



Oral Health Newsbites



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Oral Health Newsbites is a bi-annual newsletter which highlights our key innovations and events under clinical research and education. We share some of the meaningful work and achievements of our clinicians, researchers, and educators and the ways they are contributing to the future of patient care and innovation.

The SingHealth Duke-NUS Oral Health Academic Clinical Programme (ORH ACP) was launched in August 2014. The ORH ACP brings together three clinical departments and seven specialties across National Dental Centre Singapore (NDCS), KK Women's & Children's Hospital (KKH), SingHealth Polyclinics (SHP), and Changi General Hospital (CGH). ACP's main priorities include focusing on the four key Research Themes (Bone Bioengineering, Oral Devices and Therapeutics, Genomics / Biomarker Discovery, and Health Services Research), nurturing budding clinician scientists, as well as collaborating with Duke-NUS on joint certification of Senior Residency and Fellowship Programmes.

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Spearheading Innovation in Bone Grafting

NISO Project

The growing prevalence of bone damage caused by ageing, diseases, and accidents makes bone the second-most transplanted tissue in the world, with the bone graft and substitute market valued at \$3 billion in 2019 and a projected Compound Annual Growth Rate (CAGR) of 5.5% by 2027. The importance of bone grafts extends to the field of dentistry. Healthy oral-maxillofacial bone tissue is critical for maintaining oral function and quality of life, and bone grafts are widely used by dental surgeons to restore bone in the oral-maxillofacial region, including alveolar ridge augmentation for dental implant installation, mandibular reconstruction after disease or trauma, and cleft reconstruction. The market for dental bone grafts and substitutes is significant, with a value of \$551 million in 2020 and a projected CAGR of 9.8% to reach \$883 million by 2025.

The multidisciplinary NISO project (National Dental Centre Singapore, Institute of Molecular and Cell Biology, Singapore Institute of Manufacturing Technology, Osteopore International) is helmed by National Dental Centre Singapore (NDCS). The project aims to create jaw implants that promote faster bone growth and



MOU Signing Ceremony, (from left) CI A/Prof Poon Choy Yoke, CEO, NDCS; (2nd from left) Prof Jonathan Loh, Research Director, A*STAR Institute of Molecular and Cell Biology; (3rd from left) Dr Lee Eng Wah, Deputy Executive Director, A*STAR Singapore Institute of Manufacturing Technology; (right) Dr Lim Jing, Chief Technical Officer, Osteopore International Pte Ltd.

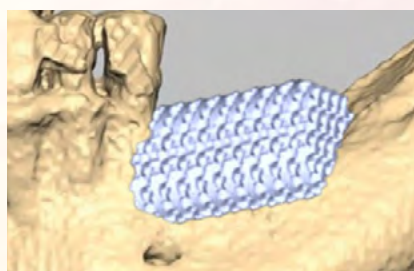
simplify future dental procedures, while also reducing the need for complex bone harvesting processes, risk of adverse immune reactions and disease transmission. This innovative technology of a novel Polycaprolactone (PCL)-based synthetic scaffold to successfully regenerate bone, has the potential to revolutionise the field of bone grafting and make the procedure safer and more accessible for patients.

PCL is a bioresorbable, non-toxic, biocompatible polymer that has been approved by the US Food and Drug Administration (FDA) for use as a bone filler in medical devices and has been shown

to be effective in promoting bone growth. The PCL-TCP-Mg scaffold developed by the NISO project is loaded with Adipose-Derived Mesenchymal Stem Cells (AD-MSCs) and Heparan Sulphate (HS) for use in non-walled oral-maxillofacial defects such as alveolar or mandibular defects. The ultimate goal is to successfully regenerate bone using this scaffold. The patented biological additives and polymer compounds will be combined and tested for any adverse reactions, any osteogenic differentiation (indicating bone growth), and higher osteogenic differentiation (indicating faster bone growth) through pre-clinical studies and a first trial in human subjects.



Blood & Cells



Dental Scaffold



Dental Implants



CLINICAL INNOVATION

NISO Project (continued)

Partnership, Roles, and Product Rollout

The NISO collaboration, valued at \$18.3 million, is slated for three years and comprises a core partnership with research and industrial organisations, with each bringing a unique skillset and expertise to the project.

