dentistry. They have the ability to hinder the growth of cariogenic bacteria and periodontal bacteria. Graphene families can enhance the process of mineralization on both enamel and dentine. These materials have been extensively researched in the field of regenerative dentistry research, namely in the areas of dental hard and soft tissue regeneration, as well as periodontal tissue and bone regeneration. The aim of this talk is to provide an overview of the application of graphene materials for dental use.

Biography

Dr Iris Xiaoxue Yin is clinical practitioner in the Faculty of Dentistry at the University of Hong Kong. She was conferred Bachelor of Medicine Stomatology from the Anhui Medical University and Doctor of Philosophy from The University of Hong Kong. She specializes in the field of developing and accessing biomaterials for minimum intervention in caries management. She published 33 articles in international peer-reviewed journal and one of her articles was awarded WILEY Top Cited Article 2020-2021. Dr Yin has been primary investigator of a grant (Health and Medical Research Fund) and co-investigator of two grants (HKU Seed Fund for Basic Research and RGC General Research Fund). She was awarded as one of Top 2% Scientists Worldwide 2023 by Stanford University.

I5-1

Gelatinolytic activity in dentin upon adhesive treatment



Xin Li
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Abstract

In this multi-parameter study, we aimed to explore the effect of diverse factors related to dental adhesive application on the activation of host-derived gelatinases. The presence of gelatinases in dentin powder upon contact with two gold-standard adhesives Optibond FL (Kerr) and Clearfil SE Bond 2 (Kuraray Noritake) was assessed by gelatin zymography. Gelatinolytic activity along adhesive-dentin interfaces was imaged using in-situ zymography. Changes in MMP-2/9 activity upon interaction with adhesives, 37°C incubation, and temperature increase during light-curing of adhesives were evaluated by a high-throughput DQ-gelatin assay. Furthermore, the adhesive-dentin interfaces were challenged with 0.01-μM MMP-9 for 1-m, upon which the micro-tensile bond-strength (μTBS) was measured. Gelatinases were detected in phosphoric acid-etched dentin powder, while the two adhesives generated no measurable MMP activation. In-situ zymography revealed that the gelatinolytic activity from specimens treated with two adhesives appeared similar as that of EDTA negative control. In solution, MMP-2/9 activity significantly decreased upon interaction with both adhesives; gelatinases were almost completely deactivated upon 1-w incubation at 37°C; light-curing increased temperature to 70°C, which appeared sufficient to dramatically decrease MMP-2/9 activity. Finally, challenging adhesive-dentin interfaces did not significantly affect μTBS. The two adhesives did not activate the release and activation of dentinal gelatinases.

Biography

Dr. Li Xin is a clinical assistant professor in Endodontics at the Faculty of Dentistry, the University of Hong Kong. She received the Bachelor’s degree in Dentistry and Master’s degree in Endodontics from Wuhan University in China. She also obtained a PhD degree in Biomedical Sciences and a second Master’s degree in General Dentistry at KU Leuven in Belgium. Her research interest includes dental restorative biomaterials, for instance hydraulic calcium silicate cements and resin-modified biosafe and bioactive composites. She is also a licensed dentist in Europe, and she is motivated to integrate the latest scientific evidence into healthcare so to ensure a high-quality evidence-base dental practice.

I5-2

pH-Responsive Nanocomplex for Caries Prevention and Treatment

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Abstract

Caries threaten the oral and systemic health of human. Prevention of caries in early stage is a critical issue for public health. However, the utilization rate of traditional anti-caries drugs is low. And they are prone to disturbing the balance of oral microecology and inducing drug resistance. Therefore, the present study developed a pH-responsive antimicrobial and remineralization promoting nanocomposite to solve the problems above. Antibacterial quaternary ammonium compounds dimethylaminohexadecyl methacrylate (DMAHDM) were loaded with pH-responsive dendrimer polyamides (PAMAM-Acetal). Thus DMAHDM-PAMAM-Acetal nanocomplex will present both pH-responsive antibacterial and remineralization promotion effectiveness. Basic characteristics of the nanocomplex were measured. The caries preventive effectiveness was tested in vitro. The results indicated that the pH-responsive nanocomplex can identify decreased pH levels in microenvironment, realizing on-demand antibacterial agent releasing. And the nanocomplex provided remineralization promoting effectiveness at the same time.

Biography

Dr. Wen Zhou is associate clinical professor and postgraduate student tutor at School and Hospital of Stomatology, Fujian Medical University. She is also a Fijian High-level talent. She obtained her BDS to MDD degree from the West China School of Stomatology, Sichuan University. She worked as visiting scholar in University of Maryland (USA) for one and a half year, sponsored by CSC scholarship. Her research focuses on the dental biomaterials and oral microbiology. Dr. Zhou has published 14 articles on journals such as Acta Biomaterialia, Dental Materials and Journal of Dentistry. Additionally, She serves as peer reviewer for Dental Materials and other dental journals. She has accomplished 5 research projects, including projects supported by the Natural Science Foundation of Fujian Province, Postdoctoral Research Foundation of China.

I5-3

Functionalized mesoporous silica applied for infectious bone rehabilitation

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Abstract

Existing implant materials cannot meet the essential multifunction of antibacterial and osteogenesis for repairing infected bone defects. A promising strategy maybe developing a versatile biomimicry composite by combining a multifunctional nanoparticle with an organic scaffold. In these studies, a drug delivery system with self-antifungal of a quaternary ammonium silane-modified mesoporous silica containing nano silver (Ag@QHMS) was synthesized. And further combined with silk fibroin (SF) to fabricate the multifunctional nano-reinforced scaffold (SF-Ag@QHMS) to mimic the natural bone nanostructure--a lamellar structure mixture of organic extracellular matrix components and inorganic calcium phosphate nanoparticles. Then, the antibacterial and osteogenic effects of this composite were evaluated then. The composite inherits the three-dimensional porous structure and better mechanical properties of the SF scaffold. Simultaneously, the introduction of versatile nanoparticles provided it with additional antibacterial ability against P. g. The expression of osteogenic-associated factors was up-regulated due to the eluted Ag. The animal model showed that the new bone formation was not only localized around the border of the defect but also arose more in the center with the support of the composite. In summary, the dual functions of antibacterial and osteogenesis of SF-Ag@QHMS composite has make it possible for infectious bone defects treatment.

Biography

Dr Dexiong Li is a Senior Clinical Assistant Professor (Implantology) of School and hospital of Fujian Medical University. He graduated from Fujian Medical University with a doctorate in June 2021. He is now a member of the Chinese Stomatological Association and the Special Committee for Oral Implantology and Aesthetic Professional Committee. He has presided over 2 research projects and has published 6 academic papers in journals. His main research field is the development and research of new oral biomaterials and versatile nano-biomaterials for soft and hard tissue regeneration around the implant.

I5-4

The Dual Role of Neutrophils in Periodontal Disease: Protective Immunity and Tissue Destruction

Dr. Tetsuhiro KAJIKAWA
Assistant Professor / D.D.S., Ph.D.
Department of Periodontology and Endodontology,
Tohoku University Graduate School of Dentistry, Sendai,

Abstract:

Periodontal disease is a multifactorial inflammatory condition driven by complex interactions between bacterial pathogens, host immune responses, and environmental factors. Central to the host defense are neutrophils, which play a dual role in both protecting against periodontal pathogens and contributing to tissue destruction during disease progression. Neutrophils are the first responders in the innate immune system, executing crucial functions such as phagocytosis, degranulation, and the release of neutrophil extracellular traps (NETs). These mechanisms are essential for controlling infections; however, when excessively activated, neutrophils can cause significant collateral damage to periodontal tissues. Recent research has highlighted the impact of Leukocyte Adhesion Deficiency Type I (LAD-1) on periodontal disease as a unique model to study neutrophil function. LAD-1, a genetic disorder characterized by defective neutrophil adhesion due to mutations in the *Itgb2* gene, leads to impaired neutrophil migration and severe periodontitis. The absence of proper neutrophil function in LAD-1 patients not only underscores the protective role of neutrophils but also reveals their potential for contributing to extensive tissue destruction when their function is dysregulated. On the other hand, emerging concepts such as trained innate immunity (TII) and clonal hematopoiesis of indeterminate potential (CHIP) further complicate the role of neutrophils in periodontal disease. TII describes a state where innate immune cells develop a form of "memory," resulting in exaggerated responses upon re-exposure to pathogens, while CHIP involves the expansion of mutated hematopoietic stem cells, leading to heightened inflammatory responses. Both TII and CHIP may amplify the destructive role of neutrophils in periodontal disease. This presentation aims to reassess the dual role of neutrophils in the pathogenesis of periodontal disease, with a particular focus on LAD-1 and other recent findings, to provide a deeper understanding of their contributions to both immune protection and tissue damage.

Biography:

Dr. Tetsuhiro Kajikawa is an accomplished dental professional with extensive expertise in periodontology. He received his Doctor of Dental Surgery (D.D.S.) from Osaka University in 2006, followed by a one-year clinical training. In 2007, he pursued a Ph.D. at Osaka University, focusing on molecular and genetic research related to periodontal tissue homeostasis. In 2014, Dr. Kajikawa joined Dr. Hajishengallis Laboratory at the University of Pennsylvania School of Dental Medicine. There, he analyzed the role of complement in periodontal disease and explored host regulation strategies targeting complement in oral inflammatory diseases. His research also involved phenotypic analysis using model mice to study the role of neutrophils in periodontitis and their link to Leukocyte Adhesion Deficiency Type 1. This work provided critical insights into immune response mechanisms, particularly the role of Th17 cells. Returning to Japan, Dr. Kajikawa assumed the position of Assistant Professor at Tohoku University Graduate School of Dentistry, where he continues to expand his research on immune cell function in periodontal disease. He had also served as a Research Associate and Lab Manager in the Hajishengallis Laboratory and collaborated with the Moutsopoulos Laboratory at the National Institute of Dental and Craniofacial Research (NIH-NIDCR) as a Special Volunteer.

O1-1

Utilizing Biofluorescence for Biofilm Detection and Oral Disease Prevention

Dr. Eun-Song LEE
Research Professor / Ph.D.
Department of Preventive Dentistry & Public Oral Health,
Yonsei University College of Dentistry, Seoul, Korea

Abstract:

The early detection and prevention of oral diseases are crucial for maintaining oral health and mitigating the impacts of periodontal conditions. A key factor in oral diseases is the presence of dysbiotic biofilm, which disrupts the microbial balance and leads to pathogenic conditions. This study focuses on detecting these pathogenic biofilms by utilizing the microbial biofluorescence characteristics. We investigated approaches using Quantitative Light-Induced Fluorescence (QLF) technology, which employs biofluorescence principles to enhance the detection and analysis of dental plaque. QLF technology uses a blue light source to induce biofluorescent emissions from dental biofilm, allowing for the visualization and quantification of red fluorescence (RF) emitted by bacterial metabolites such as porphyrins. The first part of this study evaluates RF of dental plaque as an indicator of pathogenic potential. The results revealed a strong correlation between RF intensity and the presence of periodontopathic bacteria, indicating a higher risk of gingival inflammation. These findings establish RF plaque as a reliable risk indicator for periodontal diseases. In the second part of the study, we focused on the biofluorescence properties of the interdental plaque for screening gingival health status. By examining interdental plaque samples from 40 subjects, we identified significantly higher RF properties in individuals with gingivitis and periodontitis compared to healthy subjects. Strong correlations were found between RF values and clinical indicators such as bleeding on probing and plaque index, suggesting that RF interdental plaque serves as a reliable, non-invasive screening tool for early gingival inflammation. These studies highlight the comprehensive potential of QLF technology in oral disease prevention. This technology provides a holistic approach to identifying at-risk patients and implementing preventive strategies, ultimately aiming to improve oral health practices and outcomes.

Biography:

Dr. Eun-Song Lee is a research professor at the department of preventive dentistry and public oral health, Yonsei University College of Dentistry, Korea. With over 14 years of experience, Dr. Lee specializes in the early detection and prevention of oral diseases, particularly using biofluorescence technology. She completed a Ph.D. in preventive dentistry at Yonsei University, and has published 51 peer-reviewed articles on biofilm detection and prevention. Currently, Dr. Lee is involved in both laboratory and clinical studies aimed at preventing oral and systemic diseases through advanced biofluorescence technology. Her work bridges the gap between experimental research and clinical application, ensuring effective clinical practices. In addition to her research, Dr. Lee is dedicated to teaching and mentoring the next generation of dental professionals, having supervised numerous undergraduate and graduate students. Her commitment to advancing oral health science drives her work in improving oral health care through innovative research and clinical practice.

O1-2

Oral Management of Sjögren's Syndrome: From Chairside to Laboratory

Dr. Haixia Xing
Associate chief physician of stomatology / SMD
Department of General Dentistry, Peking University School and Hospital of Stomatology & National Center for Stomatology & National Clinical Research Center for Oral Diseases & National Engineering Research Center of Oral Biomaterials and Digital
Medical Devices, Beijing, China

Abstract:

Sjögren's syndrome is a common autoimmune disease that severely impacts patients' oral health. Patients have to suffer from oral dryness, severe dental caries, oral mucosal disease, et al. Each patient needs multidisciplinary management of their oral health, besides systemic condition. Our team aim to integrate clinical and basic research to explore comprehensive oral management strategies for those patients. Following a successful 10-year follow-up of a Sjögren's syndrome patient, we analyzed treatment characteristics of nine additional cases, summarizing key individualized management strategies. A cohort of oral diseases associated with Sjögren's syndrome was then established, leading to the standardization of comprehensive management protocols. The scope was further expanded to develop clinical expert consensus for managing hyposalivation patients, enhancing the precision of clinical treatments in China. Preventive care is very important for those patients. We emphasized the application of fluoride to reduce the incidence of early caries. To relief common symptoms of dry mouth, we developed China's first "Dry Mouth" mouthwash, which significantly alleviates dryness symptoms and promotes salivary secretion, thereby improving patients' quality of life. Addressing clinical challenges to dental caries, our team conducted foundational studies on early caries detection methods and remineralization strategies, uncovering a significant role of Veillonella in caries pathogenesis, offering new insights into oral microbiome regulation. For restorative care of those patients, we established clinical strategies for dental implant restoration, and then established an implant restoration patient’s cohort. To enhancing osseointegration, our team innovated new plasma technology for modifying 3D-printed porous titanium surfaces. In conclusion, our team provides novel solutions for the oral management of Sjögren's syndrome, demonstrating the importance of multidisciplinary collaboration and marking a significant breakthrough in this field in China, also offering better treatment options for patients worldwide.

Biography:

Dr. Haixia Xing has long been dedicated to the comprehensive diagnosis and treatment of common oral diseases. In 2017 to 2019, she was a visiting scholar at the Indiana University School of Dentistry, USA. Her primary research interests focus on the comprehensive diagnosis, treatment, and management of oral diseases in patients with Sjögren's syndrome, xerostomia, and hyposalivation. She serves as a Youth Committee Member of the Fifth Chinese Stomatological Association Oral Mucosal Diseases Professional Committee, a Member and Secretary of the First Beijing Stomatological Association Oral Mucosal Diseases Professional Committee, a Specialist Member of the Chinese Stomatological Association General Dentistry Professional Committee, and a Specialist Member of the Chinese Stomatological Association Periodontology Professional Committee. She is also a member of the International Association for Dental Research (IADR), and a Committee Member of the First Oral Health Professional Committee of the Beijing Association for the Prevention and Treatment of Chronic Diseases and Health Education. She has published nearly 20 articles in core Chinese and SCI journals and serves as a reviewer for several SCI journals. She is a Youth Editorial Board Member of two journals. She has participated in some Chinese research projects and has been granted a utility model patent.

O1-3

The Impact of Online Learning Methods on Dental Student Self-Esteem: A Lesson from COVID 19 Pandemic

Dahniar SYIFFAIZZA[1], Nieka A. WAHONO[2*], Heriandi SUTADI[2]
[1] Bachelor of Dentistry Study Program, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia
[2] Department of Pediatric Dentistry, Faculty of Dentistry, Universitas Indonesia, Jakarta, Indonesia

Abstract:

Introduction: Alteration occurred in every aspect of human activities during the COVID-19 pandemic, including the learning method in dental education. The students and lecturers were forced to use the online learning method. Technology was developed rapidly to accommodate the need to diminish the distance as the learning barrier. However, the lack of engagement between peers and their lecturer during online learning has been reported. In dentistry, the student's skills are developed gradually since the pre-clinical stage, both for the cognitive and psychomotor skills, so they are ready to serve the patients during the clinical stage. **Aims:** Therefore, this study aimed to analyze the impact of online learning on the self-esteem of dental students who have undergone the offline, blended, and online learning methods during the COVID-19 pandemic, especially in pediatric dentistry subjects. **Methods:** It was a cross-sectional study. The students of the Faculty of Dentistry, Universitas Indonesia, were recruited and divided into three groups based on the learning method during the pre-clinical stage, including the offline group (6th grade, n=50), the blended group (5th grade, n=50) and the online group (4th grade, n=50). They were then asked to fill out a set of online questionnaires. **Results:** The result showed the significant differences on students' self esteem between the three groups on the student's self-esteem (Chi-square test, $p<0.001$). It also presented the students' perception on their readiness to perform in their clinical stage were significantly different among three groups (Chi-square test, $p=0.023$). Students of the offline and blended group tend to be more confident and ready for the clinical program than in the online group. **Conclusion:** The online learning method during the pre-clinical stage influenced the student's self-esteem to continue their study at the clinical stage to become a dentist.

Biography:

Dr Nieka A. Wahono, an Assistant Professor at Pediatric Dentistry Department. She earned her dental degree from the Universitas Padjadjaran and subsequently continue her training in the Pediatric Dentist Specialist Study Program, Faculty of Dentistry, Universitas Indonesia. She achieved a recognition as Consultant in Pediatric Dentistry from the Indonesian Collegium Board of Pediatric Dentist just after she completed her Doctoral Degree (PhD) at the Faculty of Medical Science, Newcastle University. She is now appointed as the Manager of Partnership, Venture, and Alumni Affairs, also an acting Head of International Office at the Faculty of Dentistry, Universitas Indonesia. She is active as the internal examiner for dentist national examination. She also an editorial board member of Journal Dentistry Indonesia, and active as reviewer in national and international journals. Her research interests include dental defects, nutrition, craniofacial growth and development, biomarkers.

O1-4

Future Directions for Undergraduate Dental Education: A Case Study of Chulalongkorn University

Assist. Prof. Dr. Supachai CHUENJITWONGSA
Head of Dental Education Unit / D.D.S., M.Sc., Ph.D.
Faculty of Dentistry, Chulalongkorn University, Bangkok, Thailand

Abstract:

Current dental graduates must possess competencies to function as general practitioners and adapt to a dynamically changing world. Thus, an undergraduate dental curriculum should incorporate both internal and external analyses to align with professional and societal needs. Feedback from key stakeholders, including students, alumni, and employers, is instrumental in identifying strengths and areas for improvement within the curriculum. Engaging in international quality assurance certification or accreditation processes (e.g., AUNQA) provides valuable insights into curriculum performance and quality, which are essential for informed curriculum design and development. Designing an effective curriculum structure requires a solid educational foundation to enhance student learning and maximize their talents. Adopting an outcome-based education framework facilitates constructive alignment within the curriculum. Integrating basic sciences with professional relevance provides a robust foundation for advanced knowledge acquisition. Introducing evidence-based dentistry early in the curriculum ensures students can access and apply reliable evidence to support their learning and practice. Horizontal and vertical integration within and across disciplines helps students connect foundational knowledge with clinical practice. Transforming specialized or niche content into elective courses can cater to students' professional interests and future career opportunities. Moreover, allocating sufficient time within the curriculum is crucial for incorporating innovative components, such as a Bachelor-Master dual degree track, to enhance student employability and global competitiveness. Effective strategies for curriculum development include: (1) creating realistic contexts that offer students opportunities to adapt their learning and practice, thereby increasing their capabilities to work in real-world settings; (2) embedding educational innovations, such as digital and AI tools, to enhance student learning; and (3) conducting educational research to continuously improve the quality of education and the student experience. This comprehensive approach ensures that the curriculum not only meets current professional standards but also equips graduates with the skills necessary to thrive in an evolving dental landscape.

Biography:

Dr. Supachai Chuenjitwongsa holds an extensive background in dentistry, medical education, and dental education. He earned his Ph.D. in Dental Education from Cardiff University in 2015. Currently, Dr. Chuenjitwongsa serves as the Assistant Vice President for Academic Affairs, overseeing the Academic Support System, Learning Innovation, Program Quality Assurance, and Professional Standards at Chulalongkorn University. In this role, he is responsible for the university-wide implementation of educational technology and artificial intelligence for learning, faculty development programs aimed at enhancing the educational competence of academic staff, and curriculum development aligned with international quality assurance standards. Dr. Chuenjitwongsa is also a dedicated educator, teaching subjects such as evidence-based dentistry, biochemistry, and professional development. His research interests focus on competency-based dental education, faculty development, and culturally appropriate education. In addition to his academic responsibilities, he is actively involved in administrative duties at both national and international levels. Notably, he serves as the Moderator of the Technical Working Group on ASEAN Dental Education, which is tasked with improving the quality of undergraduate dental education across the region.

PROGRAM

October 18 (Fri)

14:00-16:00 **Pre-Conference Workshops**

W-1 Periodontology - **Dissecting the latest periodontal classification and its implications**

Professor **George PELEKOS** and Dr **Chris FOK**

Faculty of Dentistry, The University of Hong Kong, China

W-2 Paediatric Dentistry - **Effective Strategies for Managing Children with Autism Spectrum Disorder in the Dental Setting**

Professor **Simin PENG**, Professor **Phoebe Pui Ying LAM**, and Professor **Ni ZHOU**

Faculty of Dentistry, The University of Hong Kong, China

W-1

Pre-conference Workshop – Periodontology

Dissecting the latest periodontal classification and its implications

Prof **George PELEKOS and** Dr **Chris Fok**

Synopsis

Severe periodontal disease is a global health concern, affecting 10-15% of the population. The implications of this are far-reaching, as the mismanagement and misdiagnosis of periodontal disease are on the rise, leading to devastating consequences for both patients and clinicians. The failure to diagnose by taking adequate radiographs to assess bone levels, evidence of risk assessment, monitoring, or treatment of the disease is a major issue in dentistry. In 2017, the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP) co-presented the new classification for periodontal and peri-implant diseases and conditions at the world workshop.

This workshop aims to achieve the following:

1. Identify the main categories of the New Periodontal Classification.
2. Understand the characteristics of the periodontal conditions in the new Periodontal Classification.
3. Understand the diagnosis of periodontal disease using the staging & grading system.
4. Understand the benefits of the new periodontal diagnostics and compare them with the previous ones.
5. Use case series as examples to facilitate and practice the new diagnosis in praxis.
6. Discuss possible limitations and challenges when it comes to the new classification

Biographies

Dr Pelekos completed his specialist training in periodontics and implant dentistry at the Eastman Dental Institute, University College London (UCL), UK 2009, and then joined HKU Faculty of Dentistry as a Clinical Assistant Professor in 2014. He completed his PhD in 2020 from Tohoku University (JPN). He is an established clinician, educator and researcher. Dr Pelekos is the Postgraduate Programme Director in Periodontology (MDS) and Implant Dentistry (MSc). Importantly, the MDS Programme in Periodontology was accredited by the world leading organization in periodontology – the European Federation of Periodontology (EFP) in 2019 (the 1st program accredited by EFP outside Europe). In addition, he holds a Fellowship at the Royal College of Physicians & Surgeons of Glasgow, UK, and serves as a Trainer for the Periodontology Specialty at the College of Dental Surgeons of Hong Kong. Dr George's academic career focuses on Periodontology and Implant Dentistry. His philosophy is that Periodontology is a fusion of biology, dental medicine, microbiology, immunology and behavioural science. This is reflected in his teaching, research and clinical practice. Indeed, Periodontology is his natural "habitat" at HKU, and his goal is to enhance the healthcare standard of tomorrow's periodontal specialists and general dentists and make notable contributions to the science and practice of Periodontology and Implant Dentistry. Dr Pelekos has published extensively in peer reviewed journals and has been invited to the editorial board member of the leading journal in his specialty - Journal of Clinical Periodontology. He has long served as an expert reviewer for the major scientific journals in Periodontology, Implant Dentistry and Medical/Dental Education since 2013.

Dr. Chris Fok graduated in 2015 from the University of Hong Kong with a bachelor's degree in dentistry. In 2020, he was awarded the Master of Dental Surgery in Periodontology with distinction by the University of Hong Kong under the guidance of the team led by Professor Maurizio Tonetti. He obtained the Certificate of Completion of Specialized Training in Periodontology and Implant Dentistry from the European Federation of Periodontology (EFP) and was the first graduate of the first EFP-accredited programme in Asia. He was awarded the Membership in Periodontics from the Royal College of Surgeons of Edinburgh and from the College of Dental Surgeons of Hong Kong. In addition to private practice limited to periodontology and implant dentistry, he has been active in undergraduate and postgraduate training in the University of Hong Kong. He is interested in research in periodontal medicine, masticatory function and dietary quality in periodontitis patients. He is currently leading, together with Prof. George Pelekos, a clinical trial on the periodontal therapy and rehabilitation of stage IV periodontitis patients under the Azalea (1972) Endowment Fund.

W-2

Pre-Conference Workshop – Paediatric Dentistry

Effective Strategies for Managing Children with Autism Spectrum Disorder in the Dental Setting

Prof **Simin PENG,** Prof **Phoebe Pui Ying LAM, and** Prof **Ni ZHOU**



Synopsis

The prevalence of Autism Spectrum Disorder (ASD) has experienced a notable surge among children, necessitating the development of customised management strategies by dental professionals. This workshop will deliver informative lectures covering the general profile of ASD, including its causes, as well as the distinct medical and dental challenges associated with the condition. Additionally, the workshop will delve into effective strategies for behavioural dental management tailored made for autistic children. Through case showcases and interactive discussions, participants will have the opportunity to explore real-life scenarios and exchange valuable insights. Expert speakers will share practical techniques for managing the behavioural challenges commonly encountered during dental treatments for children with ASD. The workshop will conclude with a summary of key take-home messages and provide practical tips for dental professionals to effectively manage the dental care of autistic children and support their families. By the end of the workshop, participants will gain a comprehensive understanding of ASD and acquire enhanced skills in behavioural management techniques. This workshop aims to equip dental professionals with the necessary knowledge and skills to deliver optimal dental care for children with ASD, while effectively supporting their families.

Biographies

Professor Simin Peng is a Clinical Assistant Professor in Paediatric Dentistry at the Faculty of Dentistry, The University of Hong Kong. She holds a Bachelor of Medicine (BMed) and a Master of Medicine (MMed) in Stomatology from Guanghua School of Stomatology, Sun Yat-sen University. She also completed her Doctor of Philosophy (PhD) degree at HKU. Prof Peng's clinical, teaching, and research journey in Paediatric Dentistry began at the Guanghua School of Stomatology, Sun Yat-sen University. She has extensive teaching experience in undergraduate and postgraduate education and has actively participated in dental education programs. Prof Peng is a Fellow of the Higher Education Academy (FHEA) in the UK. Her research interests include oral diseases in Paediatric Dentistry, dental education, epidemiology of oral diseases, dental health and nutrition status, and dental pain. She has published research papers in international scientific journals and serves as an invited reviewer for various scholarly journals. Prof Peng's research team has received awards at the annual meetings of the International Association for Dental Research (IADR) and the Southeast Asia Association for Dental Education (SEAADE).

Professor Phoebe Lam is a Clinical Assistant Professor in Paediatric Dentistry at the University of Hong Kong. She completed her specialist training in Paediatric Dentistry in Hong Kong and and is recognised as a Fellow in the Hong Kong College of Dental Surgeons. With membership in Paediatric Dentistry from the Royal College of Surgeons of Edinburgh, Prof Lam is a well-trained clinician in this field. Prof Lam holds a PhD from the University of Hong Kong and is actively engaged in research focused on paediatric dentistry, caries prevention among children, and dental care for individuals with special needs. Her research findings have been published in esteemed medical and dental scientific journals, such as Autism, J Evid Based Dent Pract, J Nutr Health Aging, Caries Res, and Int J Paed Dent. In addition to her academic pursuits, Prof Lam is dedicated to promoting oral health among underprivileged populations and individuals with special needs. She has been actively involved in leading and organising dental outreach and service campaigns in Hong Kong and various developing countries. Her team's efforts have been recognised with numerous awards, including 7 HKU SERVICE 100 Fund grants, 4 Gallant Ho Experiential Learning Funds, the Stephen H Y Wei Award in Paediatric Dentistry 2016, HKU KE Impact Project Funding, HKU Knowledge Exchange Excellence Award 2015, and others for their impactful service projects in Hong Kong, Mainland China, Cambodia, Uganda, Togo, and Tanzania.

Professor Ni Zhou is currently a Clinical Assistant Professor in Paediatric Dentistry at The University of Hong Kong. She received her basic dental training at Kunming Medical University. She then obtained Master’s degree in Paediatric Dentistry from the same University, and PhD from The University of Hong Kong. Her research interest is oral health promotion for children with special healthcare needs. Her paper entitled “Social story-based oral health promotion for preschool children with special healthcare needs: a 24-month randomized controlled trial” is the Top Cited Article 2020-2021 in Community Dentistry and Oral Epidemiology. She was also awarded the International Dental Collaboration of the Mekong River Region Scholarship in Thailand (2012), the First Prize in the National Oral Health Education Contest by the Chinese Stomatological Association (2013), Excellent Demonstration as Candidate of Finalist of the Unilever Hatton Divisional Award (Senior Category) in the 32nd International Association for Dental Research-Southeast Asian Division Annual Scientific Meeting in Vietnam (2018), the Provincial Health Science & Technology Award in Yunnan, China (2022), and the National Outstanding Young Lecturer by the Chinese Stomatological Association (2022).