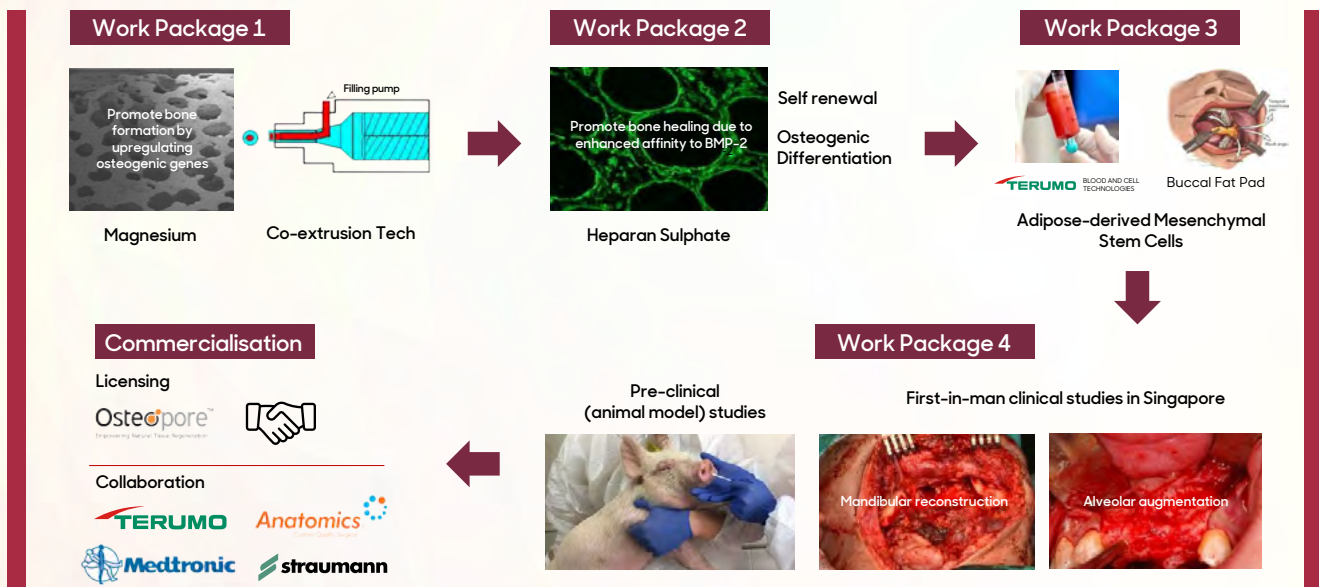
National Dental Centre Singapore (NDCS)

will be responsible for formulating clinical problem statements and coordinating in-vitro studies, pre-clinical studies, and clinical trials in collaboration with other institutions and companies.

Institute of Molecular and Cell Biology (IMCB) will be developing biological stimulants that can accelerate bone healing. **Singapore Institute of**

Manufacturing Technology (SIMTech) will focus on developing high-value manufacturing technology for the production of regenerative scaffolds that can provide a structure for the growth of new bone tissue. **Osteopore International**, the leading company in the application of tissue engineering technology, will be expanding its product lines to include the new generation of dental implants developed as part of the project. The company also brings a wealth of experience and expertise to the project, making it well-positioned to succeed in its ambitious goals.

The project partners are committed to co-developing the know-how portfolio and commercialising the novel PCL-TCP-Mg-HS3-ADMSC scaffold products over the next 3-6 years through four workstreams.



The Impact NISO Project Brings to Dentistry

The Clinical-Industrial Partnership highlights the value of collaborations in driving innovation and improving healthcare outcomes, by leveraging and synergising the strengths of both sectors. This innovative technology has the potential to revolutionise the field of bone grafting by overcoming the limitations of traditional bone

grafts and is expected to be widely adopted by dental practitioners and patients due to its unique, less intrusive nature. Overall, the use of PCL in bone grafting represents an exciting development in healthcare technology. It heralds a promising step forward in the field of dental research with significant advancements in effectively addressing the needs of patients with better surgical outcomes and shorter recovery times.