P-1

Validation of a TMR-D single-section model for the longitudinal microdensitometric assessment of enamel and dentin

ROMERO, Maria Jacinta Rosario H.[1] and Lippert, Frank[2]

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Department of Biomedical and Applied Sciences, Indiana University School of Dentistry, Indianapolis, Indiana, USA

Abstract:

Background: Earlier transverse microradiography single-section models were prone to specimen damage and loss and involved incorporation of radiopaque precision position locators which can complicate mineral density assessment. **Objective:** This study tested the reproducibility of microdensitometric parameters, measured longitudinally without an incorporated position locator, using two different specimen analysis area sizes with a single-section model for enamel and dentin developed for digital transverse microradiography (TMR-D). **Methods:** Bovine enamel and dentin blocks (5×5mm) were serially cut with a microtome to 100±20µm and 180±20µm thin sections, respectively, and subsequently covered with acid-resistant varnish and polyester sealing film. Surfaces of prepared thin sections were hand-polished with silicon carbide paper. Acid-resistant varnish was used to create treatment windows and peripheral seal. Ten single-sections each of enamel and dentin were demineralized for a total of 120h while subjecting them to TMR-D at baseline and after every 24h. Integrated mineral loss (ΔZ) and lesion depth (LD) parameters were analyzed in triplicate using 500×300µm and 800×300µm analysis area sizes for both substrates. **Results:** Repeated-measures ANOVA revealed that LD increased significantly with time for both substrates and analysis area sizes while ΔZ increased but was not different among 72h, 96h and 120h for enamel and 96h and 120h for dentin. Two-way ANOVA showed that the size of analyzed area had no significant effect on ΔZ and LD for both enamel and dentin (p=0.715-0.98) and that triplicate analyses were highly repeatable for both TMR-D parameters (p=1.0) in both tooth substrates. No specimen loss due to damage was encountered during the study. **Conclusion:** Within the study limitations, this single-section model developed for TMR-D may therefore potentially be used for longitudinal measurements of integrated mineral loss and lesion depth for enamel and dentin mitigating the issue of specimen loss and the need for incorporation of precision position locators within the specimen.

P-2

Community-based Oral-healthcare: External Validation of AI-powered Gingivitis-screening App among Elderly

Reinhard Chun Wang Chau[1], Andrew Chi Chung Cheng[2,1], In Meei Tew,[3] Tien Hsin Cindy Chang[4], Hong Jin Tan[5], Khaing Myat Thu[1], Kaijing Mao[1], Colman McGrath[1], Wai-Lun Lo[2], Richard Tai-Chiu Hsung[2,1], Walter Yu Hang Lam[1,6]

[1]Faculty of Dentistry, The University of Hong Kong, Hong Kong Special Administrative Region, China

[2]Department of Computer Science, Chu Hai College of Higher Education, Hong Kong Special Administrative Region, China

[3]Faculty of Dentistry, The National University of Malaysia, Kuala Lumpur, Malaysia

[4]School of Dental Medicine, The University of Pennsylvania, Philadelphia, PA, United States

[5]Eastman Dental Institute, University College London, London, United Kingdom

[6]Musketeers Foundation Institute of Data Science, The University of Hong Kong, Hong Kong Special Administrative Region, China

Abstract

Aim: Disparities in access to oral healthcare contribute to significant burdens of oral disease, particularly periodontal disease, among the elderly. This study aims to evaluate the diagnostic accuracy of an AI-powered, smartphone-based mHealth system ("GumAI") for gingivitis screening among community-dwelling elderly, validating its performance against dentists and periodontists. **Method:** The study used a cross-sectional design and recruited participants from community dental outreach programs. Standardized intraoral photographs were taken with a smartphone camera, and a dentist assessed gingival health. The photographs were also assessed by GumAI to determine its diagnostic accuracy compared to the dentist's assessments. External validation was performed by comparing GumAI's assessment to those of two independent periodontists blinded to the initial diagnoses. **Results:** 44 participants were enrolled. GumAI achieved 96% sensitivity and 82% specificity compared to dentists, and 42% sensitivity and 99% specificity compared to periodontists. **Conclusion:** This study provides insights into the validity of AI-powered gingivitis screening using smartphones. By comparing the AI system's performance against dentists and periodontists, this research adds to the potential of GumAI to improve access to oral healthcare and early gum disease detection in elderly people, improving oral health outcomes.**Acknowledgement:** The work described in this paper was fully supported by a grant from the Research Grants Council of the Hong Kong Special Administrative Region, China (Grant number UGC/FDS13/E01/22).

P-3

Nano-sonosensitive system combining sonodynamic ablation, antitumor immune stimulation and osteoclast inhibition for the microenvironment multi-mechanistic remodeling of oral squamous cell carcinoma

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Tianjin Medical University School and Hospital of Stomatology & Tianjin Key Laboratory of Oral Soft and Hard Tissues Restoration and Regeneration, Tianjin, China

Abstract:

Aims: Oral squamous cell carcinoma (OSCC) is an aggressive tumor that metastasizes frequently, has a limited response rate to immunotherapy, and invades the maxillary or mandibular bone easily when adjacent to the jaw bone. Sonodynamic therapy (SDT) could be used for localized tumor ablation and generation of tumor antigens to activate antitumor immune response. However, SDT-mediated immune activation is limited for systematically activating antitumor immunity due to various immune imbalance mechanisms of OSCC. Thus, exploring the comprehensive therapeutic strategy is of great value. **Methods:** A self-assembly nanomedicine was constructed with sonosensitizer (Vp) and EZH2 inhibitor tazemetostat (Taz) by nanoprecipitation. Meanwhile, macrophage membrane (MM) is designed to be coated on this nanomedicine. Then, the characterization of this biomimetic nanoplatform MM-VT thus prepared, and its SDT tumoricidal efficacy, immune activation and osteoclast inhibition effects towards OSCC were investigated in vitro and in vivo. Furthermore, the synergistic effects of this multifunctional nanoplatform, and their underlying mechanisms were studied systematically. **Results:** The biomimetic nanoplatform MM-VT could realize the ultrasound responsive drug release, amplify the antitumor immune response, and inhibit bone invasion, when combining roles of Taz in epigenetically regulated tumor immunogenicity elevation and osteoclast inhibition. The coating of MM could deliver drug specifically and exclusively to OSCC, and scavenge RANKL for osteoclast inhibition. **Conclusion:** This study provides a meaningful reference for therapeutic strategies of OSCC.

P-4

Nutritional conditions affect proliferative activity and anticancer drug sensitivity of oral squamous cell carcinoma HSC-2 cells

Ayano IGARASHI[1,2], Jumpei WASHIO[1], Satoko SATO[1], Hiromitsu MORISHIMA[2], Kensuke YAMAUCHI[2], and Nobuhiro TAKAHASHI[1]

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

[2] Tohoku University Graduate School of Dentistry, Division of Oral and Maxillofacial Reconstructive Surgery

Abstract:

Objective: The concentration of nutrient substrates such as glucose (GC) and glutamine (GT) in conventional cell culture media does not necessarily match the actual concentration in blood. However, cancer cellular metabolism and the effects of anticancer drugs have been often evaluated using conventionally cultured cells. Therefore, we investigated the effects of nutrient substrate concentration in the culture medium on the proliferation, glucose metabolism, and sensitivity to the anticancer drug, 2-deoxyglucose (2DG) of oral squamous cell carcinoma cells (OSCC). **Methods:** OSCC cell line (HSC-2) was grown in three types of D-MEM media with varying nutrient-substrate concentrations [medium A (standard medium concentration; 1000 mg/L GC, 4.0 mmol/L GT), medium B (referred to the serum concentration in healthy subjects; 1000 mg/L GC, 0.5 mmol/L GT), and medium C (referred to the serum concentration in diabetic patients; 4500 mg/L GC, 0.5 mmol/L GT)]. The effect of differences in nutrient condition on proliferative capacity and glucose metabolic activity was evaluated, and organic acids in glucose-derived metabolites were also analyzed by HPLC. Furthermore, we also evaluated how nutritional conditions affected on the effects of 2DG on the proliferation and metabolism. **Results:** In medium C, cell proliferative capacity and glucose metabolic activity were 1.8±0.6 times ($P=0.06$) and 2.1±0.8 times ($P<0.05$) higher than in medium A, respectively. The ratio of lactate to total acid production tended to be lower in medium C (35.9±6.0%) than in medium A (51.3±20.0%) ($P=0.19$). The inhibition rate of proliferative capacity by 10 mM 2DG tended to be weaker in medium C (21.0±10.5%) than in medium A (36.9±17.2%) ($P=0.054$). **Conclusion:** Cells grown under high GC conditions showed higher proliferative capacity and glucose metabolic ability, but lower sensitivity to 2DG. Their metabolic pathway was also changed a little. These results suggest the importance of nutrient-substrate concentration management in blood in clinical cancer treatment.

P-5

FeO Nanoparticles & Oxaliplatin with Immune Checkpoint Inhibitors in HNSCC Prognosis

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Abstract

Aim: To assess FeO Nanoparticles & Oxaliplatin with immune checkpoint inhibitors (anti-PD-L1, anti-CTLA-4) for its induction of ferroptosis in HNSCC prognosis. **Method:** HNSCC cell line MOC-1 was treated with FeO Nanoparticles, Oxaliplatin, and ICI which were assessed in both In-vitro & In-vivo systems. Cytotoxicity, Ferroptosis induction ROS (DCF-DA) and LPO, and Apoptosis induction using Annexin-PI evaluated to compare treated/untreated groups in In-vitro systems. For In-vivo studies, MOC1-lucitag cells injected in C57BL/6 mice subcutaneously and tumor sizes assessed by bioluminescence signals. **Results:** IONP DLIN showed the most effective cytotoxicity with the least IC50 (0.20 mM) compared to unconjugated IONP (0.90 mM) and Oxaliplatin (0.45 mM) in 24h MOC-1 cells In-vitro. Significant ferroptosis induction seen in DLIN (0.30 mM) treated cells with higher LPO+ (52%) and high ROS+ (64%) compared to untreated cells. Oxaliplatin (0.30 mM) showed higher ROS/LPO induction among all treatment groups In-vitro. Oxaliplatin showed higher Annexin V + (30%) than IONP DLIN (14%) as compared to untreated cells (5%). In In-vivo studies, the microneedle-treatment showed decreased tumor with highest reduction in mixed (IONP/Oxali/ICI) as compared to untreated. **Conclusion:** IONP DLIN has shown effective cytotoxicity with ferroptosis induction comparable to Oxaliplatin and synergistic effect of IONP/Oxali/ICI can be future therapeutic targets. **Acknowledgement:** This project is supported by the HKU Fund to Prof. Richard Su (HKU) and collaborative support from Prof Juan Mareque from Swansea University. We thank the Centre for PanorOmic Sciences at LKS Faculty of Medicine, the University of Hong Kong, for providing support flow cytometry analysis.

P-6

A case of lobular capillary angioma of the upper lip

Yu Pang
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Abstract:

Aim: To perform a surgery for a patient with a lump on the upper lip and discuss the treatment for diseases with typical features**Method:** Collect the medical history and perform an oral examination for the patient. According to all the medical information, an initial diagnosis, upper lip mucous gland cyst(mucocele) was given. Then the surgical resection of the lump was decided as the treatment. The removed tissue was sent to pathological examination. **Results:** The upper lump was resected successfully by surgery. The pathological outcome shows that the diagnosis should be revised as upper lip lobulated capillary hemangioma(pyogenic granuloma).**Conclusion:** Cases with typical features of a common disease still need to be diagnosed with caution and appropriately treat based on reliable results (like pathological results) **Acknowledgement:** Appreciation for the support of Dr. Wang Liao as the operator from West China of Stomatology, Sichuan University.

P-7

Study on therapeutic mechanism of bisphosphonate-associated osteonecrosis of the jaw and radiation osteomyelitis of the jaw

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Abstract:

Aims: By constructing rat models of bisphosphonate-associated necrosis of the jaw (BRONJ) and radionecrosis of the jaw (ORNJ), and employing transcriptome sequencing along with bioinformatics analyses, we aimed to elucidate the pathogenesis of BRONJ and ORNJ. **Methods:** Rat models of BRONJ and ORNJ, along with a blank control group, were established. Samples were collected intraoperatively and 12 weeks postoperatively. RNA extraction, purification, library construction, quality control, and sequencing were performed on mandibular specimens to identify differentially expressed genes across different time points and groups. Functional enrichment analysis via Gene Ontology (GO), Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway enrichment analysis, and protein-protein interaction (PPI) network analysis were conducted. Quantitative real-time PCR (qRT-PCR) was used to validate gene expression changes. In vivo, concentrated growth factors (CGF) and adipose-derived stem cells (ADSCs) were implanted into rat mandibular defect models to assess their bone regenerative effects. Twelve weeks later, micro-computed tomography (Micro-CT) scanning and histological examination were performed, and qRT-PCR was used to detect differentially expressed genes in both in vivo and in vitro settings. **Results:** GO and KEGG analyses indicated downregulation of the WNT pathway following the establishment of BRONJ and ORNJ models, which then showed upregulation after 12 weeks of healing, a trend confirmed by qRT-PCR. The CGF/ADSC-treated group demonstrated increased expression of WNT3a and β-catenin, and reduced GSK-3β expression compared to controls. At 12 weeks postoperatively, Micro-CT and histological evaluations revealed favorable long-term bone healing in both treatment groups. **Conclusion:** Our findings suggest that BRONJ and ORNJ development involves a complex interplay of multiple genes and pathways, with the WNT pathway being a potentially key player. CGF/ADSCs exhibit promise in promoting bone regeneration and repair in BRONJ and ORNJ, offering a novel therapeutic approach.

P-8

Predicting BRAF-V600E mutations of ameloblastoma based on radiomics

Yang Li, Wen Li, Masahiro Iikubo, Jiang Chen*
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Abastract:

Aim: The objective of this study is to investigate the impact of radiomics features intratumoral and peritumoral on genetic mutations in patients with ameloblastoma. **Method:** In this retrospective study, a total of 99 patients diagnosed with ameloblastoma were enrolled and underwent testing for BRAF-V600E mutations. The analysis involved extracting intratumoral and peritumoral radiomics features from preprocessed computed tomography (CT) images. Subsequently, a meticulous feature selection process was conducted to identify the most pertinent features for further analysis. Machine learning methods were utilized to construct predictive models based on the selected features. The performance of these models in discerning patients with and without BRAF-V600E mutations was assessed using receiver operating characteristic curves (ROC). **Results:** In comparison to utilizing solely intratumoral or peritumoral radiomics features, our developed model demonstrates notable diagnostic performance when incorporating both intratumoral and peritumoral radiomics features, as evidenced by an area under the ROC curves (AUC) of 0.85 (95% CI, 0.69-1.00). Furthermore, patients exhibiting elevated radiomic signature scores are more likely to harbor a BRAF-V600E mutation. **Conclusion:** The model demonstrates a high level of diagnostic performance, indicating its effectiveness in clinical applications.

P-9

Selection and treatment outcomes of surgery versus non-surgical therapy of mediation related osteonecrosis of the jaw: a retrospective study

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Abstract:

Background: Mediation Related Osteonecrosis of the Jaw (MRONJ) is an intractable disease whose pathogenesis is still unknown. non-operative therapy has been recommended in the past, but recently, surgical treatment is often performed even at the early stage due to its better postoperative results. However, since many MRONJ patients are elderly or cancer patients, it is necessary to carefully consider their primary diseases and general condition to select an appropriate treatment plan, but it is unclear how this was selected. Therefore, we retrospectively investigated to clarify the selection of MRONJ treatment modalities and outcomes. **Patients and Methods:** We investigated the treatment selection criteria and respective clinical course of non-operative therapy or surgical treatment for 292 patients with MRONJ at Tohoku University Hospital from 2013 to 2022. **Results:** Non-operative therapy was performed in 82 cases, with symptom improvement in 15 cases (18.3%). The reasons for choosing non-operative therapy included ECOG-PS, poor operative tolerance due to progression of the malignancy, and dementia. Within 2 years of the start of non-operative therapy, symptoms improved and worsened repeatedly. Surgical treatment was performed in 210 cases, of which 166 cases (cure rate 60.8%) underwent sequestrectomy and/or superficial curettage of surrounding necrotic bone, 44 (86.4% cure rate) also underwent marginal or segmental resection of the jawbone.
Conclusion: Although surgical treatment has been shown to have better outcomes, there are many patients who cannot be operated on, and it is important that the management of MRONJ involves careful consideration of the patient's overall condition when selecting a treatment modality. In the future, coordination of control of MRONJ in palliative care patients and standardization of surgical selection and extent of resection will be required.

P-10

DNA analysis of circulating tumor cells in the blood of patients with oral squamous cell carcinoma

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Abstract:

Background: Circulating tumor cells (CTCs) are reported to be causative cells of metastasis, and elucidation of the genetic profile of CTCs will lead to a better understanding of the mechanisms of cancer metastasis. In this study, CTCs, primary cells and metastatic lymph node cells were collected from patients with oral squamous cell carcinoma and their genetic profiles were compared. **Methods:** 8 patients attending our department, diagnosed with SCC and undergoing radical surgery were included; CTCs were isolated from preoperative blood samples using a microfluidic chip. Tumor and metastatic lymph node cells were collected from formalin-fixed paraffin-embedded specimens by laser microdissection. DNA was extracted from the collected cells and DNA analysis was performed using a unique custom panel for 32 different genes. **Results:** Common mutations were found in 12 genes in the primary cells. In lymph node cells, common mutations were found in 18 genes; in CTCs, common gene mutations were found in AHNAK2 and MUC16. **Conclusion:** The results of this study may help to elucidate the genetic mutations involved in carcinogenesis, metastasis and metastasis formation.

P-11

Management of Tooth Trauma; Ellis Class II Fracture Case Report

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Abstract

Dental trauma involving the incisors and associated tissues represents a complex dental emergency necessitating expeditious evaluation and intervention, owing to the significant psychological and physiological implications. The understanding of nature's appearance and texture are crucial in the realm of esthetic dentistry, as nature serves as the quintessential model to emulate. Given the patient's young age and the preference for a conservative approach, direct composite resin was selected. Restoring a single fractured incisor presents a significant challenge for restorative dentists, as the objective is to achieve an esthetic and natural-looking outcome. To accomplish this, it is essential to have a comprehensive understanding of composite layering techniques, meticulous application of tints and opaquers, accurate replication of incisal translucency, establishment of proper anatomical form, and development of surface texture. However, achieving an esthetically pleasing result is not the sole factor to consider; it is equally important to address functional aspects, which is critical for a successful restoration. Patients may experience emotional distress related to the potential impact on their appearance and self-esteem, as well as anxiety about the treatment process itself. These factors underscore the importance of prompt evaluation and management to minimize any long-term consequences and ensure optimal patient outcomes.**Acknowledgement:** Prof. Chu and Cariology team, RDS department, The University of Hong Kong. Their assistance is Sincerely appreciated and gratefully acknowledged.

P-12

Impact of Dental Specialty system to the dentists in Taiwan

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Abstract:

Aims: To improve the quality of dental practice, ten dental specialties in terms of Oral Maxillofacial Surgery, Oral Pathology, Orthodontics, Pedodontics, Endodontics, Prothodontics, Periodontics, Restorative Dentistry, Dentistry for Special Needs and Family Dentistry were announced by the Ministry of Health and Welfare, Taiwan in 2017. This pilot study was aimed to evaluate the impact of this dental specialty system to those dentists in Taiwan. **Methods:** Enrollment statistics by subject in each specialty was calculated. Questionnaires were used to evaluate the impact of this dental specialty system to those dentists in Taiwan. Eighty dentists participated in this pilot study. Twenty dentists of each age group, ie: 25-40y (Group A), 41-50y (Group B), 51-60y (Group C) and above 60y (Group D), participated in this study. **Results:** There is a significant divergence in the number of dentists across specialties. The family dentistry specialty has the highest number of dentists, with a total of 2174, accounting for 36.9%, while the oral pathology specialty has the fewest, with only 83 dentists, representing 1.4%. The number of dentists with specialty is 5894 (2023), which accounts for 35.6% of the total 16533 (2023) dentists in Taiwan. 90% of the dentists responded as “Major impact” in group A. 50% responded “Medium impact”, while 30% responded as “Major impact” and 20% as “minor impact” in group B. 50% responded as “minor impact”. While 30% responded “medium impact” and 20% as “major impact” in group C. 90% responded as “minor impact” in group D. **Conclusion:** There are varying responses to impact across different age groups. There are significant major impacts in dentists of younger age groups, while only minor impacts in the older dentist group. Further research is needed to assess how policies regarding dental specialists will impact the quality of oral health care in Taiwan.

P-13

Dental Student's Perspectives on International Community-Engaged Learning Program

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Abstract:

Background: The current era of globalization has witnessed a substantial surge in student exchange programs, contributing to the diversity and internationalization of academic settings. Amidst the various activities offered in such programs, the community-engaged learning program (CELP) stands out for its focus on enhancing dental health education in communities through empowerment. In a collaborative effort between universities in Malaysia and Indonesia, a CELP was organized as part of a student exchange program initiative. This program aimed to educate elementary students who join the international curricula about maintaining oral health. **Aims:** The purpose of this study was to evaluate the dental students' perspectives on the international CELP. **Methods:** Eleven Malaysian dental students who participated in the CELP in Indonesia were asked to fill out an online self-administered questionnaire focusing on evaluating their perspectives on language barrier problems, comfort levels, difficulties encountered, and overall satisfaction with the program. **Results:** The findings revealed that the international CELP successfully diminished language barriers and was perceived to have a low difficulty level, high comfort level, and high student satisfaction. **Conclusion:** This positive outcome positions the international CELP as a viable optional activity for student exchange programs, particularly between Malaysia and Indonesia. Not only does this program benefit the students, but it also raises awareness about the significance of maintaining oral health in the community.

P-14

Career choice of dentists and dental students in Japan and China

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Abstract:

Aims: There are few comparative studies on the career choices of dentists & dental students in Japan and China. The purpose of this study is to clarify the differences in attitudes of Japanese and Chinese dentists and dental students toward their career choices. **Methods:** Data collection started in April 2024. Participants were dental students and dentists aged 20 years or older affiliated with national dental schools and hospitals in Japan and China. Participants were asked to complete a self-report questionnaire using an online system. Descriptive statistics were performed. **Results:** A total of 313 participants 38.3% male, mean age=28.5 years (Standard Deviation= 6.4 years), 43.5% dentist and 56.5% dental students completed the survey until September 4th, 2024. This includes 3 schools in Japan (95 respondents) and 7 schools in China (218 respondents). Out of 11 main reasons, the most prevalent primary reason for choosing the dental profession in Japan was career safety and stability as well as parents' effect on career choice (both 21.9%), while it was career safety and stability (25.1%) in China. Also, the most prevalent secondary reason in Japan was work life balance (28.1%), while it was career safety and stability (28%) in China. In addition, the most prevalent tertiary reason in Japan was career safety and stability (17.7%), while it was the humanitarian cause of curing pain (21.1%) in China. Regarding career choice satisfaction, 61.4% and 27.6% of participants were satisfied in Japan and China respectively. For the preferred work setting choice (57.3%) chose a private clinic in Japan, while (66.5%) chose a public hospital in China. **Conclusion:** Differences in the educational, social backgrounds as well as health care systems of the countries affected participants' career choices. The findings of this study could contribute to dental education and development of good dental human resources in both countries.

P-15

Optimizing the microstructure, mechanical, and optical properties of recycled zirconia for dental applications

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Abstract

Aims: This study aimed to efficiently recycle residual dental zirconia generated from computer-aided design/manufacturing (CAD/CAM) processes and assess its viability as an alternative dental material, contributing to sustainable development within the field of dentistry. **Methods:** In this study, ball milling was used to improve the properties of recycled zirconia powder (RZP). The initial RZP (RZP-40 μm) and ball-milled RZP (RZP-BM) powders were pressed respectively, then pre-sintered at different temperatures (1000, 1050, 1100, and 1150°C), and finally sintered at 1500°C. **Results:** RZP-40 μm had irregular shapes, while RZP-BM showed finer and more uniform morphology, higher packing density, and improved de-agglomeration after 6 hours of ball milling. For pre-sintered zirconia, RZP-BM samples achieved properties comparable to commercial zirconia at 1100 °C, whereas RZP-40 μm required 1150 °C. For final sintered zirconia, RZP-40 μm samples exhibited lower Vickers microhardness, density, strength, and transmittance, with numerous defects in its microstructure. RZP-BM samples showed significant improvement in mechanical and optical properties, comparable to commercial zirconia. **Conclusion:** This study establishes a viable approach for recycling dental zirconia residues, enhancing its properties for potential reuse as dental materials.

P-16

Laser-processed copper coatings for antimicrobial properties on metal substrates

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Abstract:

Background: The acute antimicrobial effect refers to the rapid reduction of microbial populations within minutes to hours, crucial in preventing infections in high-risk environments like hospitals. Elements like copper are known for their ability to quickly kill pathogens. However, pure copper coatings are challenging due to copper's low light absorption. **Methods:** To address this, we used the multi-beam laser metal deposition (B-LMD) with blue diode lasers to apply copper coatings on stainless steel. Antimicrobial tests were conducted using Escherichia coli with contact times of 3, 5, 10, and 15 minutes. **Results:** Compared to uncoated steel (SUS401), the copper-coated surfaces showed significant bacterial reduction within 5 minutes, and nearly all bacteria were eradicated after 15 minutes. **Conclusion:** These findings suggest that B-LMD-formed copper coatings offer rapid and effective antimicrobial protection, suitable for use in medical and high-hygiene settings. **Acknowledgements:** This work was partially supported by the Design & Engineering by Joint Inverse Innovation for Materials Architecture (DEJI^{2}MA) project from MEXT and the Cooperative Research Project of the Research Center for Biomedical Engineering, Japan. The laser processing was conducted under the Joint Usage/Research Center on Joining and Welding at Osaka University.

P-17

AI-Driven Innovations in Dental Implant Treatment Planning: A Systematic Review

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Abstract:

Aims: This systematic review aims to critically assesses the effectiveness of artificial intelligence (AI) models in dental implant treatment planning, focusing on three applications: 1) identification, detection, and segmentation of anatomical structures, 2) providing technical assistance during treatment planning, and 3) addressing miscellaneous but relevant applications in the field. **Methods:** The literature search was conducted with PubMed/MEDLINE, Scopus, and Web of Science, covering studies published in English up to July 31, 2024. The inclusion criteria encompassed research exploring AI applications in implant treatment planning, excluding expert opinions, guidelines, protocols. The quality of included studies was independently evaluated by three reviewers using the Joanna Briggs Institute (JBI) Critical Appraisal Checklist for Quasi-Experimental Studies. Any disagreements were resolved through consensus. **Results:** A total of 28 included studies, 4 were rated as high quality, 4 as medium, and 20 as low quality according to JBI scale. Eighteen studies focused on anatomical segmentation, where AI models achieved accuracy rates ranging from 66.4% to 99.1%. Seven studies highlighted AI's potential in providing technical assistance for surgical planning, with promising applications such as predicting jawbone mineral density, optimizing drilling protocols, and classifying surgical plans for maxillary sinus augmentation. One study demonstrated AI's learning curve in implant planning, recommending a minimum of 50 images to achieve a predictive accuracy of over 70%. Another study reported 83% accuracy in localizing stent markers for potential implant sites by AI model while recommending using additional imaging planes to reduce the 17% miss rate and 2.8% false positives. **Conclusion:** AI models exhibit undeniable potential in automating key aspects of dental implant planning, achieving promising accuracy rates in automating anatomical segmentation and providing insightful technical assistance in surgical planning. However, for these models to be pragmatically integrated into clinical settings, well-designed and calibrated additional studies with standardized evaluation parameters are indispensable.

P-18

Enhancing Osteoconductivity and Antibacterial Properties of Titanium via Alkali-Hot Water Treatment and Nitrogen Doping

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Abstract

Introduction: Titanium (Ti) is a common material for dental and orthopedic implants due to its excellent strength and corrosion resistance. However, its bioinert surface limits its ability to bone-bonding, and it lacks inherent antibacterial properties, which can lead to post-surgical infections [1]. This study explores a two-step approach: alkali-hot water treatment (AWT) to boost osteoconductivity and nitrogen doping (N-doping) to create antibacterial properties under visible light by reducing TiO_2's photocatalytic band gap [2]. **Materials and Methods:** Commercially pure titanium (CP Ti, JIS grade 2) was treated with alkali (AT), hot water (WT), or both (AWT). Nitrogen doping was performed by annealing AWT-treated Ti at 300°C, 500°C, or 700°C under ammonia to form nitrogen-doped TiO_2 films (300-3h, 500-3h, 700-3h). Surface characteristics were assessed using SEM, a 3D profiler, contact angle measurements, and XRD. FTIR was used to examine surface functional groups. In vitro tests with MC3T3-E1 preosteoblast-like cells were performed to assess cell adhesion, proliferation, and osteogenic differentiation through ALP assays. Antibacterial activity against E. coli and S. aureus was tested under visible light exposure. **Results and Discussion:** Alkali treatment produced a network-like sodium titanate layer on Ti, significantly improving surface hydrophilicity. AWT further refined the surface structures, leading to osteoblast behaviors on Ti surfaces improved. While osteoblast proliferation was slightly slower on AWT-treated surfaces, cell initial adhesion and differentiation was improved. Contact angle measurements showed increased wettability, with AT reducing the angle to 19° and AWT increasing it to 59°. FTIR results confirmed a rise in surface hydroxyl groups after treatment. Among the nitrogen-doped samples, the 500-3h group showed notable antibacterial activity against E. coli under visible light, likely due to the modified photocatalytic properties, while S. aureus was not significantly affected. **Conclusion:** Alkali-hot water treatment enhances the osteoconductivity of Ti implants, while nitrogen doping adds selective antibacterial effects. These surface modifications present a practical approach to improving implant performance in clinical applications, balancing better bone integration and infection control.