NDCS/NDRIS Stakeholders



CI A/ Prof Goh Bee Tin
Deputy CEO
(Research and Education),
NDCS



Dr Leonardo Saigo
Deputy Head, Department
of Oral & Maxillofacial
Surgery, NDCS



Dr Charles Lau
Research Fellow,
ORH ACP



Dr Stanley Ng
Assistant Director,
Research ACP

Partners:



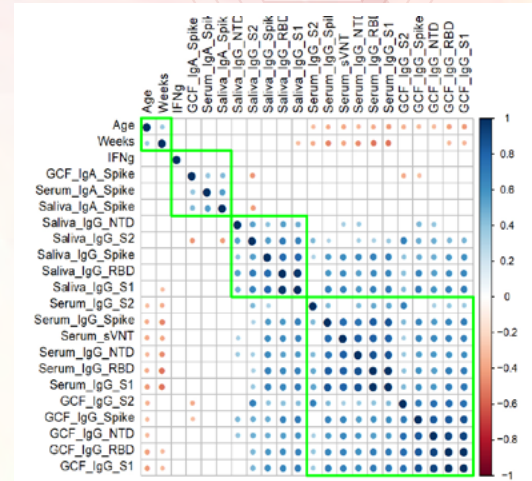
Oral Fluids as an Alternative to Serum for Detecting Antibody Response After COVID-19 Vaccination?

NDCS Researchers Investigate

Dr Chaminda Jayampath Seneviratne (Dr Jaya) and Dr Preethi Prajod from the Singapore Oral Multiomics Initiative (SOMI) team led a study on whether oral fluids such as Gingival Crevicular Fluid (GCF) could be used as a less invasive alternative to serum, to detect antibody responses after COVID-19 vaccination. Dr Jaya’s research team, in collaboration with Singapore General Hospital (SGH), had previously won the SingHealth Publish! Award for identifying that commercial mouth rinses may have a long-lasting effect on reducing SARS-CoV-2 levels in the saliva of COVID-19 patients. When aerosol generation is inevitable, such as in a clinical dental setting, these mouth rinses may serve as a useful pre-procedural transmission mitigation technique. Following this successful collaboration, Dr Jaya’s team partnered with SGH again to further investigate various oral fluids that could be used as a non-invasive alternative to venepuncture for serum samples to monitor vaccine-induced immunity comfortably and effectively. The global vaccination campaign against Coronavirus

Disease 2019 (COVID-19) is underway to limit the pandemic. While these vaccinations have been shown to prevent severe disease, the level of immunity required to prevent respiratory mucosal infection is not yet fully understood. As secreted antibodies may serve as surrogates for mucosal immunity, it is desirable to establish a non-invasive screening approach, such as oral fluids, to track them over time. Therefore, Dr. Jaya’s research team compared immune responses in the blood of healthy professionals from the healthcare sector to those with GCF and saliva following two intramuscular doses of the Pfizer/BioNTech-BNT162b2 vaccine.

Within limitations, the research team observed that GCF could be a less invasive alternative to serum and more appropriate than saliva to detect antibody responses by current COVID-19 vaccines, if the GCF collection procedure could be standardised. Investigating GCF as a potential diagnostic fluid for vaccine-induced immunity stands to reason as a non-invasive alternative to venepuncture for serum samples. 🗨️



SARS-CoV-2 neutralising antibody activity in serum, GCF, and saliva. Correlation matrix with hierarchical clustering analysis of all measured immune parameters. Four hierarchical clusters are marked with green squares.

'NDCS and SGH have worked closely together to enable and empower the fight against COVID-19 by combining their respective capabilities. This particular collaboration has helped many researchers, including ourselves, meet the goals of our individual studies while also promoting dental and oral health for patients.'

NDCS/NDRIS Stakeholders



A/Prof Chaminda Jayampath Seneviratne
Adjunct Professor,
NDCS



Dr Preethi Prajod
Research Fellow,
ORH ACP NDRIS

Partners:

Singapore General Hospital



RESEARCH BREAKTHROUGHS AND AWARDS



Congratulations to Dr Charles Lau and Dr Zayim Razina for winning the Best Poster Award at the 24th SGH Annual Scientific Meeting (SGH ASM) and SingHealth Publish! Award, respectively.