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P-19

Effect of the structural color of ALD-TiO2 on titanium substrates

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Abstract:

Aim: To examine the color-charging mechanism in nano-titanium dioxide (TiO2) coatings on titanium (Ti) abutment materials with varying thicknesses using atomic layer deposition (ALD). **Method:** The Ti surfaces were modified with different thicknesses of nano-TiO2 prepared by ALD ranging from 500 to 5000 cycles, alongside silicon wafers (Si). Subsequent evaluation of the modified surfaces was conducted. **Results:** As the thickness of ALD-TiO2 on Ti increased, the structural color transitioned from silver-grey to various colors like blue, yellow, pink, and green, with enhanced brightness and contrast. Notably, distinct rules governed the color changes between Ti and Si. The a* and b* values exhibited significant and irregular variations across all groups, while the experimental n and k values of ALD-TiO2 differed slightly between groups.Furthermore, reflection spectrum analysis revealed that the 500-cycle coating lacked characteristic peaks, a single peak emerged in the 500 and 2500-cycle coatings, aligning with the displayed color. In contrast, the 3000-5000-cycle coatings exhibited two reflection peaks. **Conclusion:** The study demonstrated that nano-TiO2 prepared by ALD could generate vivid colors on the surface of Ti abutment substrates.
Acknowledgement: This project is supported by Postgraduates Academic Exchange Fund of Fujian Medical University.

P-20

A narrative review on surface modification methods of dental implants

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Abstract

Aim: This review aims to provide an updated overview of various surface modification methods used in immediate and early loading protocols, including plasma-sprayed hydroxyapatite, anodic oxidation, SLA, SLActive, and fluoride acid etching, which have established with high survival rates in immediate and early loading therapy. **Method:** A literature search was conducted in the PubMed, Cochrane Review, and Scopus databases using various keywords and their combinations, including 'immediate loading', 'early loading', 'dental implants', 'retrospective study', 'randomized controlled study', among others. **Results:** A total of 19 articles, including 5 randomized studies and 14 retrospective studies, were included in this narrative review after the literature search. Studies have documented the successful application of hydroxyapatite, anodic oxidation, SLA, SLActive and fluoride acid etching methods in immediate and early loading treatment to reduce healing time. However, studies have also warned of detachment risks associated with additive methods. With fluoride acid etching, the fluoride ions around dental implant are beneficial for the bone apposition. A chemically modified version of SLA, SLActive, with improved hydrophilicity, provides faster healing times than SLA in vitro and in vivo. However, there were no significant differences between SLA and SLActive methods in relation to survival rate in retrospective and randomized studies. **Acknowledgement:** This work received valuable assistance from Prof. Jiang Chen and Prof. James Tsoi.

P-21

Accuracy of dental implant placement with robotic computer-assisted implant surgery

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Abstract:

Aim: This study evaluated the accuracy of dental implant placements using robotic computer-assisted implant surgery (r-CAIS) technology in fully edentulous patients. **Method:** A total of 447 dental implants were placed in 72 fully edentulous patients using the r-CAIS system. Preoperative cone-beam computed tomography (CBCT) scans were used to create precise surgical blueprints. Under surgeons' supervision, the robotic system executed the implantation procedure. Immediate postoperative CBCT scans were obtained to measure the deviations between the planned and actual implant positions. A multiple linear regression analysis examined the impact of arch side and type, implant location, and implant dimensions on deviations. **Results:** The coronal and apical deviations were 0.94 ± 0.67 mm (95% CI 0.88–1.00 mm) and 0.99 ± 0.72 mm (95% CI 0.92–1.06 mm) respectively, with an angular deviation of 2.14 ± 2.25° (95% CI 1.94–2.35°). Multiple linear regression analysis showed that coronal and apical deviations were significantly correlated with implant lengths, while angular deviations were notably related to implant diameters. **Conclusion:** The r-CAIS was validated as an accurate technology for implant surgery in fully edentulous patients. The study found that implant length and diameter significantly affected placement accuracy. Further trials are needed to strengthen clinical evidence in dental implantology. **Acknowledgement:** This project is supported by Postgraduates Academic Exchange Fund of Fujian Medical University.

P-22

Fabrication of functionalized titanium surfaces with calcium phosphate for effective gene transfection

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Abstract:

Background: Bone reintegration on the implant after sterilizing its surface is important in the treatment of peri-implantitis. However, bone reintegration on the surfaces of titanium implants after treating the infection remains challenging. We hypothesized that the secreted hard-tissue-forming conditions resulting from gene transfection on the surfaces of titanium implants can stimulate hard-tissue formation. **Objective:** In this study, we investigated a method based on the coating of calcium phosphate (CaP) nanoparticles on the surfaces of titanium discs after sterilization for effective gene transfection. **Methods:** First, the surfaces of titanium discs were treated using sandblasting and etching (control group). Next, *Staphylococcus aureus* was seeded and cultured on these titanium discs to create biofilms (bacteria-attached group). Subsequently, the bacteria-attached group was immersed in silver nitrate solution (1600 μM) and exposed to a 400 nm purple LED (Ag–purple LED group). CaP-loaded pDNA, expressing red fluorescent protein (mCherry), was seeded on the treated surfaces of titanium discs. Next, a weak current of 30 μA was applied for 5 min. MC3T3E1 cells were seeded on CaP-coated titanium discs and cultured. After three days, the gene transfection efficiencies were calculated using fluorescence microscopy. The extent of CaP adhesion on titanium surfaces in each group was measured. **Results:** The results indicate no significant differences in the gene transfection efficiencies evaluated with or without current. The extent of CaP adhesion after the application of current was significantly higher than that without current. The extent of CaP adhesion in the control and Ag–purple LED groups was significantly higher than that in the bacteria-attached group. **Conclusion:** This research suggests that Ag–purple LED treatment followed by CaP coating along with the application of a weak electric current can effectively induce CaP adhesion on titanium surfaces, enabling the fabrication of functionalized titanium surfaces.

P-23

The production and degradation of acetaldehyde by oral microbiome

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Abstract:

Introduction: Acetaldehyde, a carcinogen, is produced from ethanol by the oral microbiome (OMB), which has attracted much attention. On the other hand, our previous study showed that some oral bacteria produce acetate in addition to acetaldehyde during ethanol metabolism, suggesting that OMB may further degrade acetaldehyde. Therefore, to evaluate the carcinogenicity of OMB due to acetaldehyde production, it is important to measure both acetaldehyde producing and degrading activities. Thus, we attempted to establish a new method for bacteria with acetaldehyde-producing and/or -degrading activity. **Materials and Methods:** OMB samples collected from 10 healthy volunteers were cultured anaerobically on blood agar plates, and then each bacterial colony was isolated. Each isolated bacterial strain was incubated with ethanol or acetaldehyde, and the acetaldehyde-producing and -degrading activities were measured colorimetrically. **Results and Discussion:** The novel method could be used to measure both the acetaldehyde-producing and degrading activities of OMB and to identify the corresponding bacteria. Although both acetaldehyde-producing and -degrading bacteria were frequently found in OMB, the ratio of these two bacteria varied widely among individuals, suggesting that differences in the bacterial composition of OMB affect the risk of acetaldehyde-mediated carcinogenesis. We would like to further elucidate the metabolic characteristics of these bacteria and contribute to the effective reduction of the carcinogenic risk of OMB.

P-24

Association of Glycemic Levels of Type 2 Diabetes Mellitus Patients and Periodontal Inflammatory Status in a Southeast Asian Population

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Abstract:

Aims: Periodontitis is considered the sixth complication of diabetes mellitus (DM), yet is often overlooked by physicians and people living with DM. Although DM is highly prevalent in Asian populations, not many studies on the association between DM and periodontitis have been reported from Southeast Asia. This study examined the association of glycemic levels of DM and periodontal inflammatory status in a multi-ethnic population receiving tertiary public healthcare in Singapore. **Methods:** 181 non-smoking patients with type 2 DM (T2DM) and 181 age-, sex- and ethnicity-matched non-smoking patients without DM were consecutively recruited in an academic medical centre. Participants completed a questionnaire on general demographic characteristics. Point-of care HbA1c and BMI were measured. Full-mouth periodontal examination and plaque score were assessed. Clinical periodontal characteristics were recorded. Periodontal diagnosis was determined according to the 2017 EFP/AAP classification. The primary outcome was the periodontal inflamed surface area (PISA). **Results:** Patients with T2DM had significantly greater PISA and worse clinical periodontal measures than patients without DM. Additionally, a higher percentage of patients with T2DM was diagnosed with Stage III or Stage IV periodontitis ($p<0.01$). A higher HbA1c was accompanied with an elevated PISA. A 1.0 percentage point increase of HbA1c was associated with an increase in PISA of 70.0mm^2.
Conclusion: A dose-response relationship between HbA1c and PISA was observed. T2DM and poorer glycemic control were associated with advanced stages of periodontitis and poorer periodontal health.

P-25

Development of a Novel Device for Periodontal Probing Education

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Abstract:

Background: Periodontal probing is an essential procedure in periodontal treatment. Numerous studies have been conducted related to periodontal pocket probing such as proper interpretation of periodontal probing, probing pressure, diameter of the tip of probe, intra and/or inter examiner difference, and differences between various types of probes. In general, dental and dental hygiene students use typodont to acquire probing skills. To date, these models are capable of studying calculus detection and identifying the bottom of periodontal pockets while limited to confirming the contact between the periodontal probe tip and the root surface. **Objective:** We recently developed a device which can electronically detect contact between the periodontal probe tip and the root surface. Current study was aimed to determine its applicability in dental education. **Methods:** Thirty-seven dental hygiene students participated in the study. After obtaining a written consent, students underwent initial measurement of contact between the periodontal probe tip and the root surface utilizing the novel device. Subsequent to self-learning by the students using the device and a lecture, students took post-tests to explore the educational effect. **Results:** The results from our current study indicated significant enhancement of contact between the periodontal probe tip and the root surface by utilizing our novel device. Moreover, further improvement was observed by combining it with a lecture. **Conclusion:** Our finding suggests that our novel device for periodontal probing is applicable and effective for improving dental education.

The study was ethically approved by the Research Ethics Committee of the Tohoku University Graduate School of Dentistry (approval number: 22677).

P-26

The Effect of Bioresorbable Polymer Coating on the Freeze-dried Bone Allograft, an *in vitro* Study

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Abstract:

Aims: Alveolar bone deficiencies, resulting from various pathologies, pose a significant challenge in dentistry, particularly impacting the long-term success of dental implants, which require adequate bone for osseointegration. Alveolar bone grafting with substitute materials can prevent bone defects; however, these materials are often limited by their biochemical properties. Freeze-dried bone allograft (FDBA) is favored for its biological similarity, closely mimicking the natural regenerative response. Despite this, FDBA is rapidly resorbed by osteoclasts, compromising stability. Bioresorbable polymer coatings have been developed to protect and prolong graft effectiveness. **Methods:** We coated particulate freeze-dried bone allografts (FDBA) with 0.8% and 1.2% concentrations of the bioresorbable polymer poly(L-lactide-*co*-glycolide) (PLG) with the ratio of 70:30 mol%. The coated materials were characterized using scanning electron microscopy (SEM), energy-dispersive X-ray fluorescence (EDX), and Fourier transform infrared spectroscopy (FTIR). Cytotoxicity and biocompatibility of the developed bone allografts were evaluated through MTT assays using MC3T3-E1 pre-osteoblast cells. **Results:** FDBAs were completely coated and homogeneous, as confirmed by surface characterization using SEM and FTIR in the 0.8% and 1.2% groups. In the *in vitro* degradation study, the polymer coating began to degrade within 1 week, with degradation increasing over time. By week 12, only small remnants of the polymer film were scattered on the bone surface in both groups. The MTT assay showed no significant difference in cell viability between the 0.8% group and the control, while the 1.2% group exhibited a significant reduction in cell viability compared to the control. **Conclusion:** We successfully developed a coating method for particulate FDBA with control over the resorption rate. Coating FDBA with 0.8% PLG provides effective protection without compromising cell viability, while 1.2% PLG significantly reduces viability. Optimizing PLG concentration is crucial for balancing degradative protection and biocompatibility, supporting the use of PLG-coated FDBA in bone grafting.

P-27

Role of glgC in Streptococcus mutans Biofilm and EPS Formation

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Abstract:

Aim: To investigate the role of the Streptococcus mutans (S. mutans) glgC gene in biofilm formation and extracellular polysaccharide(EPS) synthesis. **Method:** A glgC gene knockout strain of S. mutans was constructed using homologous recombination. The microstructure of biofilms formed by the wild-type and knockout strains was observed using Scanning Electron Microscopy (SEM). Differences in biofilm formation and EPS synthesis production were assessed using crystal violet staining and Confocal Laser Scanning Microscopy (CLSM). **Results:** The biofilm density of the glgC knockout strain was reduced, with a loose and uneven structure. Compared to the wild-type strain, the knockout strain exhibited an 11.61% reduction in biofilm formation and a 21.81% reduction in EPS synthesis production, both statistically significant ($P < 0.05$). **Conclusion:** The knockout of the glgC gene significantly weakened the biofilm formation and EPS synthesis production capabilities of S. mutans. This indicates that the glgC gene may be a potential target for regulating the cariogenicity of S. mutans.

P-28

Carboxymethyl chitosan/genipin hydrogel loaded with peptide VK-24 inhibits NLRP3 inflammasome activation via Kv1.3 channel to alleviate periodontitis progression

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Abstract:

Aims: A peptide called VK-24, derived from the antimicrobial peptide human β-defensin 2, was investigated for its structural characteristics and antibacterial effects. And we explored its potential role in modulating the periodontal immune microenvironment by targeting NLRP3 inflammasome, aiming to provide a novel approach for the clinical treatment of periodontitis. **Methods:** We designed and synthesized the peptide VK-24 through peptide chain cleavage and amino acid substitution, conducted Transwell experiments and cell scratch assays to verify the impact of VK-24 on cell migration. Immunohistochemistry was used to evaluate the expression of the NLRP3 inflammasome in human periodontitis tissues. We examined the binding of VK-24 to the potassium channel Kv1.3 using immunofluorescence staining and assessed the expression levels of selected genes and proteins in different samples using RT-qPCR and Western Blot techniques. We constructed and characterized a Carboxymethyl chitosan (CMC)/genipin (GNP) hydrogel, loaded it with VK-24, and applied it to rat periodontitis models. **Results:** Antibacterial experiments demonstrated that VK-24 had significant antibacterial effects against both *S. gordonii* and *S. oralis*, with the strongest inhibition observed at a concentration of 200 μg/mL. Cell scratch assays and Transwell experiments demonstrated that VK-24 promotes migration of human periodontal ligament fibroblasts within the inflammatory microenvironment. Immunofluorescence staining confirmed VK-24's targeted binding to the Kv1.3 channel. Both RT-qPCR and Western Blot analyses indicated downregulation of NLRP3 and its downstream inflammatory cytokines at the gene and protein levels upon VK-24 application in the inflammatory microenvironment. CMC/GNP hydrogel exhibited good physicochemical properties and biocompatibility. *In vivo* experiment results suggested that VK-24-loaded CMC/GNP hydrogel partially inhibited NLRP3 inflammasomes activation. **Conclusion:** VK-24 can bind to Kv1.3 channel, mediating an inhibitory effect on NLRP3 activation and suppressing the secretion of pro-inflammatory cytokines. The controlled release of VK-24 from the CMC/GNP hydrogel contributes to alleviating the progression of periodontitis.

P-29

Efficiency of Tooth Foam containing *Cannabis Sativa* (C. sativa) in The Oral Cavity for Individuals with Inflamed Oral Mucosa

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Abstract:

Aims: to evaluate the efficiency of tooth foam containing *Cannabis sativa* (*C. sativa*) in oral mucositis. **Methods:** Double-blinded randomized controlled study based on the administration of tooth foam containing *C. sativa* to patients undergoing radiotherapy and/or chemotherapy for oral mucositis (OM). The study assessed the reduction of symptoms by visual analog scale (VAS) of pain and oral dryness and assessed the clinical signs by measuring the WHO scale severity of OM. The results compared clinical signs and symptoms of using this product to the control group, as well as compared pre-intervention to post-intervention of using this product. **Results:** tooth foam containing *C. sativa* significantly reduced the VAS of pain and clinical severity of OM when compared to the control group. In addition, patients after using this product had a significant reduction of clinical OM severity when compared to pre-intervention using this product. **Conclusion:** tooth foam containing *C. sativa* showed effectiveness in reducing oral mucositis symptoms leading to patients satisfied with this product along with reducing the clinical severity of OM. Therefore, this product can be considered as an option for oral care in patients undergoing radiotherapy and/or chemotherapy.

P-30

Streptococcus mutans LiaS gene regulates its interactions with Candida albicans

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Fujian Medical University

Abstract:

Aim: We explored the role of the Streptococcus mutans LiaS gene in mucosal lesion and the mechanism of its cross-kingdom interaction with Candida albicans. **Method:** CV staining, MTT assay and CFU counting to measure the effect of LiaS in dual-species biofilm. We observed the hyphae of C. albicans through SEM and CLSM. Analyse the mechanisms of EPS Production, glycolysis, and intracellular ROS. Quantitative PCR to confirme the pathways of cross-kingdom interactions. Murine oropharyngeal candidiasis model was used to analyse the role of LiaS gene in mucosal lesion. **Results:** We found that LiaS gene of S. mutans signifcantly upregulated the synergistic growth promotion in their dual-species bioflms. S. mutans 593-△LiaS signifcantly reduced the biomass, metabolic activity and EPS production, and suppressed hyphal transformation of C. albicans, compared to S. mutans 593 and LiaS complementary strains. The deletion of LiaS induced an increase in intracellular ROS, inhibitied pyruvate kinase activity, and reduced ATP production. Downregulated the expression of genes from the Ras1-cAMP-Efg1 pathway and hyphae formation of C. albicans, reduced the mucosal lesion. **Conclusion:** The LiaS gene promotes its cross-kingdom interaction with C. albicans. Suppression of the LiaS gene maybe a novel strategy for targeted treatment of oral candidiasis. **Acknowledgments:** This project is supported by Postgraduates Academic Exchange Fund of Fujian Medical University.

P-31

Antimicrobial effects of epigallocatechin-3-gallate, a green tea-derived catechin on periodontal disease-associated bacteria

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Abstract:

Background: Green tea catechins are polyphenols with many biological functions, including antibacterial, anticancer, and antioxidant activities. We have previously reported that green tea catechins, especially epigallocatechin-3-gallate (EGCG), inhibit the growth and acid production and stimulate the aggregation of caries-associated bacteria of the genus *Streptococcus* (Han et al. 2021; 2023). In this study, the antimicrobial effects of EGCG on periodontal disease-associated bacteria were evaluated. **Materials and Methods:** *Porphyromonas gingivalis*, *Prevotella intermedia*, *Prevotella nigrescens*, *Fusobacterium nucleatum*, and *Fusobacterium periodontium* were used. *Streptococcus mutans* was also used as a representative caries-associated bacterium. These bacteria were grown anaerobically, and the effects of EGCG on bacterial viability, growth, aggregation, and metabolic activity were evaluated. **Results:** Treatment with 2 mg/ml EGCG for 4 h killed all periodontal disease-associated bacteria, whereas it only reduced the viable count of *S. mutans* by about 40 %. Regarding growth, the periodontal disease-associated bacteria were more susceptible to EGCG than *S. mutans*, based on the growth inhibition ring test. As for metabolic activity, the 50 % inhibitory concentration (IC_{50}) of EGCG was lower for periodontal disease-associated bacteria (0.32–0.65 mg/ml) than for *S. mutans* (1.14 mg/ml). EGCG induced bacterial aggregation at the following concentrations: *P. gingivalis* (>0.125 mg/ml), *F. periodonticum* (>0.5 mg/ml), *F. nucleatum* (>1 mg/ml), and *P. nigrescens* (>2 mg/ml). *S. mutans* aggregated at an EGCG concentration of >1 mg/ml. **Discussion:** The present study showed that periodontal disease-associated bacteria were more susceptible to the bactericidal, growth-inhibiting, and metabolism-inhibiting effects of EGCG than *S. mutans*. In addition, EGCG had comparable bacterial aggregation-inducing effects on periodontal disease-associated and *S. mutans*, although there were differences among the species. EGCG may help to prevent periodontal disease by killing bacteria, inhibiting bacterial growth by suppressing bacterial metabolic activity, and removing bacteria through aggregation.

P-32

The quorum quenching enzyme Est816 modifies *in vitro* periodontal microbiota

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Abstract

Aim: To study the effect of a quorum quenching enzyme, *N*-acyl homoserine lactones lactonase (AHL-lactonase) Est816 on subgingival plaque of people with periodontitis. **Method:** This *in vitro* study collected subgingival plaque from 17 people with periodontitis. The plaque samples were anaerobically cultured and treated with Est816, using PBS as control. Biofilm formation was observed by crystal violet staining, scanning electron microscope (SEM), and fluorescence staining using confocal laser scanning microscope (CLSM). Bacterial metabolic activity was measured using XTT assay. Composition and diversity alterations of oral microbial flora was studied with the 16S rRNA gene sequencing. **Results:** Est816 significantly reduced the viability and inhibited biofilm growth ($p<0.05$). The predominant taxa in the Est816 showed at the phylum and genus level, the proportion of several important bacteria changed. The indicators of alpha diversity demonstrated that the overall oral microbial diversity in the Est816 group was not significantly different from that in the control group. The beta-diversity showed that the microbiota composition of the two groups was similar. Random forest analysis predicted that Saccharopolyspora, Bacillus, Streptococcus etc. might be important bacterial groups. Functional prediction showed that the main functional pathways were enriched in metabolism-related tasks. **Conclusion:** The AHL-lactonase Est816 reduced biofilm growth and modified the periodontitis polymicrobial communities. This showed quorum quenching can be a potential application to manage periodontitis. **Acknowledgement:** This project is supported by the Research Fund of Anhui Institute of translational medicine (No: 2022zhyx-C58) and Scientific Research Funding of Anhui Province Health Commission (AHWJ2023A20161).

P-33

Innovative Approaches into Skeletal Muscle Rehabilitation with Magnetic Bioprinting and Photobiomodulation Study

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Abstract:

Aims: 1) Using magnetic bioprinting platforms, we aimed to optimize the scalable and consistent production of the 3D skeletal muscle spheroid. 2) We explored the biological effect of photobiomodulation (PBM) used for temporomandibular disorders rehabilitation in 2D in vitro skeletal muscle cell culture. **Methods:** We used the C2C12 cell line in both parts of the experiment. For the magnetic 3D skeletal muscle spheroid culturing, we used the NanoShuttleTM-PL magnetic nanoparticle system for magnetic-based bioprinting of the spheroid. We measured the skeletal muscle spheroid for morphological outcomes and functional development of skeletal muscle tissues using immunocytochemistry and live imaging of chemical responsiveness. The PBM therapy included the following Low-Level Laser Therapy (LLLT) dosage regimens: 3, 5, and 7 J/cm^2 for 2-day regimens with the same dosage. Experiments were conducted with sham Low-Level Laser Therapy (LLLT) controls. We evaluated the differentiation and proliferation of C2C12 myoblasts in monolayer cultures 24 hours after photobiomodulation (PBM) using immunocytochemistry and luciferase-based ATP assays, respectively. The mitochondrial network was observed using optical diffraction tomography imaging. **Results:** Our methodology showed consistent morphological outcomes and functional development of skeletal muscle tissue. This was demonstrated by the expression of muscle-specific contractile proteins and the formation of myotubes, as well as the ability to respond to stimulation with cholinergic neurotransmitters. PBM with low-level light treatment effectively enhanced the rate of cell proliferation in C2C12 cells and stimulated the expression of myosin heavy chain protein. **Conclusion:** This magnetic-based 3D culture platform supports the scalable and time-efficient methods for skeletal muscle spheroid formation and could potentially be adopted for a spheroid-based assay or high-throughput screening. Furthermore, the in vitro effect of PBM on skeletal muscle culture showed that PBM may benefit energy production and has a direct effect on the skeletal muscle cell.

P-34

Long-Term Survival of Anterior Ceramic Materials in Resin-Bonded Fixed Partial Dentures: A Systematic Review and Meta-Analysis of Different Framework Designs

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Abstract:

Purpose: This systematic review and meta-analysis aimed to explore the influence of different framework designs on the durability and failure risk of Resin-Bonded Fixed Dental Prostheses (RBFDPs) over time. **Methods:** A detailed search following PRISMA guidelines was conducted across databases including Scopus, PubMed, EMBASE, Web of Science, and Cochrane Library, focusing on clinical studies involving human subjects that were published in English up until June 2023. The selected studies underwent evaluation for heterogeneity and bias risk, and the meta-analysis was performed using a random-effects model. **Results:** From 1,398 articles initially identified, 9 studies (comprising 3 randomized controlled trials, 5 cohort studies, and 1 clinical trial) with a low risk of bias were included. The findings indicated that single-retainer RBFDPs were associated with a lower rate of failure compared to two-retainer designs, showing a relative risk (RR) of 0.36 (95% CI: 0.17-0.75). Cantilever frameworks also exhibited a reduced failure rate in comparison to two-retainer designs, with an RR of 0.25 (95% CI: 0.09-0.73), while no significant differences were observed in the rates of debonding between the designs. Failure rates for metal-ceramic RBFDPs were comparable regardless of whether they used cantilever or two-retainer designs, with an RR of 0.56 (95% CI: 0.21-1.53). Additionally, no notable difference in debonding was found between cantilever and tworetainer frameworks (OR 0.40, 95% CI: 0.15-1.10). However, all-ceramic RBFDPs in cantilever configurations demonstrated a significantly lower failure rate, with an RR of 0.12 (95% CI: 0.03-0.43). **Conclusions:** The analysis indicates that cantilever RBFDPs have a reduced failure rate compared to two-retainer designs in the anterior region. For metal-ceramic RBFDPs, design does not significantly impact failure rates, whereas all-ceramic RBFDPs perform more reliably with a cantilever design. **Keywords:** Resin-bonded, Resin-bonded bridge, Ceramic, Fixed Partial Denture, Framework

P-35

Antifungal and Antibacterial Activity Test of Denture Cleanser Based on Graptophyllum pictum in Effervescent Granule Formulation

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Abstract:

Background: Candida-associated denture stomatitis is a fungal infection affecting dentures, leading to inflammation of the mucosa beneath the dentures. Many denture cleansers available on the market contain chemical ingredients that can increase surface roughness and cause color changes in denture bases. Graptophyllum pictum is an herbal ingredient with antifungal and antibacterial properties. **Objectives:** To investigate the antifungal and antibacterial activity of an effervescent granule denture cleanser based on Graptophyllum pictum in vitro with immersion times of 3 minutes, 5 minutes, 10 minutes, and 15 minutes. **Materials and Methods:** The samples were sterilized and placed in test tubes containing saliva to create an environment similar to the oral cavity and allow pellicle formation. The samples were rinsed with PBS solution then transferred to test tubes containing suspensions of S. mutans or C. albicans. The samples were immersed in the effervescent granule formulation based on Graptophyllum pictum for immersion times of 3 minutes, 5 minutes, 10 minutes, and 15 minutes, ensuring that the entire sample was submerged. The samples were then placed into BHIB and SDB media and vortexed to detach S. mutans or C. albicans adhering to the samples. S. mutans or C. albicans suspension from the BHIB and SDB media was pipetted and spread on growth media, then incubated. The number of Streptococcus mutans or Candida albicans colonies was counted manually as colony forming units (CFU/mL). This study was analyzed using both parametric and non-parametric variance analysis, followed by a post-hoc test. **Results:** The antibacterial effect of G. pictum can inhibit the growth of Streptococcus mutans in 15 min immersion and for the antifungal effect of G. pictum can inhibit the growth of Candida albicans in 15 min immersion. **Conclusion:** G. pictum in Effervescent Granule Formulation possesses good antifungal and antibacterial activity that may be effective for denture cleanser. **Keywords:** Graptophyllum pictum; Antibacterial; Antifungal: Herbal medicine; Dentistry.

P-36

Analysis of muscle fiber orientation in the human medial and lateral pterygoid muscles using diffusion tensor imaging

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Abstract:

Masticatory muscles are composed of multipennate structures that are functionally differentiated within the muscle to perform various functional jaw movements. Although the functional and morphological details of the masseter muscle have been partially clarified, those of the medial and lateral pterygoid muscles, which are deeply located in the body, remain unclear. We recently used diffusion tensor imaging (DTI), an MRI method, for identifying masseter muscle fiber orientation. In this study, we applied this method to investigate the orientation of the medial and lateral pterygoid muscle fibers.

Three healthy male volunteers participated in this study. Using an ultra-high field MRI, DTI and T1-turbo field echo (TFE) were performed to image the masticatory muscles, including the medial and lateral pterygoid muscles, in the mandibular rest and open positions (Philips Achieva 3.0T TX). The medial pterygoid muscle was segmented into one head and the lateral pterygoid muscle into two heads (superior and inferior) using the T1-TFE images as references. DTI analysis software (FMRIB Software Library, MRtrix3) was used to delineate the medial and the lateral pterygoid muscle fibers, and their orientation was evaluated in both mandibular positions.

DTI fiber tractography enabled analysis of the muscle fiber structure of the medial and lateral pterygoid muscles. The muscle fiber orientation of the medial pterygoid muscle changed horizontally during mouth opening similar to the masseter muscle, while that of the lateral pterygoid muscle changed in different directions depending on the participants.[11] This developed method revealed significant changes in the orientation of muscle fibers in both mandibular positions of the medial pterygoid muscle in the two participants.

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[1] Sugano T, Ogawa T, Yoda N et al. Morphological comparison of masseter muscle fibres in the mandibular rest and open positions using diffusion tensor imaging. J Oral Rehabil 2022; 49: 608- 615.