Dr Charles Lau
Research Fellow,
ORH ACP



Dr Zayim Razina
Research Fellow,
ORH ACP

24th SGH Annual Scientific Meeting Best Poster Award

Dr Charles Lau won the Best Poster Award in the Basic/ Translational Research category at the 24th SGH Annual Scientific Meeting (SGH ASM). The SGH ASM is a biennial event that brings together the nine institutions in the SGH Campus to showcase the latest developments in their respective disciplines, reflecting the spirit of collaboration and interdisciplinary interactions in SGH and its partner institutions.

The 24th SGH ASM took place at Academia, SGH on 7th and 8th October 2022, with the theme 'Call to Action: Future Proof Healthcare', to address the huge challenge exerted by the pandemic on our healthcare system and to motivate our healthcare system to continually adapt, innovate, and evolve. The highlights of the meeting included keynote lectures, themed sessions, and presentations by talented researchers within the SGH Campus. Dr Lau represented NDCS and the Oral Health Academic Clinical Programme (ORH ACP), Duke-NUS. In his winning poster, Dr Lau

presented his work 'Alveolar Ridge Augmentation Using a Novel Combination of 3D-Printed Polycaprolactone Scaffold & Adipose-Derived Mesenchymal Stem Cells'.

Dr Charles Lau is guided by Lead Principal Investigator, Clinical Assoc Prof Goh Bee Tin, who is also the Deputy CEO (Research & Education) at NDCS. CI A/Prof Goh is leading



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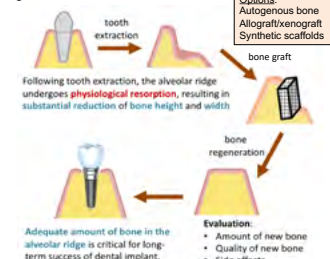
Alveolar Ridge Augmentation Using A Novel Combination Of 3D-Printed Polycaprolactone Scaffold & Adipose-Derived Mesenchymal Stem Cells

Lau Chau Sang^{1,2}, Jasper Chua³, Edgar Macabe Pena⁴, Lim Jing⁵, Leonardo Saigo⁶, Goh Bee Tin^{1,2,6}

¹ Oral Health ACP, Duke-NUS Medical School; ² National Dental Research Institute Singapore, National Dental Centre Singapore; ³ National Heart Research Institute Singapore, National Heart Centre Singapore; ⁴ National Large Animal Research Facility, SingHealth Experimental Medicine Centre; ⁵ Osteopore International Pte Ltd; ⁶ Department of Oral & Maxillofacial Surgery, National Dental Centre Singapore

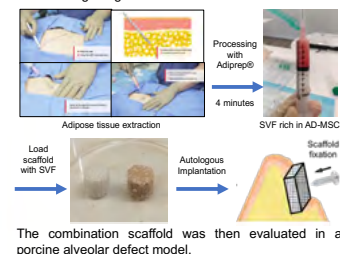
Background

Alveolar ridge augmentation is an important dental procedure to ensure sufficient bone volume in the alveolar ridge to install dental implant after tooth loss. Existing bone grafts have risk of complications and zoonosis, prompting the development of synthetic bone grafts.

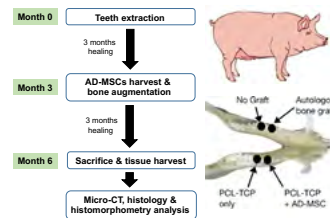


Materials and Methods

Aim: To combine adipose-derived mesenchymal stem cells and 3D-printed polycaprolactone scaffold, for alveolar ridge augmentation.

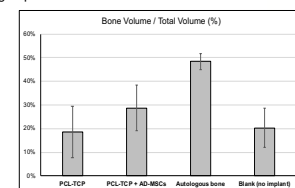


Acknowledgement: This study was co-funded by Osteopore International Pte Ltd and the National Additive Manufacturing Innovation Cluster (NAMIC) (Grant ID: 2019046).