P-37

Development of a novel occlusal force-measuring device with electret and dielectric elastomer

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Abstract:

Excessive occlusal forces applied to dentition during parafunction, such as bruxism, can cause tooth wear, prosthesis fractures, and temporomandibular disorders. To address these complications, it is necessary to understand the actual occlusal forces acting on teeth during these activities. In clinical practice, thin-film pressure sensors are inserted between the upper and lower dentition to measure the occlusal contact area and magnitude during clenching in the intercuspal position. Other methods, such as strain gauges or piezoelectric transducers, are used for measuring the magnitude and direction of the occlusal forces in experimental settings. However, these methods are limited to recording forces during predetermined tasks in a laboratory or dental chair, and cannot measure the actual load exerted on the teeth during daily parafunctional activities. In this study, we aimed to develop fundamental technologies for a new force-sensing device to measure the force on dentition in real-world conditions using electrostatic induction sheets consisting of an electret and a dielectric elastomer.
As a prototype of the device, electrostatic induction sheets were incorporated into an oral appliance typically used by patients with bruxism. The fabrication process of the device was as follows: Two polyethylene terephthalate (PET) sheets were pressed into the dentition model using a vacuum-forming machine. An electrostatic induction sheet was placed between the two formed PET sheets and bonded together. To measure the device's performance, its stability against temperature changes was assessed through bench tests, and good stability was observed at oral temperatures. Furthermore, the prototype device was placed in an oral cavity, and the force on the device was successfully measured during clenching and tapping.

P-38

Arresting Childhood Caries with Silver Diamine Fluoride Gel: Trial Protocol

Anthony Cheng, Kitty Chen, Chun Hung Chu
University of Hong Kong

Abstract

Aim: To compare a 38% SDF gel with a 38% SDF solution for arresting carious lesions of primary teeth in preschool children. **Method:** This is a randomized, double-blind, parallel-group non-inferiority clinical trial. The hypothesis is that the 38% SDF gel is not worse than the 38% SDF solution for caries arrest rate when applied semi-annually among preschool children. The trial will recruit 630 3-year-old kindergarten children, block randomized to receive either SDF gel or SDF solution application on cavitated carious lesions every 6 months. The primary outcome is the proportion of soft (active) carious tooth surfaces that harden (arrest) at the 18-month follow-up. The same calibrated examiner will conduct 6 monthly dental examinations to identify active or arrested lesions over 18 months. The examiner, children, and parents will be blinded to the treatments. The parents will be surveyed on the child's oral health-related behaviours and socioeconomic background for effect modification. (ClinicalTrials.gov NCT06241261). **Results:** If the anticipated results are obtained, clinicians can use the 38% SDF gel as an alternative to the 38% SDF solution for arresting early childhood caries. **Conclusion:** As SDF gel is cost-effective, simple, non-invasive, and non-aerosol-generating, it can be widely recommended for caries control. **Acknowledgement:** This project is supported by the UGC General Research Fund (#17104123).

P-39

The Effect of Blood Contamination on Bond Strength of Calcium Silicate-Based Sealers and Mineral Trioxide Aggregate in Simulated Strip Perforation Canals

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Abstract:

Aims: To evaluate the effect of blood contamination on the push-out bond strength and failure pattern of calcium silicate-based sealers [iRoot® SP (IR) and BioRoot® RCS (BR)] and ProRoot® MTA (MTA) in simulated strip perforation root canals. **Methods:** Thirty mandibular molars with two separate root canals in the mesial root were selected. After preparing the mesial root canals with rotary files, the distal side of the middle third of the roots was overprepared, causing strip perforation with burs. The roots were divided into two groups based on surrounding conditions: blood and normal saline (control). The prepared canals were randomly filled with: 1) Gutta-percha cone and IR; 2) Gutta-percha cone and BR; or 3) MTA (10 canals/group). After cutting each root into 2.0 mm thick slice at the perforation site, a push-out test was performed on each slice using a universal test machine at a loading speed of 0.5 mm/min. The bond strength data were analyzed using one-way ANOVA and Tukey post hoc test when comparing materials, and independent T-test was used when comparing conditions ($p < 0.05$). The failure patterns were described using descriptive data. **Results:** In both conditions, there was no difference in push-out bond strength between IR and BR; however, MTA had a higher bond strength than both sealers. When comparing within the same material, only the blood-contaminated IR group showed a significantly higher push-out bond strength compared to the control group ($p < 0.05$). MTA samples exhibited adhesive failure in both conditions, while IR and BR, when exposed to blood, predominantly showed mixed and adhesive failures similarly. **Conclusion:** Blood contamination from strip perforation could increase the bond strength of iRoot® SP, while it had no effect on the bond strength of BioRoot® RCS and ProRoot® MTA. However, under all conditions, MTA exhibited the strongest bond strength.

P-40

The preventive effect of SDF-modified salivary pellicle on dental erosion

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Abstract

Aim: To investigate preventive effect of silver diamine fluoride (SDF)-modified salivary pellicle (SP) against dental erosion. **Method:** Enamel and dentin blocks allocated into 4 groups (n=30 each): Group SDF+SP, Group SDF, Group DW+SP, and Group DW. Blocks were subjected to 14-day erosive challenge. SP morphology was assessed by atomic force microscopy (AFM). Crystal characteristics, percentage microhardness loss (%SMHL), surface loss, and surface morphology were assessed by X-ray diffraction (XRD), hardness tester, profilometry, and scanning electron microscopy (SEM), respectively. **Results:** AFM revealed modified pellicle morphology in Group SDF+SP. XRD of both blocks showed silver compounds in Groups SDF+SP and SDF. Fluoroapatite found in Group SDF+SP only. %SMHL of Groups SDF+SP, SDF, DW+SP, and DW were 33.4±2.2, 38.6±2.2, 50.3±2.2, and 58.3±2.4 in enamel and 16.1±2.2, 19.7±2.1, 32.8±2.1, and 39.0±2.3 in dentin, respectively. The surface loss (μm) of Groups SDF+SP, SDF, DW+SP, and DW were 3.6±0.7, 4.1±0.4, 5.3±0.5, and 7.0±0.6 in enamel and 5.4±0.6, 6.1±0.5, 9.1±0.7, and 9.2±0.5 in dentin, respectively. SDF-modified SP reduced %SMHL and surface loss in both blocks ($p<0.05$). SEM in Groups SDF+SP and SDF showed less surface destruction. **Conclusion:** SDF had a synergistic effect with SP. SDF-modified SP provided a superior anti-erosive effect. **Acknowledgement:** This study is supported by the General Research Fund of Research Grants Council of Hong Kong SAR, China (No. 17100820).

P-41

Effect of various solvents on the repairability of aged and non-aged 3D printed provisional material with flowable resin composite

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Abstract:

Aim: To investigate the impact of different surface modifications on the surface roughness and shear bond strength (SBS) of aged and non-aged 3D-printed provisional materials repaired with flowable resin composite. **Methods:** Two hundred twenty cylindrical 3D-printed provisional material specimens (Nextdent C&B MFH) were prepared, and they were then divided into two groups: the non-aged group and the aged group that underwent 5,000 cycles of thermocycling to simulate aging. Each group was randomly allocated into 5 subgroups (n=22) according to surface modification methods: control (C), isopropyl alcohol (IPA), methyl ethyl ketone (MEK), tetrahydrofuran (THF), and airborne-particle abrasion (APA). From each subgroup, ten specimens were examined for surface roughness (Ra) using an optical profilometer, and two specimens were examined for surface morphology using a scanning electron microscope (SEM). The other ten specimens from each subgroup were bonded with adhesive agent and flowable resin composite (bonding area of 2.38 mm in diameter) prepared for SBS testing. The repairability testing was conducted under a notched-edge shear bond strength test according to ISO 29022:2013 by using universal testing equipment (EZ-S, Shimadzu). The Ra and SBS values were statistically analyzed using a two-way ANOVA and Tukey's multiple comparison test ($p<0.05$). **Results:** From both aged and non-aged groups, the Ra values revealed that the APA group showed the highest surface roughness, with THF, MEK, IPA, and the control groups following in descending order ($p<0.05$). While the SBS of the aged and non-aged groups showed no statistically significant difference in SBS between the THF and APA groups ($p>0.05$), they also demonstrated the highest shear bond strength ($p<0.05$), followed by the MEK, IPA, and C groups. **Conclusion:** Tetrahydrofuran as a solvent modification can improve SBS more than the other three solvents, and its effect is comparable to airborne-particle abrasion. **Keywords:** 3D printed material, Repairability, Solvent, Provisional, Tetrahydrofuran

P-42

Epigallocatechin-3-gallate/mineralization precursors co-delivery hollow mesoporous nanosystem for synergistic manipulation of dentin exposure

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Abstract:

As a global public health focus, oral health plays a vital role in facilitating overall health. Defected teeth characterized by exposure of dentin generally increase the risk of aggravating oral diseases. The exposed dentinal tubules provide channels for irritants and bacterial invasion, leading to dentin hypersensitivity and even pulp inflammation. Cariogenic bacterial adhesion and biofilm formation on dentin are responsible for tooth demineralization and caries. It remains a clinical challenge to achieve the integration of tubule occlusion, collagen mineralization, and antibiofilm functions for managing exposed dentin. To address this issue, an epigallocatechin-3-gallate (EGCG) and poly(allylamine)-stabilized amorphous calcium phosphate (PAH-ACP) co-delivery hollow mesoporous silica (HMS) nanosystem (E/PA@HMS) was herein developed. The application of E/PA@HMS effectively occluded the dentinal tubules with acid- and abrasion-resistant stability and inhibited the biofilm formation of *Streptococcus mutans*. Intrafibrillar mineralization of collagen fibrils and remineralization of demineralized dentin were induced by E/PA@HMS. The odontogenic differentiation and mineralization of dental pulp cells with high biocompatibility were also promoted. Animal experiments showed that E/PA@HMS durably sealed the tubules and inhibited biofilm growth for up to 14 days. Thus, the development of the E/PA@HMS nanosystem provides promising benefits for protecting exposed dentin through the coordinated manipulation of dentin caries and hypersensitivity.

P-43

Combined minimal intervention approach to tackle stained white spot lesion

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Abstract

Aim: White lesions with discoloration can pose challenges in dental management. The aim was to minimize intervention while achieving aesthetically pleasing and functional results. This case study highlights a combined approach using ICON infiltration and composite restoration to manage a persistent white lesion, emphasizing the concept of minimal intervention. **Method:** A 36-years-old female patient presented with a large white spot lesion at the cervical area of tooth 23. Initial treatment plan involved ICON infiltration to reduce the lesion's appearance. Multiple etching and drying steps were performed, resulting in a reduction of the white lesion. However, brown discoloration and a small cavity persisted, which the patient found unsatisfactory. Acknowledging the patient's concerns, the treatment plan was adjusted to include minimal cavity preparation and composite restoration. **Results:** The treatment adhered to the concept of minimal intervention while achieving optimal aesthetic and functional results. **Conclusion:** The combined use of ICON infiltration and composite restoration demonstrated a viable treatment option for managing persistent white lesions and promoting minimal intervention. This case study serves as an example of how dentists can adapt treatment plans to address patient concerns effectively, achieve optimal outcomes, and encourage the adoption of innovative, minimally invasive dental techniques.

P-44

Remineralising dentine caries with copper tetraamine fluoride: A laboratory study

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Abstract

This study investigated the antibacterial, remineralising, and discolouring properties of copper tetraamine fluoride (CTF) on artificial dentine caries. We treated demineralised dentine blocks with CTF, silver diamine fluoride (SDF, positive control) and water (negative control) before they were subjected to Streptococcus mutans biofilm challenge. Scanning electron microscopy revealed confluent bacterial growth on dentine treated with water but not CTF nor SDF. Confocal laser scanning microscopy showed the dead-to-live ratio of the biofilm treated with CTF, SDF and Water were 0.7±0.1, 0.8±0.1 and 0.5±0.1 ($p<0.001$, CTF, SDF>Water). Log colony-forming unit values of CTF, SDF and water were 7.8±0.1, 7.8±0.1 and 8.1±0.2 ($p<0.001$, CTF, SDF<Water). Micro-computed tomography showed the dentine lesion-depth (μm) of CTF, SDF and water were 112±6, 119±7 and 248±17 ($p<0.001$, CTF, SDF<Water). The dentine mineral loss (gHAp/cm) of CTF, SDF and Water were 0.54±0.04, 0.55±0.04 and 0.66±0.04 ($p<0.001$, CTF, SDF<Water). Fourier transform infrared radiography showed the amide I-to-hydrogen phosphate ratios of dentine treated with CTF, SDF and water were 0.23±0.02, 0.24±0.05, and 0.44±0.06 ($p<0.001$, CTF, SDF<Water). X-ray diffraction revealed well-crystallised dentine hydroxyapatite of CTF and SDF, but not water. Spectrophotometry showed the ΔE values of the CTF, SDF and water groups were 6±4, 49±3 and 10±3 ($p<0.001$, CTF, water<SDF).

P-45

Mineral Concentration And Distribution In Enamel Mineralization Analyzed By Scanning Electron Microscopy/Energy Dispersive X-Ray Spectrometry

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Abstract

Aim: To analyze the temporal accumulation of phosphorus and calcium during the process of enamel mineralization. **Method:** Scanning electron microscopy/energy dispersive X-ray spectrometry (SEM/EDS) was used to measure the concentrations of calcium and phosphorus, the major inorganic components of the mineralized tissue, and carbon, the major organic component of the protein, in enamel and dentin of the mandibular first molar and in bone surrounding the tooth at postnatal days 7, 10, 14, and 21. The distribution of each element was visualized using elemental mapping. The concentrations of each element were statistically compared among enamel, dentin, and bone. **Results:** The concentrations of phosphorus and calcium were rapidly elevated in enamel from day 7 to day 14. In contrast, no such rapid increase in mineral concentrations as in enamel was found in dentin and surrounding bone. The concentrations of phosphorus and calcium in enamel were significantly lower at days 7 and 10 and higher at days 14 and 21 than in dentin and surrounding bone. The concentration of carbon in enamel was significantly higher until day 10 and lower after day 14. **Conclusion:** This study demonstrated that enamel is less mineralized than dentin in the mouse mandibular first molar from day 7 to day 10 and is more mineralized than dentin from day 14.
Acknowledgement: This project is supported by JSPS KAKENHI (grant number: JP21K10061).