Results

Our preliminary results based on micro-CT showed that the addition of AD-MSCs significantly improved the bone regeneration capabilities of the 3D-printed polycaprolactone scaffold. The bone volume/total volume fraction (BV/TV) of the 'AD-MSC + scaffold' group is $28.7 \pm 9.7\%$, while that of the 'scaffold only' group is $18.6 \pm 10.9\%$.



We are currently processing the alveolar samples for histology. After histological analysis, we would be able to observe how the scaffolds contribute to bone regeneration at the tissue and cellular level.

Conclusions

Our combination scaffold is suitable for alveolar ridge augmentation, and the ability to extract the AD-MSCs, load them into the scaffold and implant the scaffold in one surgery session without cell expansion will save a lot of time and costs for patients and clinicians.



RESEARCH BREAKTHROUGHS AND AWARDS

the study on the development of novel tissue scaffolds to address the high global demand for bone grafts for oral-maxillofacial applications. The study is co-funded by Osteopore International Pte Ltd and the National Additive Manufacturing Innovation Cluster. Prof Goh, Dr Lau, and their team have developed a scaffold comprising a porous 3D-printed polymer scaffold and filled with adipose stem cells that can differentiate into bone cells

and support tissue regeneration in bone defects. The safety and efficacy of this novel scaffold were evaluated in a pig model. Results indicated that the novel combination scaffold is suitable for alveolar ridge augmentation, and the ability to extract adipose stem cells, load them into the scaffold, and implant the scaffold in one surgery session will save a lot of time and costs for patients and clinicians. 📄

NDCS/NDRIS Stakeholders



Dr Charles Lau
Research Fellow,
ORH ACP

Partners:

Osteopore International Pte Ltd

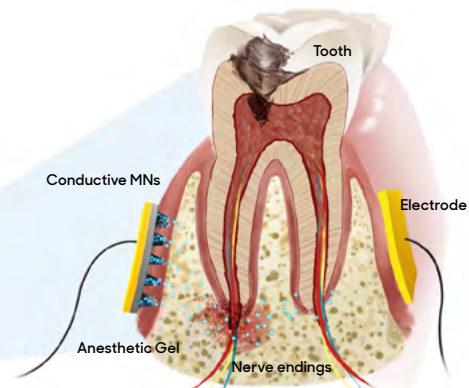
National Additive Manufacturing Innovation Cluster

SingHealth Publish! Award

Dr Zayim Razina received the prestigious SingHealth Publish! Award for her research paper on the targeted delivery of anaesthetic agents to bone tissue using conductive microneedles for painless dental anaesthesia. The SingHealth Publish! Award is conferred to SingHealth researchers who have published high impact scientific articles in top internationally recognised journals. The award also encourages researchers to continually aim for top tier internationally acclaimed peer-reviewed journals in their careers.

In her research paper, Dr Razina developed a novel conductive microneedle array that can be used in combination with iontophoresis technique to

achieve drug penetration through the oral mucosa and the underlying bone tissue. The successful delivery of lidocaine using this new strategy in a clinically relevant rabbit incisor model is shown to be as effective as the current gold standard and can be a painless alternative to the traditional needle and syringe used to administer local anaesthesia. 📄



Schematic diagram demonstrating the enhanced effect of conductive MNs on ITP for directed delivery of anesthetic drugs to deep tissues in dentistry.



Dr Zayim Razina (right), photographed here holding the SingHealth Publish! Award, with Cl A/Prof Goh Bee Tin, Deputy CEO (Research & Education), NDCS.

NDCS/NDRIS Stakeholders



Dr Zayim Razina
Research Fellow,
ORH ACP



FOSTERING EDUCATIONAL EXCELLENCE

NDCS strives to create an environment that actively promotes educational excellence among both clinicians and researchers alike. The constant evolution of academic and clinical knowledge necessitates the development of suitable platforms to facilitate the exchange of knowledge as well as encourage active collaborations. Taking this into consideration, several programmes and events were organised last year.

Celebrating Oral Health Excellence

The **Singapore Oral Health Congress** is a bi-annual event that brings together the experts in various disciplines to share their knowledge on the current advances and developments in oral healthcare. The Congress held on 25 June 2022, was a virtual event with a turnout of over 350 delegates including oral health specialists and general practitioners,

oral health therapists, students, and researchers. Held as part of the NDCS 25th Anniversary celebrations, the Congress commemorated the centre's development and progress as Singapore's flagship specialty centre for oral care and boosted the exchange of academic and clinical knowledge among delegates to inspire collaboration in oral healthcare.

Two keynote speakers, Dr Chatchai Kunavisarut,

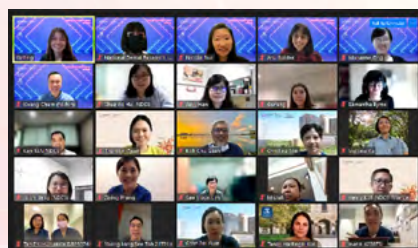


Mahidol University, Thailand, and Clinical Assoc Prof Chng Chai Kiat, Chief Dental Officer, Ministry of Health, together with nine other speakers from NDCS shared on the latest and best clinical practices and developments that will advance the oral healthcare of tomorrow.

ORH ACP Education Day 2022- Exploring Digital Capabilities and Professionalism of Students in Healthcare Education

The **ORH ACP Education Day** held virtually on 7 September 2022, was an NDCS Centre-wide event and was attended by over 100 oral health professionals and education leaders. The programme featured two invited faculty lecturers from the University of Melbourne – Dr K Cham, an optometrist and senior lecturer in Optometry and Vision Sciences and Dr A Polster, lecturer at the Melbourne Dental School who shared their experience and work on analysing healthcare student's digital capabilities and exploring professionalism in students through interdisciplinary group creativity and diversity. The ORH ACP Excellence in Teaching Awards 2022 were also presented to two outstanding

educators, **Dr See Toh Yoong Liang** (Post-Grad) and **Ms Yap Xin Ying** (Auxiliary), in recognition of their teaching excellence and dedication to oral health education.



Participants taking a group photo.



Dr See Toh Yoong Liang (right) receiving the ORH ACP Excellence in Teaching Awards 2022 (Post Graduate), from CI A/Prof Goh Bee Tin (left).



Ms Yap Xin Ying (right) receiving the ORH ACP Excellence in Teaching Awards 2022 (Auxillary) from CI A/Prof Goh Bee Tin (left).



FOSTERING EDUCATIONAL EXCELLENCE

Equipping Oral Health Professionals with Clinical Endodontics Skills

The Endodontics Unit, Department of Restorative Dentistry, launched the inaugural **Certificate Course in Clinical Endodontics**, issued by the Singapore Academy College of Clinical Dentistry (CCD). The four-month long course is designed with the aim of equipping general dental practitioners with knowledge and skills to perform endodontic diagnosis and treatments confidently and predictably. Ten general dental practitioners graduated from the pioneer cohort and were presented with a Certificate of Achievement on



Promotional poster for Certificate Course in Clinical Endodontics.

9 November 2022 at NDCS. Do keep a lookout for the second run of the course in 2023! 📌



Participating General Dental Practitioners attending the course.



Celebrating the first batch of graduates.



Graduates of the inaugural Certificate Course in Clinical Endodontics.

Faculty & Residents Social Night

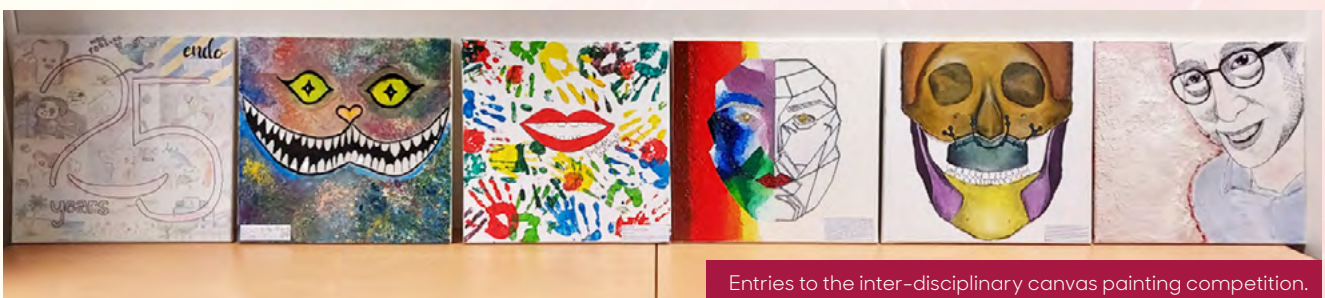
The Faculty & Residents Social Night held on 30 November 2022, was organised for members of the NDCS MDS Resident Training Programme (RTP) faculty and the MDS residents.