P-46

Enhanced dentin bonding durability with silk fibroin: A novel approach

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Abstract:

Aim: The objective of this study was to evaluate the potential of using SF as a primer to enhance dentin bonding durability. **Method:** A total of 60 Cube-shape dentin specimens (2×2×2mm) cut from the mid-crown portions of molars were embedded into acrylic resin. Allocated them to 5 groups (n=12) based on the following pretreatments for 1min: 1. Deionized water; 2. 0.001% SF solution; 3. 0.01% SF solution; 4. 0.1% SF solution; and 5. 1% SF solution. After drying, a universal adhesive was applied, followed by the construction of composite buildups. Each group was divided into 2 subgroups: no aging and 10,000 times of thermocycling. The microshear bond strength (μSBS) was evaluated. Observing bonding interface morphology by SEM. Two-way analysis of variance was employed ($P < 0.05$). **Results:** The highest μSBS values were observed in 0.1% SF solution group (no aging: 30.58MPa, aged: 29.07 MPa) and 1% SF solution group (no aging: 30.53 MPa, aged: 29.22 MPa) ($P < 0.05$). SEM images revealed that an extensive fibrous network structure, interpenetrating with dentin collagen fibrils and resin tags in 0.1% and 1% SF solution groups. **Conclusion:** This novel strategy of using SF as a primer demonstrates potential in enhancing the durability of dentin bonding.

P-47

Effect of geometry on clasp retention force—FEA study

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Abstract:

Aim: The purpose of this study is to evaluate the effect of the three-dimensional geometry of the clasp on the retention force using finite element method. **Method:** Three-dimensional clasp models were created in the finite element (FE) software ANSYS 19.0 (ANSYS, USA). The clasp FE models were created based on different lengths and diameters and different displacement loads were applied to give cast cobalt chromium alloy properties. The retention force data were analyzed using nonlinear regression analysis and curve fitting. **Results:**The maximum stress was consistently concentrated at the base of the specimens. In the rod specimen, the retention force exhibited an inverse proportionality to the third power of the length, a proportionality to the fourth power of the diameter, and a proportionality to the displacement load. In bending specimens, the retention force is approximately inversely proportional to the third power of the width; it is cubically proportional to the height. **Conclusion:** There are different functions between the three-dimensional geometry of the clasp arms and the load values. Laboratory measurements need to be further investigated. **Acknowledgement:** This work was supported by the Natural Science Foundation of Fujian Province (2023J01701)

P-48

Effect of different flushing processes on remaining hydrofluoric acid

Meiling Zheng, Changyuan Zhang
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Abstract:

Aim: To investigate the effect of different flushing processes on remaining hydrofluoric acid (HF). **Method:** 100 lithium disilicate glass-ceramics (LDGC) specimens were made and divided into 10 groups (n=10). LDGC specimens were etched with HF and flushed as follows: A1) flushed by junior dentist; A2) flushed by junior dentist + UC (ultrasonic cleaning for 5 minutes); B1) flushed by experienced dentist; B2) flushed by experienced dentist + UC; C1) flushed 3 s; C2) flushed 3 s + UC; D1) flushed 6 s; D2) flushed 6 s + UC; E1) flushed 9 s; E2) flushed 9 s + UC. Remaining HF in each group were detected quantitatively by LCMS-8040. Data were statistically analyzed by normality test, independent 2-sample t-test, and one-way ANOVA test ($\alpha = 0.05$). **Results:** HF residues were found in all groups (62.42-74611.74 ng/ml). Without UC, personnel and flushing times significantly affected the HF residuals ($P < 0.05$). After UC, there was no significant difference in HF residues between the groups ($P > 0.06$). For the same cleaning personnel and time, HF residue decreased significantly after UC ($P < 0.02$). **Conclusion:** Visual color identification alone cannot guarantee complete removal of HF, and UC is an effective method for removing HF.

P-49

Efflux pump mediated Streptococcus mutans resistance to quaternary ammonium salt

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Abstract:

Aim: The goals of this study were to explore the mechanisms of Streptococcus mutans (S. mutans) resistance to quaternary ammonium salt (QAS), dimethylaminohexadecyl methacrylate (DMAHDM). **Method:** Drug-resistance of S. mutans (S. mutans D) was induced with repeated exposures to DMAHDM. The morphological changes of S. mutans D were observed by transmission electron microscope (TEM). Membrane depolarization activity was determined with DiSC3(5). Transcriptome sequencing was used to analyse differentially expressed genes. Accordingly, efflux pump inhibitors were applied.**Results:** TEM showed DMAHDM disrupted the membrane integrity of S. mutans, but S. mutans D exhibited no obvious change. The degree of membrane depolarization increased when S. mutans. However, S. mutans D showed less change. Different gene expression of S. mutans D was detected. These genes were mainly related to membrane transport. And most of them encode the efflux pump. Accordingly, addition of efflux pump inhibitors increased the sensitivity of S. mutans D to DMAHDM.**Conclusion:** The mechanisms of S. mutans resistance to QAS may related gene to efflux pump, stabilizing the membrane integrity and depolarization. **Acknowledgement:** This project is supported by the Joint Funds for the innovation of science and Technology, Fujian province (Grant number: 2023Y9223).

P-50

Effect of miR-129-5p on proliferation and osteogenic differentiation of hDPSCs

Zonghao Zhang, Hongbin Lv*
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Abstract:

Aim: To explore the role of miR-129-5p in the proliferation and osteogenic differentiation of human Dental Pulp Stem Cells(hDPSCs). **Method:** Bioinformatics screening of differentially expressed genes during osteogenic differentiation of hDPSCs. To increase/decrease the expression level of miR-129-5p, CCK8 was used to detect the proliferative ability of hDPSCs; qRT-PCR was used to detect the expression levels of the osteogenic differentiation-related genes ALP, COL1 and RUNX2. Immunofluorescence staining and Western Blot were used to detect the expression of ALP and OPN, and alizarin red and alkaline phosphatase staining were used to determine the amount of calcium deposition in the cells. **Results:** Knockdown of miR-129-5p inhibited the proliferative ability of hDPSCs, decreased the expression levels of osteogenic differentiation-related genes ALP, COL1 and RUNX2, decreased the expression of osteogenic differentiation-related proteins ALP and OPN, and decreased the amount of cytosolic calcium salt deposition as shown by alizarin red staining and alkaline phosphatase staining. **Conclusion:** Inhibition of miR-129-5p expression in hDPSCs promotes the proliferation and osteogenic differentiation ability of hDPSCs. **Acknowledgement:** This project is supported by the Fujian provincial health technology project No. 2022CXA045.

P-51

Evaluation of cell behaviors on zirconia manufactured by different technologies

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Abstract:

Aim: To compare the behaviors of human gingival fibroblast (HGF) on zirconia fabricated by material jetting technology (MJ) and subtractive manufacturing technology (SM). **Method:** Zirconia samples (10 mm × 10 mm × 1 mm) were fabricated using MJ in 0° (MJ0 group) and 90° (MJ90 group) building directions and SM (SM group). Surface topography of zirconia in each group was observed by scanning electron microscopy (SEM). The biological behaviors of HGF on the surface of each group, including cell morphology, cell viability, cell adhesion, and cell migration, were evaluated. **Results:** The surface of MJ90 group presented a unique texture structure. Different cell alignment patterns and cell morphology were observed in MJ90 group. Additionally, HGF on this surface exhibited higher cell adhesion numbers and migration rates compared with the MJ0 and SM groups. The MJ0 and SM groups showed similar cell morphology, cell viability, cell adhesion, and cell migration. **Conclusion:** The surface characteristics of zirconia fabricated by MJ were influenced by the building direction. Zirconia fabricated using MJ in the 90° building direction showed better biological properties than that in the 0° building direction and subtractive manufactured zirconia. **Acknowledgement:** This project is supported by the Funds of Fujian Provinicial Department of Finanance (Grant number:2023CZZX01).

P-52

Pulpotomy and fragment reattachment for an anterior incisor: a case

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Abstract:

Aim: To observe the clinical efficacy of vital pulpotomy and fragment reattachment in treatment of a young permanent anterior tooth with traumatic crown fracture and pulp exposure. **Method:** A 12-year-old male presented to our hospital 24 hours after an impact injury. The tooth 21 exhibited horizontal complicated crown fracture with supragingival margin. The area of exposed pulp was 1.5 mm × 4 mm. The autogenous fragment matched the margin of the dental crown completely. The X-ray showed incomplete development of the root apex of tooth 21, and no obvious displacement and fracture image of the root were observed. After residual coronal pulp in the fragment was removed, the fragment was soaked in physiological saline. Simultaneously, vital pulpotomy capping with iRoot BP plus was performed. Theracal LC and composite resin were respectively utilized as liner and restoration material. The crown reattachment was completed using total-etch adhesive and DMG Permacem dual-cure composite cement. **Results:** Clinical and radiographic evaluation showed satisfactory aesthetic and biological results in the follow-up visit in 1 week and 1, 3 month. **Conclusion:** This case presents that the combination of pulpotomy and broken crown reattachment could improve the short-term clinical efficacy of young permanent incisor with complicated crown fracture. **Acknowledgement:** This project is supported by the Youth Scientific Research Subject of Fujian Provincial Health Commission (No.2023QNA090), China.

P-53

Research on accuracy of the full-digital technique applied to post-cores

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Abstrat:

Aim: This study proposed a full-digital workflow, and evaluated the accuracy of the post-cores fabricated by it. **Method:** Standard models with four extracted teeth (three incisors, and a molar) were prepared. Eight post-cores respectively were fabricated for each tooth by the intraoral scan with or without the scan post method, the conventional silicone impression method as controls. All files were then exported as standard tessellation language (STL) files and analyzed to evaluate the mean measurement error of post-cores in teeth. The deviation of the IOS dataset from the reference was determined at standardized measurement points, and pooled into five measurement areas: apical gap, first root canal third, second root canal third, occlusal internal, occlusal external. Significant differences were assessed with a 1-way ANOVA test and Tukey' s multiple comparison test. Statistical significance was set at $p < 0.05$. **Results:** Significant differences were found between the silicone impression method and the intraoral scan combined the scan post method in terms of the apical gap ($p < 0.05$) but not for the other four areas. **Conclusion:** The intraoral scan combined the scan post technique can be used as an alternative to conventional technique. **Acknowledgement:** This project is supported by Fujian provincial health technology project No.2022CXA046

P-54

Integrating lipid metabolomics with MRI for OSCC stage prediction

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Abstract:

Aim: Oral Squamous Cell Carcinoma (OSCC) presents significant diagnostic challenges in its early and late stages. This study aims to utilize preoperative MRI and biochemical results of OSCC patients to predict the stage of tumors. **Method:** This study involved 187 patients from two medical centers. A detailed analysis of contrast-enhanced T1-weighted (ceT1W) and T2-weighted (T2W) MRI were conducted, integrating these with biochemical results for a comprehensive evaluation. Initially, 42 clinical biochemical results were selected for consideration. To extract imaging features, machine learning algorithms in conjunction with Vision Transformer (ViT) techniques were utilized. These features were integrated with biochemical markers for predictive modeling. The performance of model was evaluated using the Receiver Operating Characteristic (ROC) curve. **Results:** After rigorously screening clinical markers, four key markers were selected for the model. The model, developed using radiomics and deep learning for feature extraction from ceT1W and T2W images, showed a lower Area Under the Curve (AUC) of 0.83 in the validation cohort when using these imaging modalities alone. However, integrating these biochemical indicators improved the model's performance, increasing the validation cohort AUC to 0.89. **Conclusion:** In this study, the performance of the model significantly improved following multi-modal fusion, outperforming the single-modality approach.

P-55

PnNVs impact oral squamous carcinoma cell proliferation and mobility

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Abstract:

Aim: Study the properties of different-sized Panax notoginseng-derived nanovesicles (PnNVs) and their impact on the growth and movement of oral squamous carcinoma cells. **Method:** Three sizes of PnNVs were extracted and evaluated for size, potential, and morphology. Cellular uptake efficiency was assessed using confocal microscopy and flow cytometry. The ability of different PnNVs to inhibit oral squamous cell carcinoma cells was evaluated using plate cloning, CCK8 assay, and scratch healing assay. Off-target metabolomics was used to compare metabolic compounds of different PnNVs. **Results:** Smaller PnNVs had the lowest zeta potential and were most efficiently taken up by cells. Medium PnNVs had the best inhibitory effect on oral squamous cell carcinoma and contained higher levels of antitumor-related metabolites compared to other sizes. PnNVs were protein-rich and low in RNA. **Conclusion:** The size of Panax notoginseng tubers affects the properties of nanovesicles extracted from them, impacting cellular uptake efficiency and activity. Medium PnNVs may be more effective against oral squamous carcinoma.

P-56

AI Model for Assessing Rat's Caries Using Modified Keyes' Scoring

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Abstract:

Aim: To improve Keyes' scoring method for Mesio-Distal-Sagittal Section caries (MDS-C) in rats and develop an Artificial Intelligence (AI)-based scoring system to enhance the accuracy of caries scoring, providing a more reliable and efficient tool for rat caries research. **Method:** Approved animal experiments were conducted using SPF Sprague-Dawley rats to construct a caries model. An improved Keyes' MDS-C scoring method was used for manual scoring of rat mandibular molars to generate more high-quality scoring data. The ConvNeXt Convolutional Neural Network (CNN) model was trained for multi-label classification. **Results:** The CNN model achieved a molar classification accuracy of 96% and an overall scoring accuracy of 82%. Specifically, the scoring accuracies for the first, second, and third molars were 78.5%, 82.4%, and 92.7%, respectively. The CNN demonstrated excellent performance with an overall Receiver Operating Characteristic Curve (AUC) of 99% for distinguishing molars and AUC values of 90%, 80%, and 80% for scoring the third, first, and second molars, respectively. **Conclusion:** The CNN model demonstrated the accuracy and efficiency of AI in MDS-C caries scoring in rat. The improved MDS-C scoring method, combined with the AI automated system, holds promise as a more reliable and efficient tool for future caries research.

P-57

Automatic segmentation of craniomaxillofacial structures using TransU-Net architecture

Zhengxing Lin, Hong-lei Lin, Hao Yu, Dan-Hong Zhu, Zhenkai Weng, Dong Zhang
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Abstract:

Aim: To develop and validate a deep-learning algorithm based on TransU-Net architecture for comprehensive segmentation of craniomaxillofacial structures in cone-beam computed tomography images. **Method:** An algorithm based on TransU-Net architecture was developed. 40 CBCT scans from healthy individuals were collected, and manual segmentation of craniomaxillofacial structures was carried out from those CBCT scans using Mimics software. A subset of 35 CBCT scans were randomly selected for training and optimizing the algorithm. The remaining 5 CBCT scans were segmented by an experienced clinician and the algorithm, respectively. The time required for segmentation and accuracy metrics including dice similarity coefficient (DSC), Hausdorff distance (HD), intersection over union(IoU) and root mean square (RMS) were calculated to quantify the similarity between the manual segmentation (ground truth) and the performances of the algorithm. **Results:** Regarding timing, manual segmentation averaged 1872.8±80.4 s, while the deep-learning algorithm significantly reduced this to 119.2±16.7 s ($p<0.05$). Additionally, the segmentation performed by the algorithm demonstrated a high level of agreement with the manual segmentation (DSC: 0.846 ± 0.069; HD: 9.674±6.983 mm; IoU: 0.850±0.081; RMS: 0.467±0.249 mm). **Conclusion:** The automated segmentation tool based on TransU-Net architecture exhibited satisfactory accuracy and efficiency. **Acknowledgement:** This project is supported by College of Computer and Data Science/College of Software, Fuzhou University.