The event included an interdisciplinary canvas painting competition with the theme 'Be Proud of Your Mouth and How to Keep You Smiling'. Submitted entries were judged based on

creativity, aesthetics, artwork descriptions, and thematic accuracy. Amidst everyone's busy schedules, the event was a wonderful platform for active interaction between the Executive Office, Associate Directors, and Residents. 📌



A snippet of the event.



Entries to the inter-disciplinary canvas painting competition.



WELCOMING NEW ORH ACP COLLEAGUES

Diving into the Oral Inflammation Mechanisms to Prevent Chronic Diseases

A/Prof Fábio Leite



A/Prof Fábio Leite, Principal Investigator, Head, SOMI.

A/Prof Fábio Leite joined NDCS as a Principal Investigator and the Head of the Singapore Oral Multiomics Initiative (SOMI) in September 2022. He earned his DDS, MSc in Periodontology and PhD in Dentistry from São Paulo State University (UNESP) with a research stay at the Oral Microbiology and Cell Analysis facilities at the University of Washington.

Dr Fábio brings with him a wealth of work experiences, comprising an Assistant Professorship in Brazil and an Associate Professorship in Denmark, where his administrative roles included Head of Department, Clinical Coordinator, Ethics Committee Vice-President, Member

of Dental School Executive Committee, and Member of Steering Committee for strategic research on inflammation.

He has supervised 40 Master's and PhD students, published over 90 papers, filed patents, and received grants in Brazil, Australia, and Denmark.

Research Interests

Dr Fábio's research competencies include integrating clinical/ population questions with basic/ bench research, planning clinical and laboratory data collection, and leading multidisciplinary teams. Having started his PhD with a focus on the common gut and periodontal inflammation pathways, his subsequent research motivation has been to understand the diverse clinical manifestations of oral inflammation in destructive and healing processes to offer better precision-dentistry. Dr Fábio's current research focus is on understanding the

different components of diabetes and metabolic syndrome, two conditions of alarming prevalence worldwide that lead to the deterioration of the oral cavity. One in three persons in Singapore is at risk of developing diabetes and metabolic diseases in their lifetime. By 2050, one million Singaporeans will be living with diabetes. Hence, it is important to understand non-communicable diseases, including the oral ones. The lack of deeper insights may necessitate dependency on daily medication for life. Otherwise, tooth loss, poor nutrition, amputation, blindness, dialysis, and even premature deaths may occur. The process incapacitates the diseased and affects the whole family. In the long term, Dr Fábio intends to continue exploring structural, behavioural and biological components of oral diseases by combining epidemiological, clinical, and laboratory models. 🌐

'Working at SingHealth Duke-NUS presents unique opportunities to combine electronic records, prime laboratory facilities, artificial intelligence, and big data expertise that can propel oral health care forward.'

'I look forward to getting to know the research community in Asia, and to forge collaborations on relevant research projects that benefit the population.'



WELCOMING NEW ORH ACP COLLEAGUES

Shining the Spotlight on the Relationship Between Oral Diseases and Lifestyle Habits

A/Prof Gustavo Nascimento

A/Prof Gustavo Nascimento joined NDCS as a Principal Investigator in September 2022. He earned his Doctor of Dental Surgery (DDS) degree in 2009 and his residency in Public Health and Family Dentistry in 2012. Both his dental and residency training included internships at the University of Illinois at Chicago College of Dentistry (USA).

Dr Gustavo's work experience comprises a post-doctoral position and an Assistant Professorship in Brazil, and a tenured Associate Professorship at Aarhus University (Denmark). During the tenure at Aarhus, his responsibilities included teaching and supervising undergraduate, Master's, and PhD students (30 Master's and 6 PhD supervisions).

Dr Gustavo has published more than 120 peer-reviewed articles and has been a reviewer for more than 60 international journals (including Lancet Regional Health – Southeast Asia, Journal of Clinical Periodontology, Journal of Dental Research). He recently joined the Editorial Board of Journal of Dental Research. Dr Gustavo collaborated with several universities worldwide (including Aarhus University [Denmark], ACTA [Netherlands], Karolinska Institute [Sweden]), and obtained more than SGD 1 million in grants. In 2019,



A/Prof Gustavo Nascimento photographed here with the Centennial Emerging Award by the International Association for Dental Research.


Dr Gustavo was awarded the Bagger-Sørensen Young Researcher Award, a prestigious Danish research prize, for his promising career as an oral health researcher. In 2020, he was awarded the Centennial Emerging Leader Award by the International Association for Dental Research (IADR), given his achievements and potential to develop and strengthen oral research.

Research Interests

Dr Gustavo's research focuses on diverse aspects of oral epidemiology, especially on the relationship between oral and systemic diseases, development

and application of causal inference approaches, collection and analysis of longitudinal data, and more recently, the role of oral inflammation in the senses of taste, smell, and food preferences.

Dr Gustavo's PhD thesis investigated the relationship between obesity and periodontal inflammation from an epidemiological perspective. He was a pioneer in the dental field in estimating the combined effect of life-course systemic inflammation (obesity) and unhealthy habits (smoking, high consumption of alcohol, and carbohydrates) on the risk of periodontitis using a causal inference analytical approach. This research has paved the way for a broader understanding of periodontitis as an inflammatory disease resulting from the accumulated effects of systemic inflammation induced by detrimental health behaviours over the life course. Dr Gustavo's PhD studies comprised a 1-year training at the University of Adelaide (Australia). He was awarded the best PhD thesis in Dentistry in 2016 by the Brazilian Ministry of Education.

Dr Gustavo is currently collaborating with the NDCS Periodontics unit, SingHealth, and Duke-NUS to explore the relationship between oral and systemic diseases. 

'Singapore offers a unique opportunity for dental researchers to explore the relevance of oral health in the context of health and health care. By evaluating current policies and generating new evidence, I aim to reinforce the fundamental contribution of oral health to achieving a healthy population. Thus, I hope to collaborate with colleagues across disciplines to strengthen oral health research in Singapore and improve oral health care at the individual and population levels.'

FY22 Grant and Award Recipients

FY2022 Grants and Recipients

Grant	Recipient
Clinician Scientist, Individual Research Grant, National Medical Research Council (NMRC) for the research on next generation, Artificial Intelligence (AI) based, bioactive devices for dental implants and cell regeneration	Dr Hemant Vijaykumar Unadkat, Clinician Scientist, NDCS, A/Prof Singhealth Duke-NUS ORH ACP

FY2022 Awards and Recipients

Award	Recipient
SGH 24th Annual Scientific Meeting – Best Poster Award – Basic Translational Research Category	Dr Charles Lau, Research Fellow, NDCS
SingHealth Publish! Award 2022	Dr Zayim Razina D/O Seeni Syed, Research Fellow I, NDCS
Singapore Health Quality Service Award	Star Category – 19 winners Gold Category – 25 winners Silver Category – 48 winners
World's Top 2% Most-cited Scientist (Stanford University)	<ol style="list-style-type: none"> 1. Prof Marco Peres, Director SOPI Lead, NDRIS, Senior Principal Investigator, ORH ACP, Director, Health Services Research, ORH ACP 2. A/Prof Karen Peres, Principal Investigator, ORH ACP 3. A/Prof Gustavo G. Nascimento, Principal Investigator, ORH ACP 4. A/Prof Jaya Seneviratne, Adjunct Principal Investigator, ORH ACP 5. CI A/Prof Yap U Jin Adrian, Adjunct Principal Investigator, ORH ACP

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